AGENDA

SPC ON UTILITIES AND CORPORATE SERVICES

April 18, 2018, 9:30 AM
IN THE COUNCIL CHAMBER
Members

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

1. CALL TO ORDER

2. OPENING REMARKS

3. CONFIRMATION OF AGENDA

4. CONFIRMATION OF MINUTES

   4.1 Minutes of the Regular Meeting of the SPC on Utilities and Corporate Services, 2018 March 14

5. CONSENT AGENDA
   (None)

6. POSTPONED REPORTS
   (including related/supplemental reports)

   (None)

7. ITEMS FROM OFFICERS, ADMINISTRATION AND COMMITTEES

   7.1 Corporate Environment, Health and Safety (EHS) Performance Report, UCS2018-0282

   7.2 Waste & Recycling Services Outlook for 2018 to 2025, UCS2018-0153

   7.3 The City of Calgary 2017 Infrastructure Status Report, UCS2018-0116

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 (Spruce Cliff) – Ward 08 File No. 3415 8 AV SW, UCS2018-0434
(Held confidential subject to Sections 23,24 and 25 of *FOIP*)

10.1.2 Summary of Real Estate Transactions for the Fourth Quarter 2017 (JH), UCS2018-0435
(Held confidential subject to Sections 23,24 and 25 of *FOIP*)

10.1.3 Proposed Approval of Expropriation (Alyth-Bonnybrook) – (Ward 09) File No. 1009 26 AV SE (DG), UCS2018-0468
(Held confidential subject to Sections 23,24 and 25 of *FOIP*)

10.1.4 Proposed Approval of Expropriation (Alyth-Bonnybrook) – Ward 09 File No. 1027 26 AV SE (DG), UCS2018-0469
(Held confidential subject to Sections 23,24 and 25 of *FOIP*)

10.2 URGENT BUSINESS

11. ADJOURNMENT

MINUTES

SPC ON UTILITIES AND CORPORATE SERVICES

March 14, 2018, 9:30 AM
IN THE COUNCIL CHAMBER

PRESENT:	Councillor W. Sutherland, Chair Councillor D. Colley-Urquhart Councillor D. Farrell Councillor J. Gondek Councillor S. Keating Councillor J. Magliocca Councillor J. Farkas
ALSO PRESENT:	City Manager J. Fielding Deputy City Manager B. Stevens Acting City Clerk D. Williams Legislative Assistant L. McDougall General Manager D. Duckwork

1. CALL TO ORDER

Councillor Sutherland called today's Meeting to order at 9:33 a.m.

2. OPENING REMARKS

Councillor Sutherland provided opening remarks at today's Meeting and introduced Mr. David Ducksworth, General Manager Utilities and Corporate Services, and welcomed him to his first Committee Meeting.

3. CONFIRMATION OF AGENDA

Moved by Councillor Demong

That the Agenda for the 2018 March 14 Regular Meeting of the SPC on Transportation and Transit be confirmed, **after amendment**, by adding an Item of Urgent Business, Closed Meeting, entitled "Green Line Update (Verbal), VR2018-0013".

MOTION CARRIED

4. CONFIRMATION OF MINUTES

4.1 Minutes of the Regular Meeting of SPC on Utilities and Corporate Services, 2018 February 14

Moved by Councillor Demong

That the Minutes if the 2018 February 14 Regular Meeting of the SPC on Utilities and Corporate Services be confirmed.

MOTION CARRIED

5. CONSENT AGENDA

5.1 Status of Outstanding Motions and Directions, UCS2018-0274

Moved by Councillor Colley-Urquhart

That the SPC on Utilities and Corporate Services receive this report for information.

MOTION CARRIED

6. POSTPONED REPORTS

None

7. ITEMS FROM OFFICERS, ADMINISTRATION AND COMMITTEES

7.1 Financial Plan 2019-2022 – Water and Wastewater Lines of Service, UCS2018-0223

A clerical correction was noted in the header on all 7 pages of Report UCS2018-0223, by deleting Item "#7.2" and by substituting Item number "#7.1"

A PowerPoint presentation entitled "Water and Wastewater Lines of Service Financial Plan 2019-2022", dated 2018 March 14 was distributed.

Moved by Councillor Keating

That subject to Section 6(1) of the Procedure Bylaw 35M2017, Committee suspends Sections 77, in order that Committee may ask questions of Administration and Debate with no time limit.

MOTION CARRIED

Moved by Councillor Demong

That the Standing Policy Committee on Utilities and Corporate Services recommends that Council approve the recommended financial plan policies, measures and targets for the Water and Wastewater lines of service for 2019 – 2022 as shown in Attachment 2.

And further, that Report UCS2018-0223 be forwarded as an item of Urgent Business to the 2018 March 19 Combined Meeting of Council.

MOTION CARRIED

7.2 Financial Plan 2019-2022 – Stormwater Management Line of Service, UCS2018-0230

A PowerPoint presentation, submitted by Administration, entitled “Stormwater Line of Service Financial Plan 2019-2022”, dated 2018 March 14.

Moved by Councillor Farrell

That the Standing Policy Committee on Utilities and Corporate Services recommends that Council approve the recommended financial plan policies, measures and targets for the Stormwater line of service for 2019-2022 as shown in Attachment 2.

And further, that Report UCS2018-0230 be forwarded as an item of Urgent Business to the 2018 March 19 Combined Meeting of Council.

MOTION CARRIED

7.3 Winter Green Cart Collection Schedule, UCS2018-0303

A PowerPoint presentation entitled "Winter Green Cart Collection Schedule", dated 2018 March 14 was distributed.

Moved by Councillor Demong

That the Standing Policy Committee on Utilities and Corporate Services direct Administration to:

1. Implement every-other-week green cart collection over the winter months (November to April) starting 2018 November; and
2. Return to the 2018 April 25 Strategic Session of Council with a Green Cart Program charge included as part of WRS' indicative rates and fees for 2019-2022.

And further, that Report UCS2018-0303 be forwarded as an item of Urgent Business to the 2018 March 19 Combined Meeting of Council.

MOTION CARRIED

7.4 Waste & Recycling Services Financial Plan 2019-2022, UCS2018-0150

A PowerPoint presentation entitled "Waste & Recycling Services Financial Transition Plan for the 2019-2022 Cycle", dated 2018 March 14 was distributed.

Moved by Councillor Demong

That Administration Recommendation 1 contained in Report UCS2018-0150, be approved as follows:

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

1. Return to the 2018 April 25 Strategic Session of Council, with indicative rates and fees for the 2019-2022 One Calgary service plans and budgets based on a one year transition plan for the Waste & Recycling Services' financial model; and

And further, that Report UCS2018-0150 be forwarded as an item of Urgent Business to the 2018 March 19 Combined Meeting of Council.

Against: Councillor Farkas

MOTION CARRIED

Moved by Councillor Demong

That Administration Recommendation 2 contained in Report UCS2018-0150, be approved as follows:

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

2. Include vacated tax support in the One Calgary service plans and budget discussions.

MOTION CARRIED

Moved by Councillor Keating

That subject to Section 6(1) of the Procedure Bylaw 35M2017, Committee suspends Sections 78 (2)(a), in order to complete today's Agenda.

MOTION CARRIED

8. ITEMS DIRECTLY TO COMMITTEE

8.1 REFERRED REPORTS

8.2 NOTICE(S) OF MOTION

9. URGENT BUSINESS

10. CONFIDENTIAL ITEMS

Moved by Councillor Farrell

That, in accordance with Section 197 of the Municipal Government Act and Sections 23, 24, 25 and 27 of the Freedom of Information and Protection of Privacy Act, the SPC on Utilities and Corporate Services now recess, at 11:56 p.m., to reconvene in Closed Meeting, in the Council Lounge, to discuss the following confidential matters:

10.1.1 Selling Prices For Road Rights of Way In Greenfield Areas File No: 2018 Sectotr Rates (JM), UCS2018-0264

10.1.2 Reserve Bids For Properties In The 2018 Tax Sale File No: 2018 Tax Sale (JM), UCS2018-0265

10.2.1 Green Line Update (Verbal), VR2013-0013

MOTION CARRIED

The SPC on Utilities and Corporate Services moved into Public Session at 12:34 p.m. with Councillor Sutherland in the Chair.

Moved by Councillor Keating

That the SPC on Utilities and Corporate Services rise and report.

MOTION CARRIED

10.1 ITEMS FROM OFFICERS, ADMINISTRATION AND COMMITTEES

10.1.1 SELLING PRICES FOR ROAD RIGHTS OF WAY IN GREENFIELD AREAS FILE NO: 2018 SECTOR RATES (JM), UCS2018-0264

The following members of Administration were in attendance in the Closed Meeting discussion with respect to Report UCS2018-0264:

Clerk: D.Williams; Presenter and Advice: T. Hayter, J. Moisan; Observer: D. Cassidy, I. Campbell, S. Alexander, S. Quayle, F. MacIntyre, S. Wheeler, E. Lee, S. McClurg, K. Stewart

Moved by Councillor Farrell

That with respect to Report UCS2018-0264, the following be approved:

That the SPC on Utilities and Corporate Services recommend that Council:

1. Approve Administration Recommendation 1 contained in the Report; and
2. Request the Recommendations, Report and Attachments remain confidential under Sections 23, 24 and 25 of the *Freedom of Information and Protection of Privacy Act,* until published in the Council Agenda.

3.

MOTION CARRIED

10.1.2 RESERVE BIDS FOR PROPERTIES IN THE 2018 TAX SALE FILE NO: 2018 TAX SALE (JM), UCS2018-0265

The following members of Administration were in attendance in the Closed Meeting discussion with respect to Report UCS2018-0265:

Clerk: D.Williams; Presenter and Advice: D. Cassidy, S. Quayle, F. MacIntyre; Observer: IT. Hayter, J. Moisan, Campbell, S. Alexander, S. Wheeler, E. Lee, S. McClurg, K. Stewart

Moved by Councillor Gondek

That with respect to Report UCS2018-0265, the following be approved:

That the SPC on Utilities and Corporate Services recommend that Council:

1. Approve Administration Recommendation 1 contained in the Report; and
2. Request the Recommendations, Report and Attachments remain confidential under Sections 23, 24 and 25 of the *Freedom of Information and Protection of Privacy Act,* until published in the Council Agenda.

MOTION CARRIED

10.2 URGENT BUSINESS

10.2.1 Green Line Update (Verbal), VR2018-0013

The following members of Administration were in attendance in the Closed Meeting discussion with respect to Report UCS2018-0265:

Clerk: D.Williams; Presenter and Advice: D. Cassidy, S. Quayle, F. MacIntyre Observer: IT. Hayter, J. Moisan, Campbell, S. Alexander, S. Wheeler, E. Lee, S. McClurg, K. Stewart

Moved by Councillor Keating

That with respect to Verbal Report, VR2018-0013 the following be approved:

That the SPC on Utilities and Corporate Services receive the Verbal Update for information and that the Closed Meeting discussions remain confidential under Sections 24 and 27 of the *Freedom of Information and Protection of Privacy Act.*

MOTION CARRIED

11. ADJOURNMENT

Moved by Councillor Demong

That this meeting adjourn at 12:36 p.m.

MOTION CARRIED

THE FOLLOWING ITEMS HAVE BEEN FORWARDED TO THE 2018 MARCH 19 COMBINED MEETING OF COUNCIL:

URGENT BUSINESS:

7.1 Financial Plan 2019-2022 – Water and Wastewater Lines of Service, UCS2018-0223

7.2 Financial Plan 2019-2022 – Stormwater Management Line of Service, UCS2018-0230

7.3 Winter Green Cart Collection Schedule, UCS2018-0303

7.4 Waste & Recycling Services Financial Plan 2019-2022, UCS2018-0150

THE FOLLOWING ITEMS HAS BEEN FORWARDED TO THE 2018 APRIL 05 COMBINED MEETING OF COUNCIL:

10.1.1 SELLING PRICES FOR ROAD RIGHTS OF WAY IN GREENFIELD AREAS FILE NO: 2018 SECTOR RATES (JM), UCS2018-0264

10.1.2 RESERVE BIDS FOR PROPERTIES IN THE 2018 TAX SALE FILE NO: 2018 TAX SALE (JM), UCS2018-0265

The next Regular Meeting of the SPC on Utilities and Corporate Services has been scheduled for 2018 April 18 at 9:30 a.m.

CONFIRMED BY COMMITTEE ON

CHAIR

ACTING CITY CLERK

Corporate Environment, Health and Safety (EHS) Performance Report

EXECUTIVE SUMMARY

The semi-annual Corporate Environment, Health & Safety (EHS) Performance Report is prepared by Environmental & Safety Management (ESM) in its capacity of providing governance and oversight for The City of Calgary's (The City's) EHS management systems and demonstrates The City's accountability for these responsibilities.

The number of work-related injuries and illnesses increased between 2016 and 2017, with cascading effects including reduced productivity and increasing Workers' Compensation Board (WCB) costs. Overall, The City's WCB Premiums are projected to rise in future years due to industry rate increases, increases in earnings, and increased claim costs.

Although corporate safety performance improved over the course of the year, The City did not meet its safety-related Action Plan targets for 2017 at year end. Corporate Total Recordable Injury Frequency (TRIF) and Lost Time Claims Frequency (LTCF) for 2017 were 10.5 and 5.0, respectively, exceeding their Action Plan targets of 8.9 and 3.5. Targeting the identification, reporting, and correcting of hazardous conditions and near misses is critical to preventing occupational injuries and illnesses and will be a continued focus of efforts in 2018.

The number of internally reported substance releases decreased slightly in 2017; however, the number of releases reported to Alberta Environment and Parks (AEP) remained relatively consistent. Compliance with the seven-day timeline for written report submission to AEP decreased from 97 per cent in 2016 to 85 per cent in 2017.

Environmental programs with specific Action Plan performance targets included in this report met their 2017 targets, including the Brownfield Program and the Environmental Risk and Liability program. Other environmental programs that are meeting program-level goals include Corporate Food and Yard Waste, ReTree YCC, and Waste in Public Spaces. The City's Cycling Strategy program is on track to meet its Council-set targets in future years. Corporate greenhouse gas (GHG) emissions are not on track to meet their 2020 target at this time, but are trending in the right direction. Overall, corporate performance continues to improve over time with significant achievements in 2017.

ADMINISTRATION RECOMMENDATION:

That the SPC on Utilities and Corporate Services receive this report for information.

PREVIOUS COUNCIL DIRECTION / POLICY

On 2009 March 25, the SPC on Utilities and Environment directed Administration to report semi-annually to Committee on corporate environment and safety performance, including audit results (UE2009-07).

BACKGROUND

The City's Action Plan for 2015 – 2018 has three priority areas which drive actions and outcomes related to corporate environmental and safety management: a well-run city, a healthy and green city, and a city of inspiring neighbourhoods. The City's Code of Conduct includes The City of Calgary's Environmental Policy and Occupational Health & Safety Policy. These policies establish a set of commitments outlining The City's intentions to manage environmental and

safety risks, fulfil compliance obligations, and continually improve performance. The City's environmental and occupational health and safety management systems support The City in fulfilling its policy commitments. Using a results-based accountability (RBA) approach encourages collaboration and evidence-based decision making to improve performance and manage risks. The RBA approach also provides a framework to demonstrate how The Corporation's performance contributes to higher level results and Council Priorities.

The previous Corporate EHS Performance Report (UCS2017-0688), delivered on 2017 September 15, provided information on specific elements of corporate EHS performance. Occupational health and safety information focused on The City's efforts related to hazard identification, safety communication, and incident investigation. Information on corporate environmental management focused on climate change adaptation, managing contamination risks on City-owned land, and waste diversion from City operations and City-owned public spaces.

The current Corporate EHS Performance Report provides updates on The City's occupational health and safety performance, management of contaminated sites, waste management, and corporate climate change programs. It also provides new information on additional environmental performance measures not included in the previous report, on topics such as food and yard waste collection, ReTree YYC plantings, and downtown bicycle trips.

INVESTIGATION: ALTERNATIVES AND ANALYSIS

Detailed information on corporate EHS management and performance in 2017 is included in Attachment 1. Upcoming sections provide an overview of that content.

Occupational Health and Safety Management and Performance

The report includes information on The City's Occupational Health and Safety Management System and Corporate Safety Strategy, as well as information on serious occupational health and safety incidents, compliance with Workers' Compensation Board reporting timelines, and recent legislative changes.

The City's Occupational, Health and Safety (OHS) Policy reinforces The City's commitment to provide a safe and healthy work environment for its employees. The City's OHS Management System establishes the standards, processes and programs to manage health and safety risks and continually improve safety performance.

Alberta Occupational Health and Safety (OHS) issued one stop work order to The City in 2017 related to an employee injury during unsafe conditions while working on a slope. Investigation reports on an additional five incidents were required by Alberta OHS in 2017.

Centralization of the Workers Compensation Board reporting function in early 2015 and the implementation of the Safety Data Management System in late 2015 contributed to improving The City's compliance with WCB reporting timelines. The Workers' Compensation Matters course is being offered to supervisors across The City to support compliance.

The City's TRIF and LTCF increased between 2016 and 2017. Although TRIF and LTCF decreased throughout the year, The City did not meet their respective Action Plan targets of 8.9 and 3.5 for 2017. TRIF was 10.5 and LCTF was 5.0. The most commonly reported immediate and underlying causes continue to be "failure to identify hazard" and "lack of knowledge/awareness". Preventing workplace injuries and illnesses requires continued focus in 2018. Key improvement areas include increasing awareness and reporting of workplace

Corporate Environment, Health and Safety (EHS) Performance Report

hazards; implementing controls on top safety hazards; improving health and safety competence for leaders, including continued development of the Safety Leadership Program; and increasing visibility of safety for employees through targeted communication strategies and tactics.

The average number of days lost per lost time claim was 23, above the Action Plan target of 19 days. Improvements are required in intentional incident management, including returning employees to work in accommodated positions. Although the percentage of employees that were provided an accommodation improved from 72% in 2016 to 76% in 2017, there continue to be challenges to accommodating employees. In order to reduce lost time and improve employee accommodation, efforts in 2018 will focus on improving supervisor understanding of the WCB process, and promoting the use of tools and services which help to expedite an employee's return to work.

The City's WCB Premiums were $20.7 million for 2017 and are projected to rise due to industry rate increases, increases in earnings, and increased claim costs.

Corporate Environmental Management and Performance

The City of Calgary's Environmental Policy provides direction for City business units to work together to fulfill environmental compliance obligations and continually improve performance. Environmental & Safety Management will be working with key partners over the course of 2018 to continue implementing and improving key components of The City's corporation-wide environmental management system.

Compliance with the seven-day timeline for written report submission to Alberta Environment and Parks for substance releases decreased from 97 per cent in 2016 to 85 per cent in 2017. This was partially due to changing reporting requirements and challenges maintaining staff awareness. The Corporate Substance Release Reporting Program is currently undergoing a major update which is expected to improve compliance with reporting timelines.

All nine ISO 14001-registered business units maintained their registrations in 2017. These business units undergo formal internal and external audits every year to assess conformance to the ISO 14001 standard, corporate environmental management standards, and the business unit's own management system requirements. The ISO 14001 standard was updated in 2015, with a compliance date of 2018 September 14. ISO 14001-registered business units have been working to transition to the new standard and it is anticipated that all will meet the compliance date.

The Corporation improved its environmental performance in 2017 through several key accomplishments, including: a reduction in corporate energy demand; expansion of food and yard waste diversion to all City-owned public facilities; an increase in the number of City contracts with environmental requirements; exceeding corporate targets for brownfield renewal; meeting Action Plan targets for environmental risk and liability assessment; improving submission success for Environmental Construction Operation Plans; the successful conclusion of the ReTree YYC program; an increase in the number of public spaces with recycling bins; and an all-time high in the number of daily bicycle trips downtown using The City's network of cycling tracks.

Several important milestones for environmental programs across The Corporation were achieved in 2017, including development of a Low Carbon Plan for Calgary and a Climate Change Adaptation Plan which will be presented to Council in June 2018; the Eco-Leaders Program was a 2017 finalist for the Alberta Emerald Award; the 4 Avenue Flyover: A Little Lost

Corporate Environment, Health and Safety (EHS) Performance Report

Space Project was a 2017 finalist for the Canadian Brownfield Network Brownie Award; a Calgary River Access Strategy was presented to Council in early 2017; Calgary Parks expanded The City's naturalization program to cover 32 hectares of habitat improvements; expansion of the goat-grazing program to control invasive weeds; expansion of the Beet 55 pilot trial for Cycle Track maintenance; and approval of Municipal Right of Way Bylaw 17M2016 which will hold utility providers to the same environmental standards as City contractors when working on City-owned property.

Stakeholder Engagement, Research and Communication

ESM partners with subject matter experts across The Corporation and continues to monitor and report on EHS management and performance, and to develop and improve environmental and safety data sources and systems. This includes the online safety reporting system. Improved data capabilities are enhancing decision-making and planning regarding corporate environmental and safety management.

Strategic Alignment

This report supports Council's priority of a well-run city and aligns to the following actions of Action Plan 2015 – 2018:

- W2.3: Measure, benchmark, and report our performance to drive continuous improvement and support decision making.
- W6.2: Use tools such as management systems and auditing to minimize environmental, health and safety (EHS) risks.
- W8.2: Collaborate across the organization to deliver risk based programs and services that align with budgets and resources.

Social, Environmental, Economic (External)

The semi-annual Corporate EHS Performance Report demonstrates The City's accountability for its environmental and safety performance in support of Council's priorities of a well-run city, a healthy and green city, and a city of inspiring neighbourhoods. Corporate performance related to health and safety supports The City of Calgary's reputation as a healthy, safe, and desirable place to work.

Financial Capacity

Current and Future Operating Budget:

There are no operating budget impacts associated with the preparation and distribution of this report or ongoing performance reporting.

Current and Future Capital Budget:

There are no capital budget impacts associated with the preparation and distribution of this report or ongoing performance reporting.

Risk Assessment

The City's environmental and occupational health and safety management systems take a risk-based approach to managing performance. The City has controls in place and improvement

activities planned to manage EHS risks. Strategies and actions implemented to manage EHS risk and/or improve EHS performance are regularly monitored and reported.

REASON(S) FOR RECOMMENDATION(S):

This report provides the Committee with information on corporate environmental and safety performance.

ATTACHMENT(S)

1. Attachment 1 – Corporate Environment, Health and Safety (EHS) Performance Report

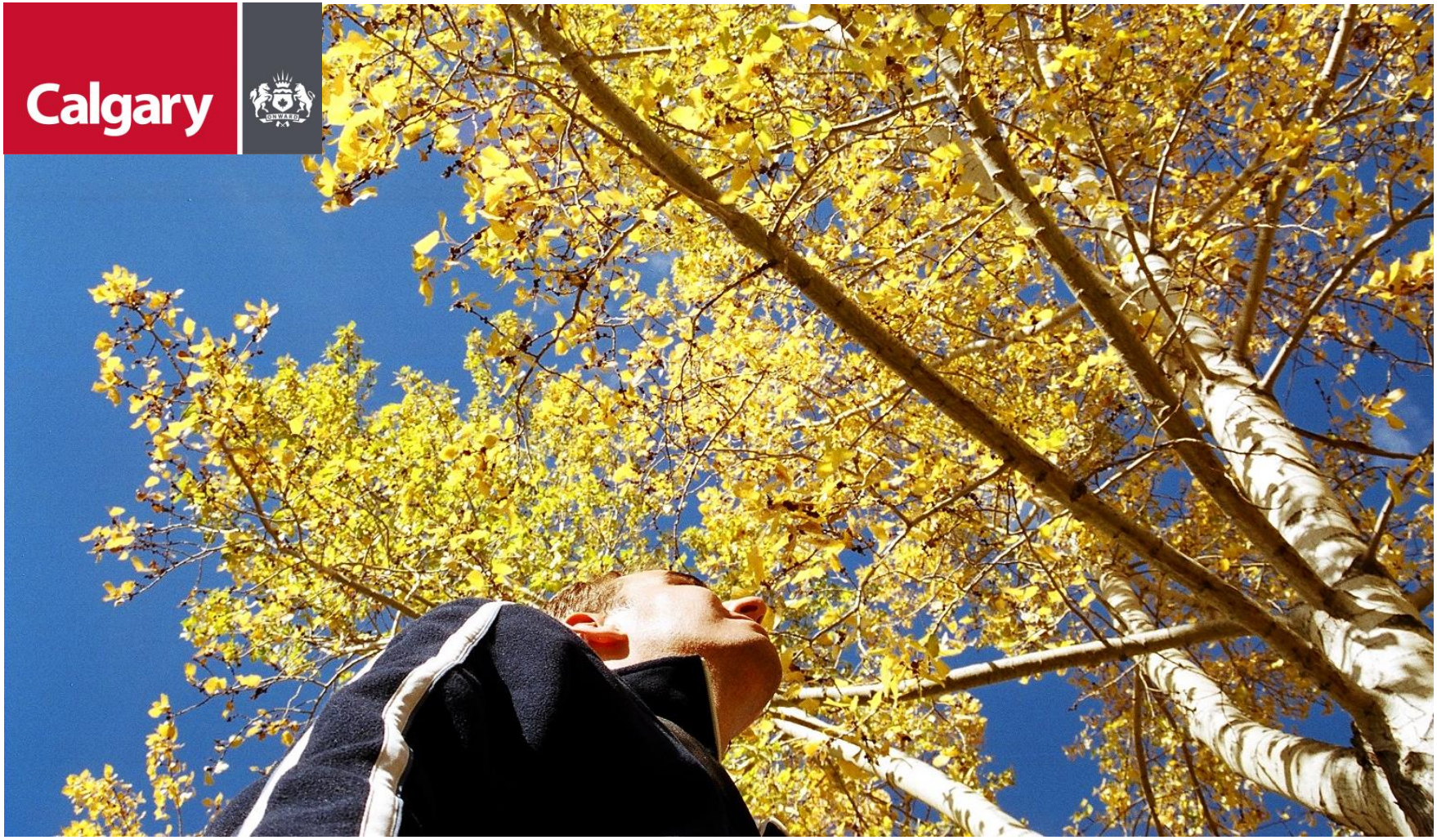


Photo credit: S. Hooper. 2011. Original photo. (License https://creativecommons.org/licenses/by/2.0/legalcode)

Corporate Environment, Health and Safety (EHS) Performance Report

April 18, 2018

Table of Contents

1 Introduction

The City of Calgary (The City) is committed to its corporate responsibilities related to environmental stewardship and a safe and healthy work environment. To demonstrate accountability for these responsibilities, The City reports semi-annually on specific indicators of environmental, health and safety performance.

The City's Action Plan for 2015 – 2018 has three priority areas which drive actions and outcomes related to corporate environmental and safety management: a well-run city, a health and green city, and a city of inspiring neighbourhoods. The City's Code of Conduct includes The City of Calgary's Environmental Policy and Occupational Health & Safety Policy. These policies establish a set of commitments outlining The City's intentions to manage environmental and safety risks, fulfil compliance obligations, and continually improve performance.

The City's environmental and occupational health and safety management systems support The City in fulfilling its policy commitments. Through the processes established within the systems, environmental and safety considerations are integrated into The City's day-to-day activities and longer-term strategic plans.

Photo credit: User abdallahh, Flickr. 2010. Original photo. (License https://creativecommons.org/licenses/by/2.0/legalcode)

In keeping with corporate direction, the results-based accountability (RBA) approach has been increasingly incorporated into corporate environmental and safety management, encouraging collaboration and evidence-based decision-making to improve performance and manage risks. The RBA approach also supports environmental and safety reporting by providing a framework to demonstrate how The Corporation's performance contributes to higher level results and Council Priorities.

2 Occupational Health and Safety Management and Performance

The City's Occupational, Health and Safety (OHS) Policy reinforces The City's commitment to provide a safe and healthy work environment for its employees. The City's OHS Management System establishes the standards, processes, and programs to manage health and safety risks and continually improve safety performance. Within the OHS Management System, The City has a Corporate Safety Strategy that identifies opportunities to strengthen corporate safety culture and improve safety performance. The strategy was approved by the Administrative Leadership Team for the 2014 to 2018 period and focuses on five result areas: safety culture, leadership, governance, programs and services, and evaluation and measurement. Successes and challenges of strategy implementation will be reviewed in 2018 to inform the development of a strengthened approach for 2019 and beyond. The future strategy will also integrate and align with the 4Cs behaviours, the Corporate Strategic Plan and One Calgary, changes to legislation, corporate learning programs, and new and existing corporate safety programs and initiatives.

Occupational health and safety incidents

Alberta Occupational Health and Safety (OHS) issued one stop work order to The City in 2017:

- On 2017 June 06, a Calgary Parks employee was transported to hospital with temporary partial paralysis after slipping and falling down a slope onto some boulders. Upon arrival at the scene, Alberta OHS issued a stop work order to allow initiation of an investigation. The stop work order was lifted shortly thereafter; however, Alberta OHS issued a Demand for further information and records. Calgary Parks complied with the Demand and no further action has been requested by the regulator. Corrective actions include the development of a safe work procedure for the work being completed during the incident, and improved training on field-level hazard assessments.

The following incidents were also reported to Alberta OHS in 2017. In all cases, Alberta OHS issued a Demand for The City to complete an investigation and provide them with a copy of the investigation report. The City has complied with each Alberta OHS Demand and no further actions have been requested by the regulator.

- On 2017 April 03, a Roads employee drove a piece of equipment off the road, causing the equipment to roll onto its side and into a pond, submerging half of the equipment. The employee was not injured in the roll-over. Corrective actions include refresher training on equipment operation.

- On 2017 September 03, Calgary Transit Peace Officers encountered a citizen consuming an unknown drug substance at a Light Rail Transit (LRT) station after hours. Within minutes of the encounter, one of the officers became seriously ill due to exposure to the drug substance. The Calgary Police Service, Calgary Fire Department, and Emergency Medical Services attended the scene and the officer was taken to hospital. Calgary Transit is participating in the corporate response to opioid hazards and has purchased personal protection kits including Narcan®, masks, gloves, barrier goggles, and alcohol wipes. In addition, the Calgary Police Service provided information sessions to all Calgary Transit operational teams in 2017.

- On 2017 September 07, a Calgary Recreation employee sustained a head injury after falling from a ladder. The employee was transported to hospital. Corrective actions include a review of position-based hazard assessments, creation of a field-level hazard assessment tool, and review of safe ladder use with staff.

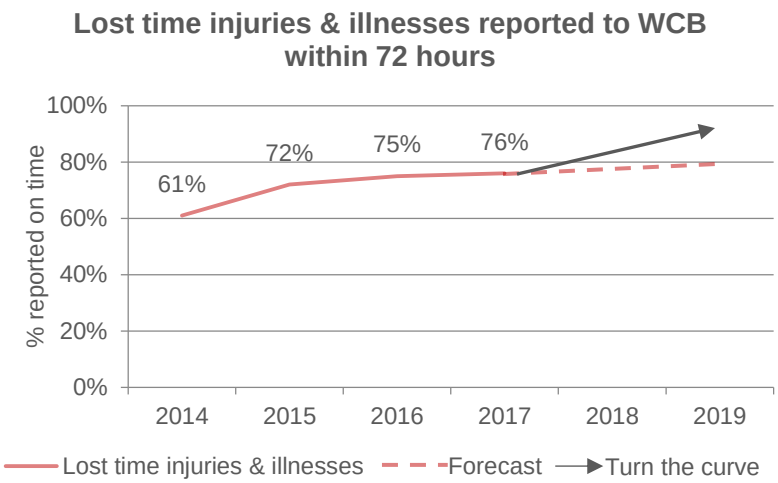
- On 2017 November 14, a welding incident at a Fleet Services facility resulted in a small explosion within an in-floor hoist vault, followed by a small fire above the vault opening. The incident resulted in minor property damage. No injuries resulted from the incident. Corrective actions include process and documentation improvements, and training for employees and supervisors.

- On 2017 December 05, a Calgary Transit employee fell after missing a step on an outdoor stairway. The incident resulted in a knee injury requiring surgery. Calgary Transit has reviewed the safety of the stairway and no infrastructure changes are required. The employee was provided with coaching to avoid distractions while walking and navigating stairways.

Workers' Compensation Board (WCB) reporting

Lost time injuries and illnesses must be reported to the Workers' Compensation Board (WCB) within 72 hours of the employer receiving notification that the incident has resulted in lost time or medical treatment being sought. Increasing supervisor understanding of WCB processes will be key to further improving compliance in 2018 and beyond. The Workers' Compensation Matters course is being offered to supervisors across The City to support compliance.

In 2017, Calgary Transit passed an audit conducted by the WCB to determine compliance with four legislative requirements related to reporting and provision of timely and accurate information.



Changes to the Occupational Health and Safety Act Workers' Com

Bill 30: An Act to Protect the Health and Well-Being of Working Albertans received F amendments to Alberta's *Occupational Health and Safety Act* and *Workers' Compensation Act*. All business units and employees will be affected by the amendments. Most of the amendments come into force on 2018 June 01. Environmental & Safety Management is working with key partners including Law, Finance, Human Resources, Supply, and Corporate Security to understand the implications for The Corporation and support business units in complying with the changes.

Preventing workplace injuries and illnesses The City's Occupational Health and Safety Policy outlines The City's commitment to providing a safe and healthy work environment for its employees. The Policy also sets out expectations for employees to contribute to a safe and healthy work environment as a shared responsibility. Through the implementation of the Corporate Safety Strategy, The City aims to continually improve its occupational health and safety performance. Protecting the health and safety of employees aligns with Council Priority to be a "Well-run City".

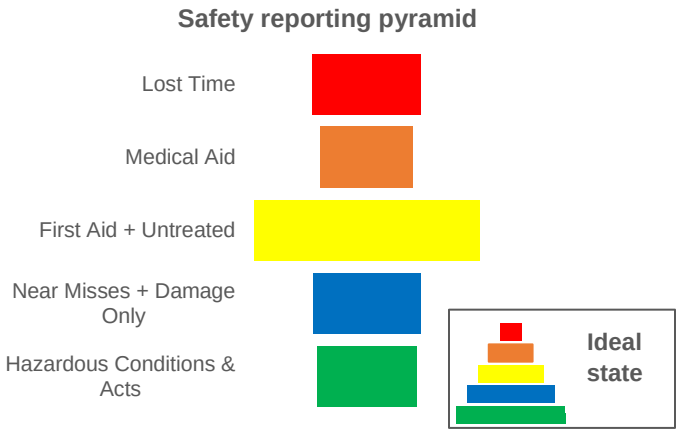
Customers

Leaders, managers, and operational and administrative employees
Health, safety and wellness risk owners, Administrative Leadership Team (ALT).

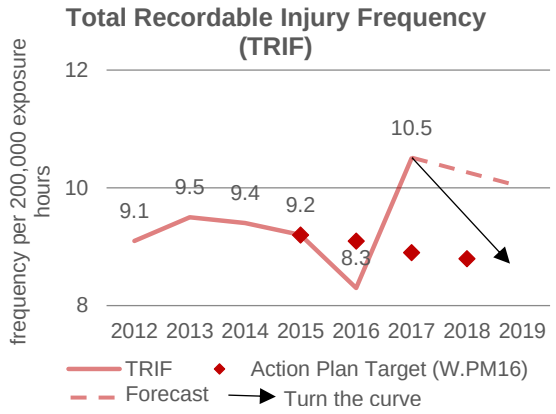
Key partners

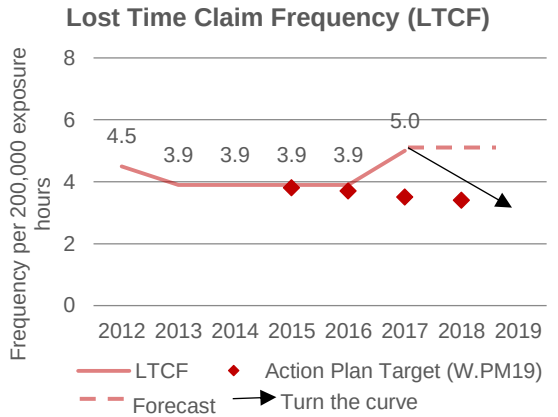
Senior Safety Committee, business unit safety contacts, Human Resources, Facility Management, Corporate Security, Supply Management, Law, Fleet Services, Corporate Analytics & Innovation.

How are we doing?



Identifying, reporting, and correcting hazardous conditions and near misses is critical to preventing occupational injuries and illnesses. The percentage of all reported incidents that were hazardous conditions or near misses decreased from 39% in 2016 to 32% in 2017. In an ideal state, at least 90% of The City's reported incidents should be hazardous conditions or near-misses, which can then be proactively controlled before they result in injuries or illnesses.





The City's Total Recordable Injury Frequency (TRIF) increased from 8.3 at the end of 2016 to 12.8 at the end of Q1 2017. **While TRIF decreased quarterly throughout 2017 (Q4 TRIF was 9.0), the overall TRIF for 2017 was 10.5, exceeding the Action Plan target of 8.9 (W.PM16).** Similarly, The Corporation's LTCF increased from 3.9 at the end of 2016 to 6.0 at the end of Q1 2017. **LTCF also decreased throughout 2017 (Q4 LTCF was 4.2); however, the overall LTCF for 2017 was 5.0, exceeding the Action Plan target of 3.5 (W.PM16).** Although there were fewer medical aid incidents in 2017 than 2016, the number of lost time claims increased by 28%. Recordable incidents continue to be primarily related to slips, trips, and falls; overexertion; and body positioning. **The most commonly reported immediate and underlying causes continue to be 'failure to identify hazard' and 'lack of knowledge/awareness'.**

Sample of key accomplishments in 2017

- Implemented the corporate-wide safety dashboard in Q3 2017. The dashboard provides a real-time view of safety performance. It includes incident and injury measures, but also shifts the focus to proactive safety actions by including measures such as hazardous condition identification, safety meetings, and inspections.
- Rolled-out safety reporting notepads for employees that do not have regular access to the online safety reporting system.
- In response to a large increase in slips injuries in early 2017, implemented an initiative to encourage use of ice cleats, which included making these easily available to staff.

Moving forward

- Increase communication and employee awareness of workplace safety hazards through regular safety meetings, shared incident learnings, regular review of position-based hazard assessments, and field-level hazard assessments.
- Continue promoting Health and Safety competency development for leaders, including The City's Leading Health and Wellness course. Begin integrating safety competency requirements into leader development plans.
- Continue developing the Safety Leadership Program, including development of four e-learning modules for leaders (safety leadership, incident investigation, hazard assessment and workplace inspection).
- Increase the visibility of safety for employees through improved communication strategies and tactics.

Managing workplace injuries and illnesses Intentional incident management includes supporting employees in seeking timely medical treatment after a work-related injury, and supporting them through Workers' Compensation Board (WCB) and return to work processes to reduce the amount of time the employee loses from work. Incident management also includes thorough and timely incident investigations, which are critical to understanding causes and developing appropriate corrective actions and strategies.

Customers

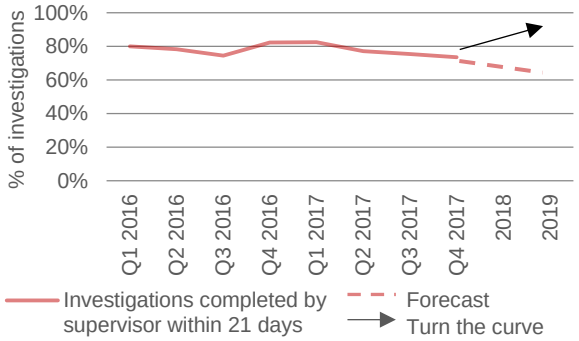
Leaders, managers, and operational and administrative employees
Health, safety and wellness risk owners, Administrative Leadership Team (ALT), Council.

Key partners

All business units, including Human Resources, City leaders and managers.
Workers' Compensation Board (WCB), industry partners.

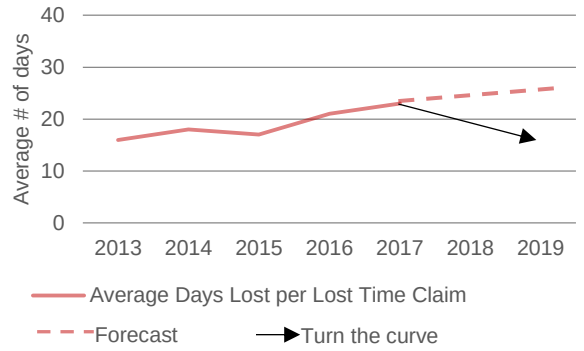
How are we doing?

Percentage of investigations completed within 21 days



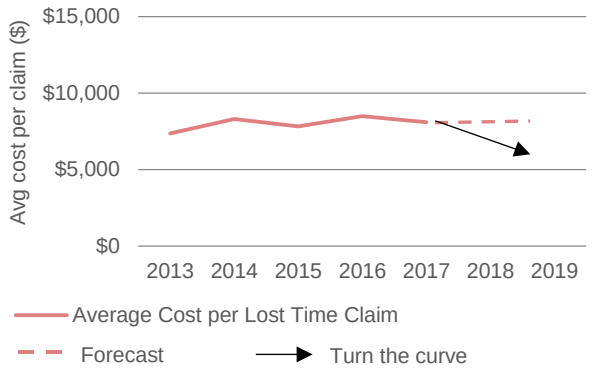
It is important to complete incident investigations and implement corrective actions in a timely manner to prevent similar incidents from occurring in the future. Addressing incidents in a timely manner also demonstrates the importance of safety to employees, contributing to a stronger safety culture. Industry standard suggests that most incident investigations should be completed within 21 days, although investigations of serious incidents may take longer. **In 2017, 77% of investigations were completed by supervisors within 21 days.**

Days lost due to work-related incidents



In 2017 the average number of days lost per lost time claim was 23, above the Action Plan target of 19 days (W.PM18). Injury severity was only a minor factor in days lost for 2017. A gap in intentional incident management is contributing to the increase, as well as challenges returning employees to work in accommodated positions. In 2017**, 76% of employees that could be accommodated (based on medical clearance) were provided with an accommodation.** Although this is an improvement over 2016 (72%), identifying accommodation opportunities in a timely manner continues to be a challenge.

Lost time claim costs



The Corporation's average lost time claim incident costs increased to $5.8 million in 2017 from $4.0 million in 2016 due to the increase in lost time claims and delays in providing suitable accommodation. Lost time claim costs directly impact WCB premiums for future years. **The City's WCB Premiums were $20.7 million for 2017 and are projected to rise due to industry rate increases, increases in earnings, and increased claim costs.** Amendments to the Workers' Compensation Act will likely result in a further increase to premiums over time.

Sample of key accomplishments in 2017

- Initiated 'incident scrums' with injured employees to better understand incident causes and identify opportunities to improve the incident management process.
- Promoted use of Occupational Injury Service (OIS) Clinics. These clinics provide expedited services for occupational injuries, reducing delays in employees receiving medical assessment and treatment. Use of the clinics supports faster adjudication of WCB claims and more timely accommodation.
- Human Resources updated the job demands analysis form. Completion of the forms is being prioritized for high-risk positions. The forms assist business units and physicians to understand the physical and cognitive demands of a position, allowing them to more appropriately apply work restrictions and return employees to work sooner.

Moving forward

- Continue promoting the Workers' Compensation Matters course to provide leaders with an understanding of the WCB process and provide them with the knowledge required to support workers during the return to work process.
- The percentage of reported incidents with immediate and underlying causes recorded in the online reporting system has been continually improving, seeing an increase from 44% in 2016 to 62% in 2017. For 2018, safety advisors will be supporting leaders across The City to improve the quality of the causal analyses being conducted to better understand root causes and develop appropriate corrective actions and strategies.

3 Corporate Environmental Management and Performance

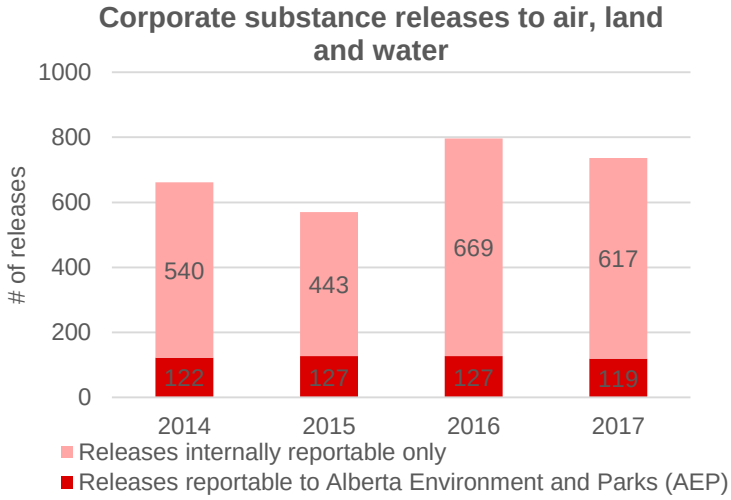
The City of Calgary's Environmental Policy provides direction for City business units to work together to fulfill environmental compliance obligations and continually improve performance. Environmental management at The City is currently focused at the business unit level with nine business units formally registered to the ISO 14001 standard for environmental management systems. In 2017, the ALT endorsed a renewed corporate-wide environmental management system that includes all The City's service lines. A corporate-wide system will enable The City to work across organizational lines to manage environmental risks and take advantage of opportunities for efficiency and collaboration. Within the corporate-wide system, business units with higher environmental operating risks will continue to maintain registrations to the ISO 14001 standard. Environmental & Safety Management (ESM) will be working with key partners over the course of 2018 to implement and improve key components of the developing corporate-wide environmental management system.

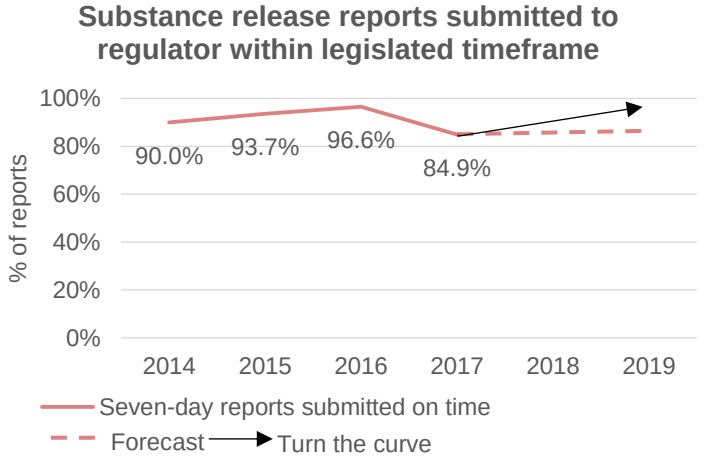
Environmental incidents

The Corporate Substance Release Reporting Program requires that City substance releases be reported to 311. The City encourages internal reporting of all substance releases. Substance releases that exceed established thresholds and those that may cause an adverse effect on the environment or human health must also be reported to Alberta Environment & Parks (AEP). The number of internally reported releases decreased slightly in 2017. The relatively higher number of internally reported releases in 2016 and 2017 are attributed to increased employee awareness of internal reporting requirements and processes. The number of releases reportable to the provincial regulator decreased slightly in 2017, but has remained relatively stable since 2014.

In 2017, the primary causes of the substance releases reportable to AEP were equipment hose/line failure, vehicle leaks and accidents, sanitary system blockage or backup, water main breaks, and human error. Accordingly, the most common substances involved in these AEP-reportable releases were hydraulic oil and other vehicle fluids, chlorinated water, and sewage.

A written report must be submitted to AEP within seven days of notifying them (by telephone) of a reportable release. **Compliance with the seven-day timeline for written report submission decreased in 2018**, partially due to challenges clearly communicating requirements to staff. The Corporate Substance Release Reporting Program is currently undergoing a major update. Improvements are focused on incorporating newly updated provincial regulations, providing clear and reasonable guidance to employees, streamlining the reporting process, and improving data analysis capabilities. The updated program is expected to improve compliance with reporting timelines.





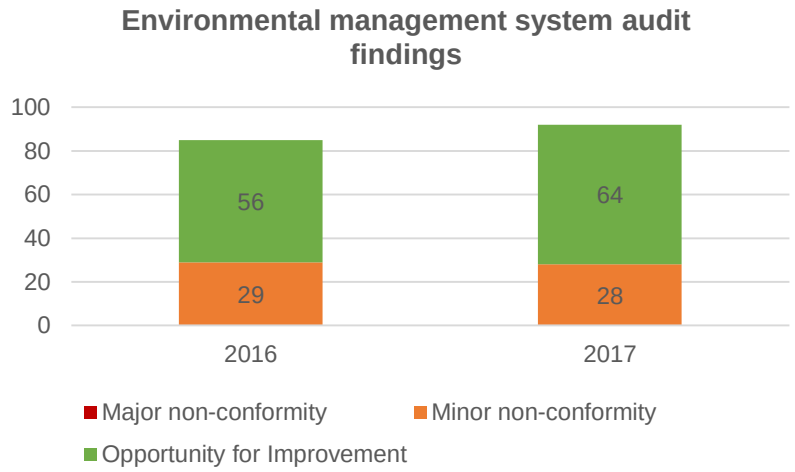
Internal and External Environmental Audits

Nine business units maintained ISO 14001 registrations in 2017: Fleet Services, Calgary Parks, Calgary Recreation, Waste & Recycling Services, Water Services, Water Resources, Calgary Transit, Roads, and Transportation Infrastructure. These business units undergo formal internal and external audits every year to assess conformance to the ISO 14001 standard, corporate environmental management standards, and the business unit's own management system requirements. Internal audits also assess compliance with environmental legislation. While Supply Management, Calgary Fire Department, and Calgary Police Service no longer register to the ISO 14001 standard, they continue to maintain their environmental management systems and underwent internal environmental audits in 2017.

Internal environmental audits identified two medium-risk non-compliance findings in 2017. The findings were related to waste management and substance release reporting. The Internal Environmental Audit Program underwent a major update in mid-2017, including a shift towards risk-based auditing. Risk-based internal auditing is expected to drive a more in-depth evaluation of compliance in 2018 and beyond.

The ISO 14001 standard was updated in 2015, with a compliance date of 2018 September 14. ISO 14001-registered business units have been working to transition to the new standard. In July 2017, Roads became the first business unit to successfully re-register to the updated standard with Waste & Recycling Services successfully re-registering in September 2017. The remaining seven business units will re-register in 2018.

In 2017, the internal and external environmental audits did not identify any major management system non-conformities. A total of 28 minor management system non-conformities and 64 opportunities for improvement were identified. Findings related to the management system were primarily related to environmental aspects identification and assessment, training, and maintenance of management system documentation and records. Findings related to environmental performance were primarily related to emergency preparedness and response, chemical and fuel storage, and substance release reporting.



Improving corporate environmental performance is a key commitment under The City of Calgary's Environmental Policy. We work together to conserve, protect, and enhance the environment by complying with legislation, conserving our resources, and preventing pollution. This is an important part of being a responsible environmental steward, including The City's commitment to mitigating and adapting to climate change. Improving our corporate environmental performance is also a key component of building a resilient city.

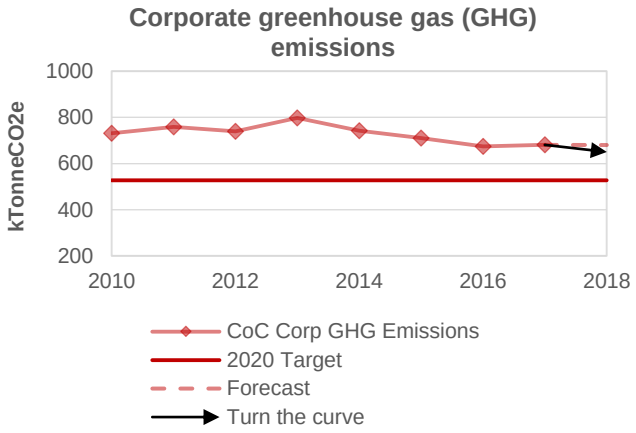
Customers

Environmental policy owners, environmental management system stewards, customers of environmental programs, cross-departmental environmental working groups, business unit environmental subject matter experts, third party vendors, Council, Administrative Leadership Team (ALT), and citizens.

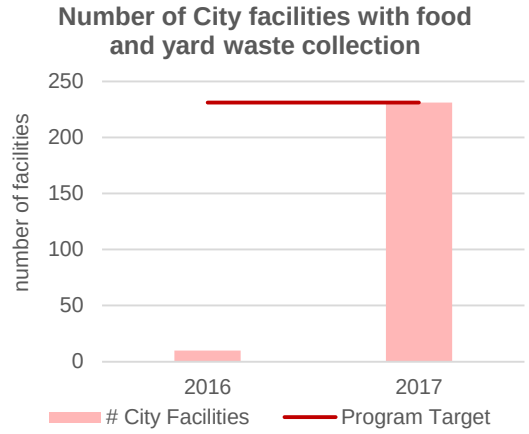
Key partners

Internal: Utilities & Environmental Protection, Planning & Development, Transportation Department, Calgary Parks, Supply Management, Law, and Facility Management.
External: Transportation experts, waste experts, academia, non-profits, consultants, businesses.

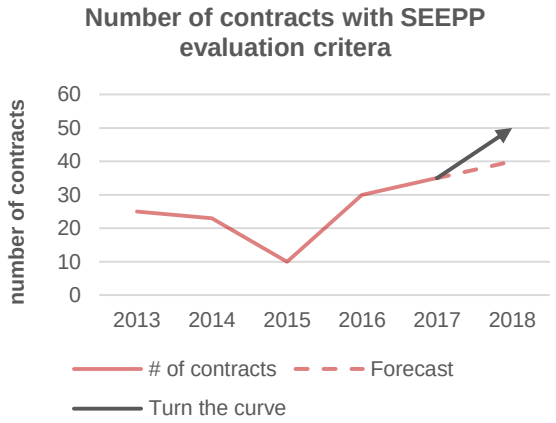
How are we doing?



The City reduced its energy consumption and resulting greenhouse gas (GHG) emissions between 2013 and 2017 through a number of initiatives. For example, energy efficiency projects and building-scale renewable energy have decreased the demand for electricity from the provincial grid. The majority of the rise in GHG emissions between 2016 and 2017 is attributable to the cold winter, which drives more consumption of natural gas for building heating. Corporate GHG emissions comprise approximately four per cent of city-wide GHG emissions.



The objective of the Food and Yard Waste Corporate rollout project was to provide food and yard waste diversion at all City facilities and for all City employees to help The City meet the Council-approved Industrial, Commercial, Institutional (ICI) waste diversion target of 75% for corporate facilities. In 2017, the project expanded access to food and yard waste diversion from 10 City-owned buildings to **all staffed buildings and City-owned public facilities with food amenities, for a total of 231 buildings.**



The Council-approved Sustainable Environmental and Ethical Procurement Policy (SEEPP) provides a framework for decision-making on procurement that reflects The City's commitment to sustainability. Since 2015, the number of bid documents developed with vendor sustainability practices or environmental **requirements for products has steadily increased. This trend continued in 2017 through consistent collaboration and cooperation of purchasing business units, such as piloting sustainability criteria in Fleet contracts.**

Sample of key accomplishments in 2017

- In 2016 and 2017, The City replaced just under 78,000 high pressure sodium street lighting with LED luminaires, and modernized our buildings through LED retrofits and building upgrades. The City has also invested in renewable energy at our facilities, including 2.9 MW of solar PV systems on City facilities. Additional GHG reduction projects included a 4MW gas turbine in their combined heat-and-power plant, allowing it to utilize all of the biogas that is generated by the wastewater with the potential to reduce GHG emissions by about 40,000 tonnes CO2e per year; the new Composting Facility is diverting organic material away from landfill where it would otherwise decompose into methane with the potential to GHG emissions from landfill by 11,5000 tonnes CO2e per year; transit has ordered 30 new Compressed-Natural-Gas (CNG) buses that can use Renewable Natural Gas (RNG) that is generated from organic waste sources with the potential to reduce GHG emissions by about 90 tonnes CO2e per year, per bus (an 86% reduction).
- All City-owned buildings now offer Food and Yard Waste collection, providing diversion opportunities to all City employees. Efforts in 2017 by the Corporate Food and Yard Waste program included thousands of signage updates (5000+); the addition of 900 indoor and 217 outdoor food and yard waste bins; and 107 dumpsters and 110 green carts for use by City maintenance staff. The project team in partnership with Supply also completed a compostable bag RFP which allows all City property managers to take advantage of corporate pricing on compostable bags which are significantly more affordable than the prices that were being charged by individual contractors. Under this program, The City will use approximately 300,000 certified compostable bags per year.
- Contracts awarded in 2017 with embedded environmental considerations included the following: workstations for a 9-1-1 Communications Centre with Greenguard indoor air quality requirements; a Desktop Managed Services (IT) contract with a mandatory requirement for providing EPEAT (Electronic Product Environmental Assessment Tool) and ENERGY STAR ratings for each device proposed; a cross-corporate coffee services contract that eliminated Styrofoam, encouraged bulk drip coffee machines (which reduce waste), and required eco-label options for coffee; and a large-scale janitorial paper contract resulting in purchases of ECOLOGO certified and 100% recycled content paper towels, demonstrating The City's commitment to reduce lifecycle costs and reduce waste/conserve natural resources. For example, the janitorial paper contract will save almost 2200 trees, over 8.2 Million L of water, and almost 270 kg of CO2 emissions.

Moving forward

- Several green energy and energy efficiency projects are on the horizon for The City under the Energy Management Office's Corporate Energy Plan for 2016-2026. For example, in early 2018 the City's Energy Management Office will partner with Waste & Recycling Services to complete a 1MW solar array project adjacent to the new Compost Facility to offset the facility's energy use.
- The Corporate Food and Yard Waste project team will continue to engage and support City property managers to ensure best practice is used throughout their facilities. The team will be working with Supply to provide all the necessary garbage, recycling, organic waste bins and signs in City Stores. This will make it easier and more affordable for property managers to access the infrastructure necessary to follow waste diversion best practice in addition to improving consistency across City facilities.
- An Energy Audit Program to identify opportunities to reduce energy consumption, energy costs, and GHG emissions for Water and Wastewater Systems was initiated in 2016 through Water's Energy Management Strategy. By November 2017, the energy audit projects at Glenmore Water Treatment Plant (WTP), Bearspaw WTP, and eight secondary pump stations in the potable water system were completed. An energy audit project also began at Pine Creek Wastewater Treatment Plant (WWTP) in December 2017 and is expected to be completed in Q3 2018. The projects established baselines of energy consumption and GHG emissions by facility, identified reduction opportunities, and estimated cost savings for energy efficiency measures in terms of payback years. Implementation of the audit programs' recommendations may reduce the City's GHG emissions by more than 2,000 tonnes CO_2e per year.

Supporting internal customers means working collaboratively to reduce the environmental impact of capital projects, public services and infrastructure in support of The City's commitment to lead by example and inspire actions to conserve, protect, and enhance the environment for all Calgarians. Through internal support programs, The City will integrate environmental principles and performance objectives into all decision-making processes to enhance environmental sustainability for present and future generations.

Customers

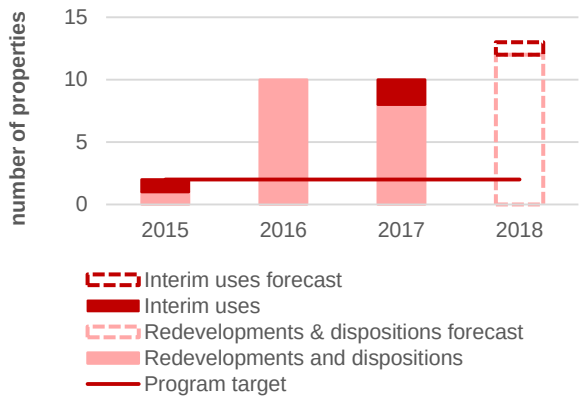
City land stewards (Transportation Infrastructure, Roads, Parks, Recreation, Transit, Waste & Recycling, Water Resources, Fire Services, Facilities Management); Real Estate & Development Services, City site operators, City project managers, telecommunication companies, utility providers, contractors, and citizens.

Key partners

Internal: Internal stakeholders (Sustainability Strategies, Transportation Planning), land stewards, Planning & Development, Law, Finance, Real Estate & Development Services, Facility Management, Corporate Analytics & Innovation, Urban Forestry, Water Resources.
External: Consultants, community members and citizens, Community Associations, non-profit groups, Federation of Canadian Municipalities, regulatory authorities (Alberta Environment & Parks, Alberta Health Services, Alberta Energy Regulator).

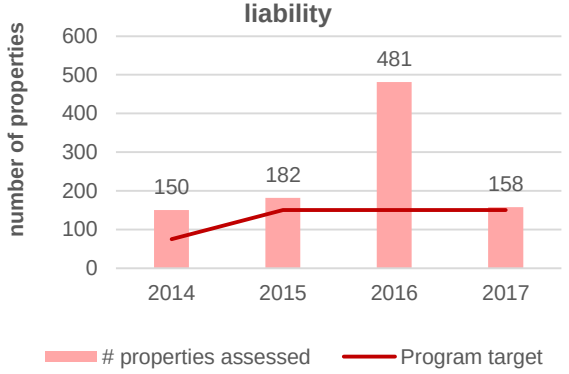
How are we doing?

Number of City-owned brownfields returned to community use



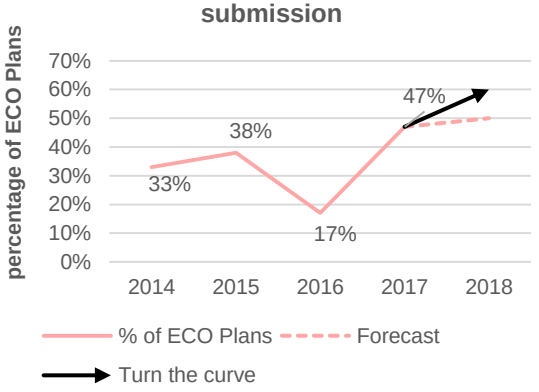
The Brownfield Program facilitates interim uses for underutilized City-owned brownfield sites, and reports on corporate-wide achievements in brownfield redevelopments and dispositions. The overall corporate-wide target from the Action Plan is two brownfield redevelopments, interim-uses or dispositions per year for 2015-2018. The program itself focuses on finding temporary, active uses for brownfield sites prior to redevelopment (interim uses). **In 2017, there was one interim-use project; two redevelopments through City capital projects; and seven brownfield dispositions.** In 2018, it is forecast that the program will exceed its program targets for this business cycle, with an additional 12 redevelopments and dispositions, and one additional program-supported interim use project.

City-owned properties assessed for potential environmental risk & liability



The Environmental Risk and Liability (ERL) Program provides services that reduce unacceptable risks on contaminated sites to an acceptable risk level by: identifying contaminated sites; assessing the extent of contamination; and managing the contamination to reduce risk. The number of sites assessed each year is dependent on the complexity of the sites assessed, the nature of environmental risks identified, and the number of City land transactions and capital projects. The City has an Action Plan target for 2015-2018 to assess 150 sites per year. **In 2017, 158 sites were assessed, meeting the Action Plan target.** In addition, the ERL program managed 34 contaminated sites, and will provide recommendations for 3 newly identified contaminated sites, reducing The City's liability risk.

ECO Plans approved or conditionally approved on first submission



The City's Environmental Construction Operations (ECO) Plan program aims to mitigate environmental risks associated with The City's capital construction projects by setting out the conditions and parameters for environmental awareness, mitigation, and due diligence. In 2017, considerable effort was put into increasing the number of submissions that met program requirements at first submission to reduce the cost of plan submission and potential project delays for The City's capital projects. **Of the 75 ECO Plan projects initiated in 2017, 47% of the submissions met program requirements on first submission.** This is up from only 17% the previous year, and partially due to an improved submission process through the use of an online electronic ECO Plan template.

Sample of key accomplishments in 2017

- *The 4 Avenue Flyover: A Little Lost Space Project* reimagined an underutilized, vacant space under the 4th Avenue Flyover Bridge in the community of Bridgeland-Riverside. The project was a collaboration between Calgary Transportation, ESM, the Bridgeland Riverside Community Association, Langevin Science School, and the University of Calgary. In 2017, the project temporarily redeveloped the space in partnership with local residents and the Bridgeland-Riverside Community Association using tactical urbanism techniques such as street painting; installing temporary seating and tables; utilizing mobile games tables; and creating nature play spaces using repurposed materials. This project was a finalist for the 2017 Brownie Award from the Canadian Brownfield Network.
- An ECO Plan is a contractor's plan to identify and mitigate the environmental impacts that may result from their activities. To assist contractors in identifying and mitigating the risks of their activities in compliance with The City's requirements, in 2017 an electronic ECO Plan template was developed and rolled out. The goal of the template is to have quality, organized ECO Plans that describe the project, its potential effects and its mitigation and control measures, and to assist ESM in ensuring ECO Plans are not incomplete which can result in substantial burdens on the review process and a delay in the project plan acceptance. Of the 75 ECO Plans reviewed in 2017, 84% submitted an ECO Plan prior to construction, and 47% were complete on their first submission. Approximately 25% of the submitted plans used the online electronic form. Future improvements to the template will increase the number of successful submissions and reduce project delays.

Moving forward

- A process to lease city-owned vacant land to support urban agriculture and food production was drafted in 2017 under the Urban Agriculture Pilot Project initiated by Sustainability Strategies and supported by ESM. The intent is to advance urban agriculture opportunities within Calgary on City-owned land, thereby revitalizing underutilized spaces and providing unique prospects for local farmers. Through a public process, The City's Urban Agriculture Advisory Committee selected a community partner who will repurpose a City-owned vacant land parcel in Manchester into an urban farm. The pilot is part of an ongoing effort to increase green space in The City, and improve local food security.
- In 2017 remedial construction was completed on the Former Imperial Oil Refinery, a contaminated site impacted by almost 50 years of previous petroleum product refining activities. The site is now moving into the redevelopment planning phase to return the site to community use under a memorandum of understanding and associated legal agreements between Imperial Oil and The City of Calgary.

Improving the community is part of The City's commitment to its citizens. Environmental stewardship in a shared responsibility of government, business, communities, and individual citizens. Many City programs to protect and enhance the environment or conserve resources therefore extend to the community at large, thereby enabling citizens to reduce their environmental impact and contribute to the imagineCALGARY urban sustainability plan.

Customers

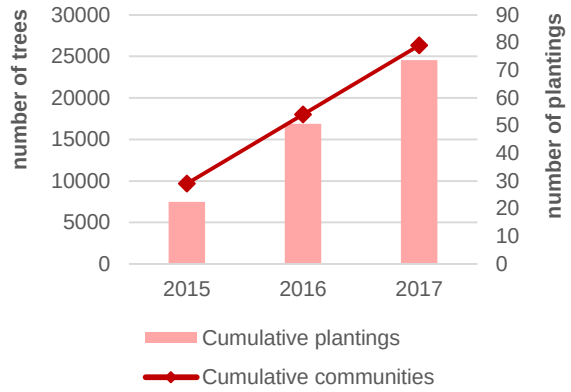
Council, Administration Leadership Team (ALT), industry groups, citizens and communities.

Key partners

Internal: Utilities & Environmental Protection, Planning & Development, Calgary Parks, Calgary Recreation, Facility Management, Supply, Corporate Analytics & Innovation, Customer Service & Communications.
External: Targeted stakeholder groups from the building industry, transportation experts, waste experts, academics, non-profits, consultants, businesses.

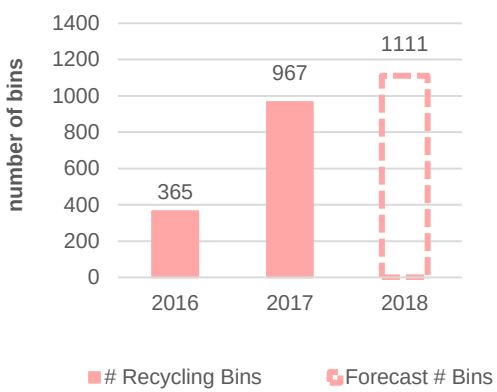
How are we doing?

Total number of trees planted by ReTree YYC program year (cumulative)



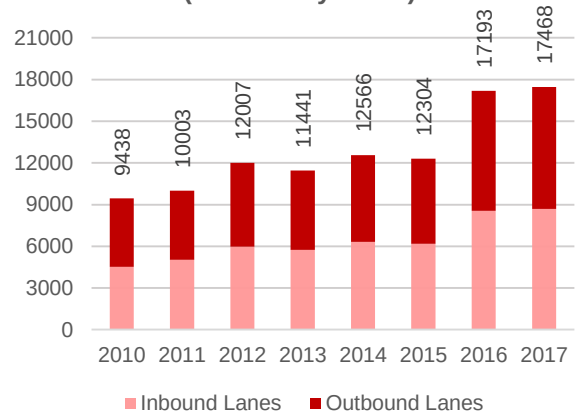
In September 2014, Calgary experienced a late-summer snow storm causing extensive and severe damage to more than a million trees. ReTree YYC launched in 2015 to respond and recover from this disaster and provide public education and outreach. The goal of the planting program was to increase the urban canopy and encourage Calgarians to become involved in tree stewardship. The three-year ReTree YYC program successfully concluded in 2017. **Program results for 2015 through 2017 include: over 356,000 trees assessed and pruned, and over 24,000 trees planted in 79 communities (citizen tree planting program).**

Number and percent of recycling bins provided in City-owned public spaces



In 2015, Council approved a revised target of 70% waste diversion, city-wide, by 2025. To help meet this target, the goal of the Waste in Public Spaces Project was to improve public waste diversion opportunities for citizens by increasing the number of recycling bins provided in City-owned public spaces. This included adding additional bins, updating bins with confusing labelling, or replacing some waste bins with recycling bins. Through the efforts of the Waste in Public Spaces Project (WIPS), **The City increased the number of recycling bins in public spaces from 365 in 2016 to 967 in 2017.**

Total downtown bicycle trips per day (annual May count)



Transportation activities account for about 30% of GHG emissions in Calgary, 80% of which are generated by passenger vehicles. Alternative modes of travel such as walking and biking help offset vehicle-sourced GHGs. In 2011, Council set a target under the Cycling Strategy for 4% of all downtown trips to be by bicycle**. In 2017, the strategy almost met its target at 3.8%, for a total of 17,468 daily trips by bicycle this year.** Since 2011, The City has installed, added, or improved 87 km of bikeway, including a cycle track network on four corridors. This has resulted in a 75% increase in downtown bike trips since 2011 (from 10,003 in 2011 to 17468 total daily trips in 2017). Trips by bicycle now make up 3.8% of the morning peak into and out of downtown.

Sample of key accomplishments in 2017

- In addition to the tree maintenance and plantings achieved in 2017, ReTree program staff attended public events, hosted educational forums, and worked with industry partners to ensure easy access to information regarding tree care and build tree-care culture. Continuous improvements have been made on the inventory and data collection system used to track existing tree care and plan for future tree plantings. In addition, baseline data has been improved for tracking urban canopy coverage.
- The Waste in Public Spaces project has decreased the amount of waste going to the landfill by improving access to public recycling and reducing public confusion regarding the use of City-owned public recycling bins. Whether a citizen is on a LRT platform, downtown sidewalk, or park, they now see the same types of waste bins and signage for City-own public spaces that also follow waste diversion best practices, thereby improving ease of use. Multiple City business units continue to work together to provide service value for citizens. In two years, The City has tripled the number of public recycling bins to over 1,100, in addition to the 6,500 garbage bins provided across City-owned public spaces. The Waste in Public Spaces project team also completed three large-scale public waste audits in 2017, and worked with a supplier to create a unique can and bottle ring for waste bins that will reduce the number of cans and bottles going to the landfill while increasing safety for members of the public that depend on this refundable income.
- Under the Cycling Strategy, The City added 19 km of new/improved bikeway, improving conditions on 14 and 15 Ave SW, Bowness Road NW, Northmount Dr NW at 14 St, and Home Rd NW. The City also constructed the first kilometer of bike lane east of Deerfoot Trail, on 8 Ave SE and Marlborough Way SE.

Moving forward

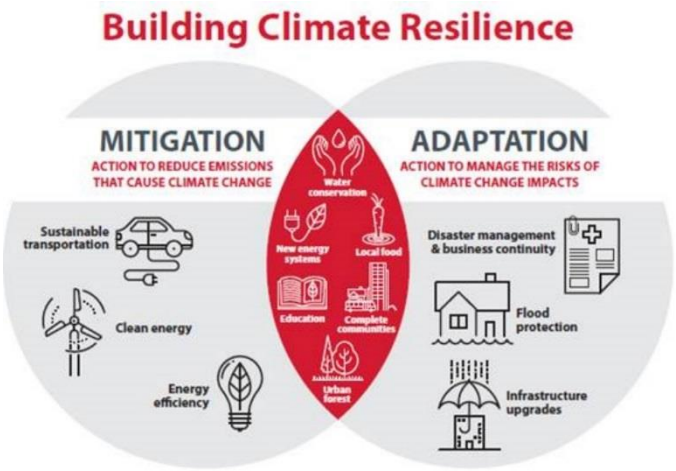
- Capital business cases for future tree planting and watering have been submitted for consideration in the 2019-2022 budget cycle to continue the success of the ReTree YYC program and ensure the resiliency of Calgary's urban tree canopy. Moving forward, the program will address:
  - A planting matrix that will be implemented to ensure lower canopy areas are being represented
  - To sustain the existing tree canopy, 3,500 trees need to be planted annually
  - To grow the tree canopy an additional 4,000 trees need to be planted annually
- Moving forward with the Waste in Public Spaces project, Roads, Transit, and Parks will install an additional 144 public recycling bins. Roads will install an additional 100 can and bottle rings. In addition to this, business units will be able to work more collaboratively using the Waste in Public Spaces Corporate Public Waste GIS Map. As an example, Roads and Transit are using this tool to work together and find efficiencies in waste bin maintenance while improving quality of service for certain areas of the city. The Waste in Public Spaces waste audit reports were finalized in 2018, providing the strategic direction for City-owned public waste in the future.
- To meet the Cycling Strategy target of 4% downtown bicycle trips per year, Transportation will improve additional corridors that connect communities to our improving bikeway network, and will plan the next phase of cycling infrastructure improvements in the Centre City.

3.1 Additional Environmental Milestones and Highlights for 2017

Climate Resilience

In 2017, The City developed a Low Carbon Plan for Calgary. This plan is an update to the previous Calgary Community GHG Reduction Plan and will be presented to Council along with the Climate Change Adaptation Plan in June 2018. The Low Carbon Plan will identify strategies, programs and actions necessary to reduce city-wide greenhouse gas emissions in line with The City's targets.

Actions will be identified in five key themes: Buildings and Energy Systems, Land-use and Transportation, Waste and Consumption, Natural Systems, and Cross-Corporate Governance and Leadership. Strategies, programs, and actions have been identified and prioritized by modelling the technical potential for GHG reductions in Calgary, calculating the economic cost-benefit of the opportunities, identifying best-practice policy approaches, and considering our jurisdictional authority and responsibility.



Environmental Outreach

The annual 3-day Mayor's Environmental Expo runs during national environment week with the purpose of enhancing environmental education amongst Calgary's school aged population. This year the event had 4,308 participants compared to 3234 participants in 2016, and offered a total of 75 workshops. Also in 2017, the Eco-Leaders Program, a youth environmental leadership initiative, assisted 32 school teams, representing 12 wards, to research, design and implement environmental projects in their community. This program empowered 1,331 students, from grades 1 to 12, with direct education. Through this program students gained in-school environmental education and project support from City of Calgary staff and local organizations and participated in a skill development conference. Teachers gained professional development, received curriculum development assistance and project seed grants. All 32 schools presented their final projects at the Mayor's Environment Expo. The Eco-Leaders Program was a 2017 finalist for the Alberta Emerald Award.

In 2017, Calgary Parks adopted citizen science (the collection and analysis of data relating to the natural world by members of the public) to help achieve biodiversity goals for citizen eco-literacy in a cost-efficient manner. Under this program, Calgary Captured on the Zooniverse.org platform was launched in February 2018, allowing Calgarians to participate in the classification of local species in our parks using their home computers and mobile devices.

River Access

A Calgary River Access Strategy was presented to Council with strong support from stakeholder groups. The strategy balances public safety and environmental protection of riparian areas while improving recreation, education, and business opportunities for citizens on and around Calgary's rivers.

The 50th Annual River and Pathway Clean-up, organized by Calgary Parks and sponsored by Conoco Phillips Canada, attracted 2,900 volunteers who removed litter in every city quadrant from parks and along nearly 200 kilometres of pathways and river banks. Volunteers included groups from non-profit organizations, community associations, local businesses and City staff.

Riverbank stabilization and beach rehabilitation work as part of the River Park/Sandy Beach/Britannia Slopes redevelopment plan was also completed in 2017, improving public river access in this portion of the Elbow River.

Biodiversity

This past year, Calgary Parks expanded delivery of naturalization projects to 19 projects (covering more than 32 hectares) of habitat improvements in support of The City's 2025 biodiversity target to restore 20% of open space. For example, the Bowmont Park Rehabilitation project seeks to rehabilitate approximately 7.5 hectares of parkland through the Bowmont Park Management Plan update. In addition, an application (app)-based data collection system was deployed for rapid ecosystem health assessments of natural park areas. This tool, and a model that describes the connectedness of our parks system for wildlife movement, are used to inform restoration and development planning prioritization across City parks. A Restoration App was also developed to track naturalization projects across the city. In alignment with other apps developed by Parks, Calgary's Bioblitz was held at Weaselhead Park in June as part of the Canadian Wildlife Federation's nationwide "BioBlitz Canada 150" program. The purpose was to identify and record as many species as possible at this natural area for iNaturalist, a global app for biodiversity. Expert-led tours were provided to help citizens identify local plant and animals. Event partners included: Alberta Council for Environmental Education, Weaselhead/Glenmore Parks Preservation Society, Nature Calgary, and Calgary Parks.

To protect our City's natural areas from noxious weed threats while preserving and protecting vulnerable ecosystems, The City of Calgary's biological control program was implemented in 2006 as an alternative to conventional chemical control. Since then, Urban Conservation has expanded the program to now include 96 release sites, including two experimental release programs for yellow toad flax and Canada thistle. For example, since 2009 The City has been releasing weevils to control houndstongue, with 20 release sites currently in Calgary. As of 2017, four of these sites were considered houndstongue-free.

Calgary Parks also continues to expand its goat-grazing program to control invasive weeds. In collaboration with Law, Community Standards, Calgary Parks and Planning, Urban Conservation drafted a Land Use Bylaw amendment to allow targeted grazing (e.g., goats) on Calgary-owned land which was passed in Council in 2017. This would allow grazing in more parks beyond those targeted this year (Confluence Park and Ralph Klein Park). The intent is to further The City's commitment to practice alternative land management and reduce reliance on pesticides.

Sustainable Roads Maintenance

During the 2017 and 2018 winter seasons, Roads Maintenance Central District will be expanding its pilot trial to test the effectiveness of using Beet55 for Cycle Track Maintenance. Beet55 uses the carbohydrate (sugar) from beets mixed with Brine (Salt and Water) to create a compound that will stick to the road and break the bond of snow and ice to the road surface. This project has the potential to reduce the volume of salt that is applied to the roads each season, and is currently used for regular road maintenance in British Columbia and piloted in other parts of Canada. This year, the plan is to expand the initial trial of 2,000 litres to 97,000 litres to better assess how this product fairs against the currently salt brine product being used on Calgary's roads.

Fats, Oils and Grease (FOG)

Fats, Oils and Grease (FOG) management continues to be a major challenge in the City for Water Services. The Industrial Monitoring Group (IMG) has worked hard to identify collaboration opportunities with different departments to support compliance and share knowledge about problem areas and sites around the city. Working with Alberta Health Services and other internal business units, Water Services has implemented a collaborative

approach to improve internal and public compliance through an outreach/educations program to ensure Food Service Establishments (FSE's) are aware of their responsibilities under Wastewater Bylaw 14M2012. In 2017, other major program achievements included social media and other outreach campaigns (for example, through ENMAX bill inserts) to promote awareness for residential FOG management; improving internal compliance in City facilities to lead by example; and increasing the number of FOG Inspectors.

Municipal Right of Way Bylaw

The Municipal Right of Way Bylaw17M2016 requires all utility providers performing work within service corridors or City Structures to abide by all bylaw requirements before accessing City owned land to place their infrastructure. The bylaw holds utility providers to the same environmental standards and requirements as City contractors when working on City-owned property. Environmental requirements under this bylaw were integrated into the following support documents to ensure compliance: Environmental Compliance Plan, Utility Provider Environmental Acknowledgment Form, and an Inspection Environmental Compliance Plan checklist. Anticipated bylaw outcomes include: improved environmental stewardship of City-owned land; protection of the City's environmental assets; reduced corporate liability risk; and improved regulatory compliance for utilities operating within City-owned Right of Ways.

Waste & Recycling Services Outlook for 2018 to 2025

EXECUTIVE SUMMARY

This report provides an outlook on what Waste & Recycling Services (WRS) is focusing on over the period of 2018 to 2025, while working towards the target of diverting 70 per cent of Calgary's waste away from landfills by 2025. It serves as an overview of the plan to get to 70 per cent diversion, and the key trends and opportunities that WRS is responding to.

There is a progression of work that is being undertaken to strategically divert waste in Calgary away from landfills. Recyclables and organic materials are the two largest streams of divertible waste that have historically gone to landfill, and programs have now been implemented city-wide to divert these streams of waste to recycling and composting facilities. The next focus areas for WRS will be: education, communication, and engagement to optimize existing programs; targeted programs for specific materials still going to landfill; and pricing and enforcement to incentivize additional diversion. Waste-to-energy (WTE) is not required to achieve 70 per cent diversion, but technologies continue to be monitored and the business case for investing in this type of residual waste management continues to be explored.

While WRS continues to implement the overarching plan for achieving 70 per cent diversion by 2025, we are also responding to trends and opportunities that are emerging. There are five primary trends that require our response over the coming years: increasing customer expectations; changing market standards for recycled materials; increasing contamination of recyclables; decreasing tonnage of waste for disposal; and advancing technologies.

ADMINISTRATION RECOMMENDATION:

That the SPC on Utilities and Corporate Services receive this report for information.

PREVIOUS COUNCIL DIRECTION / POLICY

A deferral report for the 2018 waste-to-energy technology report (UCS2018-0147) was approved by Council on 2018 February 26 to allow that report to be brought as an attachment to this outlook report.

On 2016 June 22 the SPC on Utilities and Corporate Services received the Waste Diversion Target Update (UCS2016-0470), including updates on waste diversion in each sector, and a status update on waste-to-energy.

On 2015 December 7, Council adopted the revised target of 70 per cent waste diversion across all waste sectors by 2025, as recommended in the Waste Diversion Target Update (UCS2015-0835). The overall waste diversion target was revised from the original target of 80 per cent diversion by the year 2020, as set in 2007 (UE2007-035). As part of the 2015 report, Council directed Administration to report back in Q1 2018 on the potential application of waste-to-energy technology.

BACKGROUND

The City of Calgary's aspirational waste management goal is to achieve zero waste, where all discarded materials are resources that can be reused (recycled, composted, repurposed, etc.), and no garbage is sent to landfills. On the journey to zero waste there will be interim steps and

Waste & Recycling Services Outlook for 2018 to 2025

targets. The target that WRS is currently working towards is 70 per cent diversion of waste from landfills by 2025. The overarching steps for achieving this target are shown in Figure 1, and discussed in detail in Attachment 1.

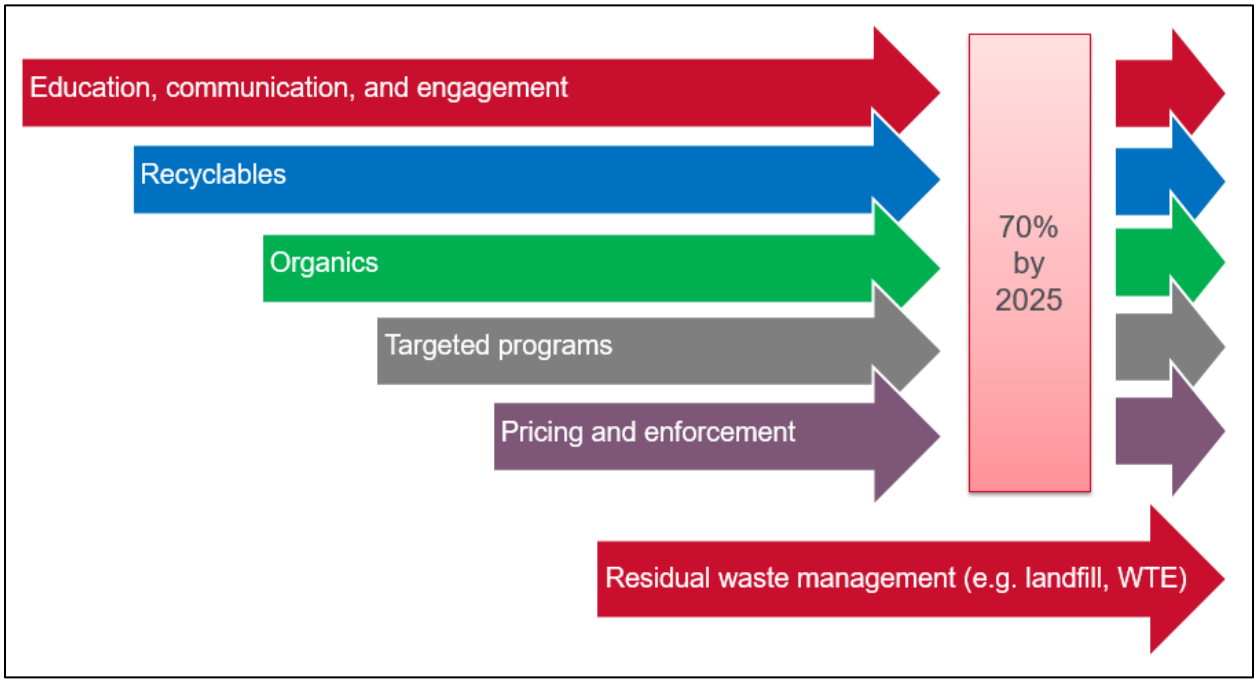


Figure 1: Steps towards 70% by 2025

INVESTIGATION: ALTERNATIVES AND ANALYSIS

Since 2007, WRS has successfully implemented broad recycling and organics diversion programs across the single-family (SF) residential, multi-family (MF) residential, and industrial, commercial and institutional (ICI) sectors, supported by strong education and engagement activities. These programs require continued investment and refinement to optimize the diversion they achieve. Targeted programs for specific materials such as textiles and single-use items (e.g. plastic bags) will be a focus of ongoing diversion work, as well as pricing and enforcement to encourage the use of diversion programs. Residual waste management, including opportunities for WTE, will be explored as opportunities to increase diversion beyond 70 per cent. An update on WTE technology is provided in Attachment 2.

Five primary trends, further discussed in Attachment 1, have been identified that are influencing WRS work. Opportunities for responding to each of these trends have been highlighted below, including specific initiatives that are being undertaken. The trends and opportunities are:

Trend #1: Increasing customer expectations.

Opportunities (and initiatives):

- Provide options for residential customers (e.g. variable pricing for Black Cart Program, to allow residents control over what they pay for garbage by charging only for the amount they throw away).

Waste & Recycling Services Outlook for 2018 to 2025

- Engage customers and explore new programs (e.g. engage customers on services and service levels; engage waste generators on strategy for targeted items; explore programs for targeted items).
- Improve transparency of service costs (e.g. black cart and green cart charges that reflect the cost of delivering those services).
- Continue to improve efficiency and reduce costs (e.g. green cart winter schedule; collection services review; route efficiency).

Trend #2: Changing market standards for recycled materials.

Opportunities (and initiatives):

- Advocate for Provincial Extended Producer Responsibility to shift the responsibility and costs of recycling from local governments to producers (e.g. via Alberta Urban Municipalities Association, and the Recycling Council of Alberta).
- Improve ability to market recycled materials (e.g. explore alternative markets; improve quality of processed recycled materials).

Trend #3: Increasing contamination of recyclables.

Opportunities (and initiatives):

- Enhance education and enforcement to improve the quality of materials collected in recycling programs, so materials can be marketed effectively and program costs are kept as low as possible (e.g. education and communication campaigns; enforcement of programs).

Trend #4: Decreasing tonnage of waste for disposal.

Opportunities (and initiatives):

- Optimize services across facilities (e.g. review services and service levels at each site; Shepard summer Throw ‘n Go; enhanced residential Throw ‘n Go).
- Explore regional waste management opportunities (e.g. Calgary Metropolitan Region Growth Plan and Servicing Plan; pursue regional initiatives; City Charter Collaboration Table)
- Consider new activities at sites (e.g. Landfill gas to energy options; energy production; technology pilots).

Trend #5: Advancing technology.

Opportunities (and initiatives):

- Investigate technologies (e.g. continue to test technology for in-truck data collection and cart inventory tracking; continue to monitor waste-to-energy technology; alternative fuels for fleet).

Stakeholder Engagement, Research and Communication

Customers are a critical partner for achieving maximum waste diversion, and are engaged in the design and implementation of programs. Broad customer engagement to inform the next phase of new programs is planned for 2019 and timelines will be shared with Council in advance of the engagement.

Waste & Recycling Services Outlook for 2018 to 2025

Strategic Alignment

The waste diversion target of 70 per cent diversion by 2025 is a key step in leading the community toward zero waste. This report aligns with Council's Priority for a healthy and green city and Strategy H1: Implement the Green Cart Program and multi-family recycling strategy, and reduce industrial, commercial and institutional waste going to our landfills. A focus on financial sustainability enables WRS to deliver on its commitment towards Council's Priority for a well-run city and Strategic Action W2: Be as efficient and effective as possible, reducing costs and focusing on value-for-money.

Social, Environmental, Economic (External)

Social
Implementation of waste diversion programs makes Calgary a more attractive place to live and increase Calgary's reputation as an environmentally friendly city.

Environmental
Reducing and diverting waste is a critical component of reducing Calgary's impact on land, air and water. Waste reduction and recycling reduces greenhouse gas emissions, redirects natural resources back into the economy and reduces future environmental liability.

Economic
Waste diversion supports an increase in jobs and stimulates economic growth. The City's diversion strategies and programs are supporting the growth of private businesses and fueling innovation in the industry.

Financial Capacity

Current and Future Operating Budget:

Activities identified in this report that require operating budget will be included in the One Calgary budget and business plan process.

Current and Future Capital Budget:

Activities identified in this report that require capital budget will be included in the One Calgary budget and business plan process.

Risk Assessment

There are no significant risks associated with this report.

REASON(S) FOR RECOMMENDATION(S):

This report provides an outlook on what Waste & Recycling Services (WRS) is focusing on over the period of 2018 to 2025.It serves as an overview of the plan to get to 70 per cent diversion, and the key trends and opportunities that WRS is responding to.

ATTACHMENTS

1. Waste & Recycling Services Outlook for 2018 to 2025
2. 2018 Report on Waste to Energy
3. Presentation

Item #7.2
UCS2018-0153
ATTACHMENT 1

WASTE & RECYCLING SERVICES

OUTLOOK FOR 2018 TO 2025

Table of Contents

GLOSSARY

AUMA – The **Alberta Urban Municipalities Association** represents urban municipalities including cities, towns, villages, summer villages and specialized municipalities and more than 85% of Albertans. It is a dynamic and evolving association, advocating the interests of members to the provincial and federal orders of government and other stakeholders.

CNG – Compressed natural gas is a fuel that can be used in place of gasoline, diesel, or propane. CNG combustion produces fewer undesirable gases than these other fuels.

EPR – **Extended Producer Responsibility** is an environmental policy approach in which the producer of a product is responsible for that product through the post-consumer stage of its life cycle. EPR shifts the responsibility and costs of recycling from local governments to producers.

GHG – A **greenhouse gas** is a gas that contributes to the greenhouse effect and climate change by absorbing infrared radiation, e.g. carbon dioxide and chlorofluorocarbons.

ICI – **Industrial, Commercial, & Institutional** waste is the waste generated by non-residential sources in a municipality, and includes:

- Industrial waste – generated by manufacturing, primary and secondary industries.
- Commercial waste – generated by commercial operations such as shopping centres, restaurants, offices, etc.
- Institutional waste – generated by institutional facilities such as schools, hospitals, government facilities, seniors' homes, universities, etc.

MF – **Multi-Family** (or multi residential) is a group of more than four dwelling units that share a common parcel of land, or share a private roadway that provides access to the dwelling units, notwithstanding that some of the dwelling units may be located adjacent to a public street, or both.

MRF – a **Materials Recovery Facility** is a facility that receives, separates and prepares recyclable materials for marketing.

MSW – **Municipal Solid Waste** is solid waste resulting from or incidental to municipal, community, commercial, institutional and recreational activities, and includes garbage, rubbish, ashes, street cleanings, abandoned automobiles, and all other solid waste except hazardous waste, industrial solid waste, oilfield waste and biomedical waste.

National Sword – a Policy initiative implemented by the Chinese government that bans the import of certain recyclable commodities, and places very tight contamination limits on others. National Sword has resulted in loss of markets and price reductions for goods collected in Calgary's Blue Cart program.

RCA – the **Recycling Council of Alberta** is the primary voice for waste reduction in the province of Alberta. As a non-profit, charitable organization, it promotes and facilitates waste reduction, recycling, and resource conservation in the Province of Alberta.

SF – **Single-Family** (or single detached dwelling) is a building designed to contain one dwelling unit only and is separated on all sides from any other dwelling unit.

WMF – a **Waste Management Facility** is a facility for the collection, storage, treatment or disposal of waste. City of Calgary WMFs include Shepard, Spy Hill and East Calgary.

WRS – **Waste & Recycling Services** business unit, within Utilities & Environmental Protection

1. INTRODUCTION

This report provides an outlook on Waste & Recycling Services' focus over the period of 2018 to 2025 as we work towards our target of achieving 70 per cent diversion of waste by 2025. It serves as an overview of the plan to get to 70 per cent diversion, and the key trends and opportunities that we are responding to in the interim.

1.1 70% BY 2025 TARGET

The City of Calgary's aspirational waste management goal is to achieve zero waste, where all discarded materials become resources that can be reused (recycled, composted, repurposed, etc.), and no garbage is sent to landfills. On the journey to zero waste there will be interim steps and targets. The target that we are currently working towards is 70 per cent diversion of waste from landfills by 2025. The strategy for achieving this target was outlined in the 2007 November 14 report, 80/20 Strategy by 2020 (UE2007-35). While the target was updated in 2016 to the current target of 70 per cent by 2025 (UCS2016-0470), the overarching steps for achieving 70 per cent diversion remain the same (Figure 1).

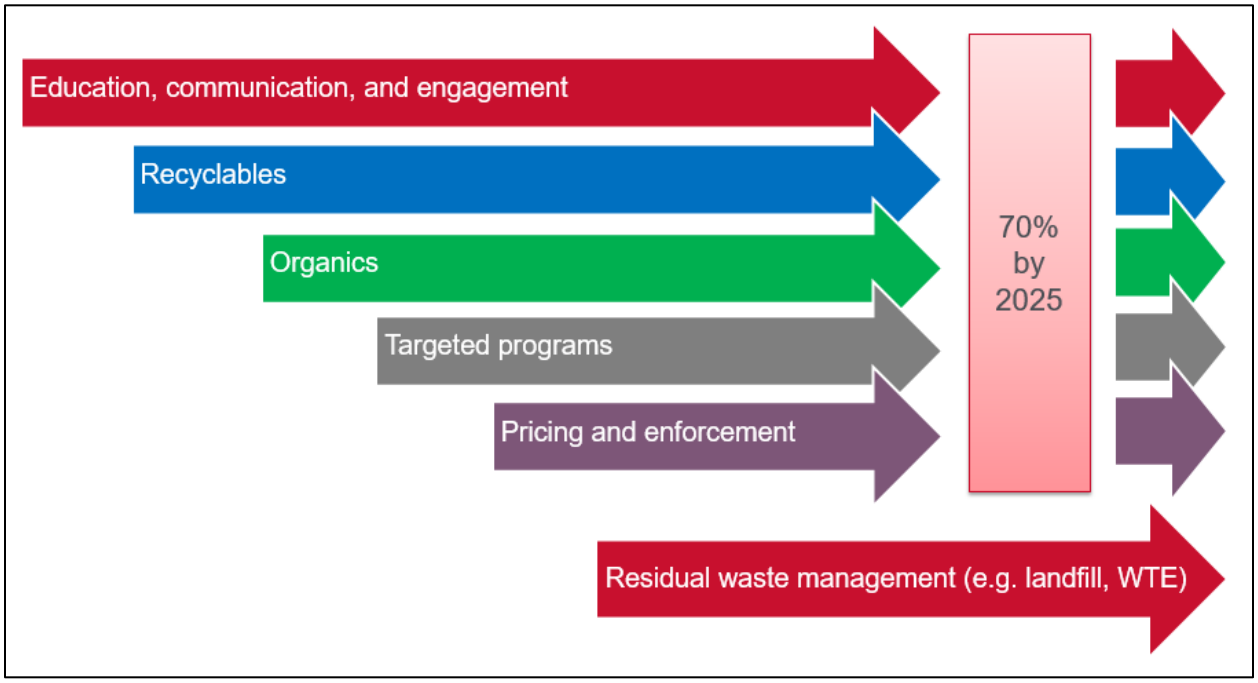


Figure 1 – Steps Towards 70% by 2025

Our work to reduce the amount of waste going to landfill is supporting us to extend the life of our landfills as long as possible. We are fortunate that we have not yet faced the same challenge that many cities have of running out of landfill capacity. We have had the opportunity to run pilots, engage stakeholders, and to watch industry lessons to inform our programs and investments. As shown in Figure 1, there is a progression of work that is being undertaken to strategically move Calgary towards

our target of 70 per cent diversion by 2025. The steps in the plan are staged to maximize resources to their greatest advantage and build on each success.

Education, communication, and engagement – Education, communication, and engagement are the foundation for all programs and will continue to be a primary focus for achieving our diversion target. This is the key element for optimizing participation in our programs, and needs to be enhanced to ensure the success of existing programs and design and implement new ones. Waste reduction will also be an increasingly important part of education programs, as we aim to reduce the amount of waste that is generated.

Recyclables and Organics – These two waste streams represent the largest volumes of waste that can cost-effectively be diverted away from landfills. We have progressively implemented programs to divert these streams to productive end-uses through Community Recycling Depots, the Blue Cart and Green Cart Programs, and bylaws requiring multi-residential, industrial, commercial, and institutional organizations to collect and divert these materials.

Targeted programs – As recyclables and organics are removed from our waste stream, additional diversion becomes more challenging. Some targeted programs for specific materials are already in place, including household hazardous waste, electronics, paint, tires, used oil and oil container drop-off programs. Future targeted programs will focus on finding diversion opportunities for materials that continue to go to landfill, such as textiles, bulk items like mattresses, and single-use items like plastic bags.

Pricing and enforcement – With diversion opportunities and strong education and engagement programs in place, the final step for incentivizing people and organizations to reduce their waste and use diversion programs is through pricing and enforcement. Charging customers based on the amount of waste they generate, and enforcing bylaws and special rates for certain materials will help optimize the benefit of diversion programs.

Residual waste management - Once materials that can be reused, recycled, or composted are removed from the waste stream, we are left with residual waste. There may be opportunities to capture energy from this residual waste and reduce our dependency on landfilling if technologies can be applied cost-effectively to the materials that make up our residual waste stream. Once our diversion programs reach maturity we will have a better understanding of the volume and content of our residual waste, which is necessary to assess the applicability of available technology. This is not required to meet our target of 70 per cent diversion, but will be an important opportunity for us to explore in order to achieve higher levels of diversion. Attachment 3 provides an update on the state of waste to energy technology and the considerations for this approach.

1.2 CLIMATE

Reducing Calgary's greenhouse gas (GHG) emissions to meet our city-wide emission targets is an important part of our work to achieve environmental sustainability. While WRS operations account for less than one per cent of our community-wide GHG emissions, emissions associated with the products

citizens consume and throw away may represent as much as one-third of Calgary's overall emissions. We aim to minimize the impact of our operations by capturing landfill gas, producing alternative energy, and optimizing our fleet management. We also support the community to reduce emissions associated with waste by diverting organics away from landfills where they generate methane gas, and we will be expanding our education programs to include a focus on waste reduction.

We have landfill gas collection systems installed at our Shepard and East Calgary waste management facilities (WMFs). A new system is currently being installed at Spyhill WMF and is scheduled to be completed this year. All the landfill gas is currently being flared. Flaring the gas has significantly less impact than allowing methane to escape into the environment. We are currently studying the feasibility of several landfill gas to energy options and end uses, to further enhance the environmental benefits of capturing the landfill gas.

WRS has partnered with Energy Management and ENMAX to install a solar array at the Shepard WMF adjacent to the Composting Facility. The array has a capacity of 1,080 kW, generating enough electricity to power almost 500 average Calgary homes in a year and will help avoid an estimated $160,000 in annual operating costs, achieving payback within 11 years. This project has also contributed to The City achieving sustainability objectives and LEED Gold certification on the Composting Education and Administration Building adjacent to the compost facility. A further expansion of the array is currently being investigated. We will continue to pursue opportunities for additional solar generation on our sites.

We currently have two compressed natural gas (CNG) collection trucks in our fleet, which emit significantly less air pollution than diesel vehicles, and are gathering information on electric truck options and what approaches have been successful in other municipalities.

2. TRENDS AND OPPORTUNITIES

While we continue to implement the overarching plan for achieving 70 per cent diversion by 2025, we are also responding to trends and opportunities that are emerging. There are five trends in particular that require our response over the coming years, and these are described below, as well as the opportunities that each of these trends present.

2.1 TREND #1: INCREASING CUSTOMER EXPECTATIONS

Customers are better informed and more engaged than ever in the services that they pay for. With this increased information and ability to influence service-providers, customers' expectations for services are increasing. Customers want choice in the services they receive, and the ability to access services that are tailored to their needs. They also expect transparency from service-providers, responsive service, and clear value for money. This trend presents the following opportunities:

1. Provide options for residential customers.

2. Engage customers and explore new programs.
3. Improve transparency of service costs.
4. Continue to improve efficiency and reduce costs.

2.1.1 PROVIDE OPTIONS FOR RESIDENTIAL CUSTOMERS

Currently all single residential households in Calgary receive the same waste collection service and pay the same waste collection charges. They receive a black cart, a blue cart, and a green cart, which are collected at the same frequency throughout the city. Of course, not all households produce the same amount of waste, and accordingly, not all households require the same level of service. Customers prefer to be charged only for the level of service they require, and it is more transparent for individuals to pay only for what they use.

Now that the three residential waste collection programs are operating across Calgary there is an opportunity to look at how the programs can be optimized to reflect the different needs of individual households. The Black Cart Program is where options will first be offered to residents, with Administration bringing a report to Council in 2018 Q2 to seek approval for a variable pricing approach that will allow residents to choose a black cart size option and be charged accordingly. As part of a program that provides cart size options, charging for excess waste that is outside of the black cart will also be important. Currently citizens bag excess garbage that does not fit in their black cart and it is collected at no additional cost. Within a variable pricing approach, households will pay for excess garbage.

Once a black cart variable pricing program is in place, providing options for blue and green carts will also be investigated. Longer-term, additional service flexibility may be possible through cart identification programs that allow us to track when individual carts have been serviced, and charge households accordingly. The technologies and financial viability for programs of this type are discussed further under Trend #5: Continuing technology advancements.

Next steps:

- Black Cart Program variable pricing approach will be presented to Council in 2018 Q2.
- Options for Blue Cart and Green Cart Programs will be investigated during the 2019-2022 business cycle.

2.1.2 ENGAGE CUSTOMERS AND EXPLORE NEW PROGRAMS

To ensure that new programs and changes to existing programs and services meet the needs and expectations of our customers, we will be engaging all our customer classes in 2019. As we look for ways to enhance our services, increase diversion from landfill, and find efficiencies in our operations, we require a better understanding of our customers' priorities for services and service levels. Information on the engagement approach will be shared with Council in advance of the engagement being undertaken.

Specific items such as textiles, and single-use items like plastic bags, present opportunities for unique, targeted programs that include partners in the community. We will engage organizations that generate waste such as plastic bags, and work with them to develop a strategy to reduce the generation of this type of waste. We will also explore opportunities to pilot programs for priority materials, allowing us to gather information for developing full-scale programs.

Through the combination of customer engagement and exploring programs, we will identify the services that are most valued by citizens and the programs that cost-effectively achieve the greatest environmental benefit. This is critical for informing our investments in services and operations at our sites. A waste composition study being carried out in 2018 to 2020 will also support us to target programs on specific materials that make up a significant portion of our waste to landfill.

Next steps:

- Customer engagement on services and service levels will be undertaken in 2019.
- Waste generators will be engaged starting in 2019 to develop a strategy for targeted items.
- Programs for targeted items will be explored during the 2019 – 2022 business cycle.

2.1.3 IMPROVE TRANSPARENCY OF SERVICE COSTS

Under our current financial model, a blend of property tax, grants and fees fund the various WRS programs and associated activities. While this financial model has historically served WRS' financial requirements, the evolution of services delivered by WRS requires financial changes to ensure sustainable funding options that provide transparent and complete costs for each service in an equitable manner.

As a first step, the Waste & Recycling Services Financial Plan 2019-2022 (UCS2018-0150) proposed financial changes that will create a more transparent cost structure for residential services, while reducing WRS' dependency on tax support. Specifically, a new black cart charge and a change to the green cart charge will move funding from taxes to fees, allowing residents to see the costs of these services. This approach also supports the introduction of options for black cart service, so fees can be adjusted based on the amount of waste a household generates.

We will continue to look for opportunities where there is a direct connection between a service and a customer to make service costs more transparent.

Next steps:

- Black cart and green cart charges proposed as part of One Calgary will reflect the cost of these services.

2.1.4 CONTINUE TO IMPROVE EFFICIENCY AND REDUCE COSTS

A key element in serving our customers is ensuring that we deliver services as cost effectively as possible. Benchmarking assists us in identifying areas where we may be able to improve efficiency; we continually look at opportunities for reducing costs while maintaining a high level of service. Notably,

with the revenue shortfall at our WMFs in recent years, WRS has paid close attention to the services offered at these sites and the associated costs, and has adjusted operations to bring costs in line with revenues. Opportunities for optimizing services and new activities at these sites are discussed further in Trend #4: Less waste coming to waste management facilities for disposal.

Another area of focus for efficiencies and cost reductions is our cart-based collections for residential customers. Reducing the frequency of collections can reduce costs and encourage waste diversion, as in the case of reducing black cart collection from weekly to every-other-week with the introduction of the Green Cart Program in 2017. In 2018 we will change green cart collection to every-other-week in the winter months to reflect lower volumes of materials collected during those months (Winter Green Cart Collection Schedule UCS2018-0303). This will reduce costs for residents and GHG emissions associated with collection trucks. We have also recently implemented a new route design software to improve the efficiency of our collection routes. Additional opportunities for reducing costs will be explored in the next business cycle, ensuring that any changes made are in line with the expectations and priorities that customers have for the services they receive.

In late 2018, as requested by Council, a report will be coming to SPC on Utilities & Corporate Services on the Collection Services Review being undertaken this year. This report will focus on the residential cart based collection system and include: a strategic review of service delivery models; updated benchmarking; and key performance indicators to measure efficiency and effectiveness.

Next steps:

- Green cart winter collection schedule will be initiated in 2018 Q4.
- Collection services review will be reported to Council in 2018 Q4.
- Continue to improve route efficiency.

2.2 TREND #2: CHANGING MARKET STANDARDS FOR RECYCLED MATERIALS

Once recyclable materials are collected through City of Calgary recycling programs, they are taken to a Materials Recycling Facility (MRF), which is operated under contract with Cascades Recovery+ (Cascades). The products that come out of our MRF are commodities that can be marketed. Changes in the global market for recycled materials affect the revenue we can recover to offset the costs of running recycling programs.

Global recycling markets and policies dictate the quality, quantity, and pricing of recycled end-products that can be sold. With China's National Sword Program announced in 2017, the global recycling market has entered a period of unprecedented uncertainty. The pressure is greater than ever to ensure that the recyclables we send to market are high quality so that they may be attractive to potential buyers in this very competitive global marketplace. This trend presents the following opportunities:

1. Advocate for Provincial Extended Producer Responsibility.
2. Improve ability to market recycled materials.

2.2.1 ADVOCATE FOR PROVINCIAL EXTENDED PRODUCER RESPONSIBILITY

Extended Producer Responsibility (EPR) is an environmental policy approach in which the producer of a product is responsible for that product through the post-consumer stage of its life cycle. EPR shifts the responsibility and costs of recycling from local governments to producers. This incentivizes producers to reduce waste associated with their products and packaging, and to create products that are readily reusable or recyclable.

If the Government of Alberta implemented an EPR program, this would provide financial savings and environmental benefits for The City of Calgary, other Alberta municipalities, and tax payers. The financial risk associated with changes in the global markets for recycled materials would then be carried by producers, and as a group they would also have the purchasing power to invest in recycling processes that can produce higher-grade materials.

In 2009, as a member of the Canadian Council of Ministers of the Environment (CCME), the Government of Alberta committed to working towards the development of EPR programs for priority products and materials. Alberta has not yet implemented a legislated EPR program, while all other provinces have implemented or are in the process of implementing a form of EPR regulation. Council approved a request for decision (RFD) for the Alberta Urban Municipalities Association (AUMA) Municipal Leaders' Caucus (March 14-15, 2018) to advocate that the Government of Alberta develop and implement legislation to establish Extended Producer Responsibility (EPR) in Alberta (IGA2018-0148).

Following Council approval, the RFD was presented at the AUMA Municipal Leaders' Caucus and received unanimous consent, ensuring the AUMA will send the issue to its Environment and Sustainability Committee and renew advocacy efforts for EPR with the provincial government. The City of Calgary will also continue to support the efforts of the Recycling Council of Alberta.

Next steps:

- Continue working with AUMA and supporting their advocacy efforts.
- Continue collaborating with the Recycling Council of Alberta and supporting their advocacy efforts.

2.2.2 IMPROVE ABILITY TO MARKET RECYCLED MATERIALS

In the absence of a Provincial EPR program, The City will continue to have responsibility for processing and marketing recycled materials through our contract with Cascades. The global market is changing in response to the China National Sword Program. Like so many municipalities across North America, we are now exploring alternative markets for our recycled materials. Cascades has been able to market some materials to new purchasers, and will continue to seek out the best opportunities to market our materials.

Photo: Bales of mixed paper at the materials recovery facility

Meanwhile, we are working with Cascades and our customers to decrease contamination and ensure the end products from our MRF are of high quality to enhance our ability to successfully market this material.

Next steps:

- Continue to explore alternative markets.
- Work to improve the quality of recycled materials.

2.3 TREND #3: INCREASING CONTAMINATION OF RECYCLABLES

It is a well-documented trend across cities that contamination of recycling waste streams increase over time, and we are seeing this currently in our City recycling programs. Contamination rates in our blue carts also increased when we reduced black cart collection frequency to every other week. Introducing a variable pricing approach to our Black Cart Program is also likely to increase the amount of improperly sorted materials in blue carts, and we will continue monitoring this. Contamination leads to challenges at the MRF, affecting the quality of final products, reducing the profitability of these final products, and increasing operating costs. This trend presents an opportunity to enhance education and enforcement.

2.3.1 ENHANCE EDUCATION AND ENFORCEMENT

Education is a foundational element of all our diversion programs. When we launch a program, we focus on communication and education to ensure that customers are aware of the program that is coming and how to use it. This effort tends to achieve high participation and low contamination. However, continuing to keep awareness and participation high requires continued investment in educating customers.

Targeted education and communication campaigns support program success; for example, a blue-black-green cart communication campaign will be running from April to December 2018 and is being tailored to the highest priority education items for citizens, including targeting the contaminants we are finding in carts. We also need to target specific sectors and identify where education can have the largest impact, for example by working with waste haulers to understand what challenges they and their customers face in separating waste so we can work together to achieve better diversion in the industrial, commercial and institutional (ICI) and multi-family (MF) sectors.

To ensure that programs achieve their full potential, communication, education and enforcement are essential. WRS needs to develop a progressive enforcement strategy that can complement our communication and educational activities to ensure citizens and businesses are taking part in waste diversion activities.

Next steps:

- Bolster communication and education through targeted campaigns, such as the blue-black-green cart communication campaign running from April to December 2018.
- Develop multi-year communication and education plans for City diversion programs.
- Explore approaches for enforcement of diversion programs, including cart inspection and tagging teams.

2.4 TREND #4: DECREASING TONNAGE OF WASTE FOR DISPOSAL

WRS operates three WMFs across the city, where waste is managed according to regulatory requirements to protect public health and our natural environment. The City of Calgary is fortunate to own sites where waste can be landfilled, and not be subject to fees set by third parties or required to ship waste long distances for disposal, as many cities across North America do. Once a city no longer has landfill capacity, major expenditures and lengthy processes are required to rapidly increase diversion of waste or identify new landfill opportunities.

In 2016 and 2017 we experienced a revenue shortfall due to reduced landfill tonnes coming to the three WMFs. A decline in landfill waste was expected, as Calgary's 70 per cent diversion by 2025 target included initiatives to significantly reduce the volume of waste landfilled. However, the drop in tonnes has been accelerated by the economic downturn and increased competition from landfills outside of the city. Tipping fees were frozen in 2017 and 2018 in response to the economic downturn, and adjustments were made to the operations of the WMFs to offset the revenue shortfall. The strategies to achieve the required savings included reduced hours of operation of WMFs and resulted in a reduction of employees.

We anticipate that volumes of waste coming to our WMFs will continue to decline as we continue to make progress towards our diversion target of 70 per cent by 2025 and the economy takes time to recover. This trend presents the following opportunities:

1. Optimize services across facilities.
2. Consider new activities at sites.
3. Explore regional waste management opportunities.

2.4.1 OPTIMIZE SERVICES ACROSS FACILITIES

The three WMFs operated by The City offer many of the same services, but given their locations and the unique nature of each site, there is an opportunity to review the services offered at each site and optimize activities so that customers receive the best possible service, while also minimizing costs.

Photo: Shepard Waste Management Facility scale house

Engagement of all customer classes in 2019 will be an essential part of reviewing and optimizing services and activities across WMFs. The services that customers desire, and their willingness to pay for various levels of service will be critical for designing services and associated rates. Approaches may include offering some services at one or two sites only, seasonal services (such as the summer residential Throw ‘n Go service that will be available at Shepard WMF in the summer of 2018), and adjusting schedules to better match customer demand.

An important part of reviewing services will be understanding residential demand for Throw ‘n Go services, and examining opportunities to provide options for disposing and diverting waste that are accessible and convenient for customers.

Next steps:

- Review services and service levels at each site to best serve all customer classes.
- Examine opportunities for enhanced residential Throw ‘n Go services.

2.4.2 CONSIDER NEW ACTIVITIES AT SITES

Land is a valuable asset, and while we look at how best to optimize services at our WMFs, we are also aware of opportunities for diversion activities and activities beyond waste management that could possibly add to the value that Calgarians get from these sites. Opportunities could include generating energy or piloting new technologies.

We have landfill gas collection systems installed at our Shepard and East Calgary WMFs. A new system is currently being installed at Spyhill WMF and is scheduled to be completed this year. We are currently studying the feasibility of several landfill gas to energy options and end uses, to further enhance the environmental benefits of capturing the landfill gas. WRS has partnered with Energy Management and ENMAX to install a solar array at the Shepard WMF adjacent to the Composting Facility. A further expansion of the array is currently being investigated.

Piloting new technologies, such as autonomous vehicles and drones, is another opportunity that might be viable at our sites. Individual opportunities will present unique considerations for whether they are compatible with core operations on the site, can be undertaken safely, and are cost-neutral or revenue-generating. Collaboration and pursuing partnerships will be important in conjunction with developing a vision for the types of opportunities that would get the most value out of our sites without compromising core operations.

Next steps:

- Explore options for converting landfill gas into a useable energy source.
- Consider options for energy production at our sites.
- Examine opportunities to pilot new technologies at our sites.

2.4.3 EXPLORE REGIONAL WASTE MANAGEMENT OPPORTUNITIES

With the introduction of the Calgary Metropolitan Region Board, there is new drive and opportunity for regional collaboration on many fronts, including management of waste. Solid waste is one of the items for consideration in the development of the Metropolitan Region Servicing Plan that will accompany the Metropolitan Region Growth Plan due in 2021. WRS is part of an internal Administration group supporting work towards the development of the Interim Growth Plan.

Aligning programs and facilities could improve waste management throughout the region. Most municipalities manage waste independently, so they have different requirements for residents and businesses, and provide different opportunities for diversion. This impedes the effectiveness of programs. Waste is also travelling long distances across the province in some instances in response to diversion programs and market competition. Alignment of programs and regional partnerships could improve affordability of facility investments and allow for higher quality facilities serving the region. It could also improve waste diversion outcomes and reduce unnecessary flow of waste across the province.

In addition to the opportunities for regional collaboration, initiatives launched by other organisations could influence waste management in Calgary. For example, Lafarge is exploring the possibility of using non-recyclable waste as an alternative fuel source for its operations. Monitoring regional initiatives and collaborating wherever possible will be important to ensure we are exploring all options for managing waste and investing in the appropriate areas.

Finally, there may be an opportunity to work with Edmonton and the Province on waste management issues across the province, such as monitoring the movement of waste. We will explore the value and opportunities to raise waste management issues with these parties.

Next steps:

- Contribute to the development of the Calgary Metropolitan Region Growth Plan and Servicing Plan.
- Pursue opportunities for regional initiatives.

2.5 TREND #5: ADVANCING TECHNOLOGY

Technology advancements for all aspects of waste management continue to be developed and deployed in the industry. As technologies are proven they present opportunities for us to increase diversion, reduce costs, find efficiencies in our operations, increase quality and speed of customer responses, and reduce GHG emissions associated with our work. This trend presents an opportunity to investigate technologies as they emerge.

2.5.1 INVESTIGATE TECHNOLOGIES

Technologies are presenting new opportunities for all elements of the waste management industry, including: optimizing collections through route design and in-truck data collection; cart inventory tracking; billing customers based on usage of services; fleet that use renewable fuel sources; and waste processing facilities.

Radio-frequency identification (RFID) chips are embedded in our black and green residential carts, and are being considered for the blue carts. These chips allow us to identify and track carts, and in the future could allow us to bill customers based on how many times they put their cart out for collection. Last year we conducted a pilot on RFID-reading technology on several black cart trucks. More testing is required to ensure the reliability of data collected and the robustness of the technology. We have also recently implemented a new route design software to improve the efficiency of our collection routes.

We currently have two CNG collection trucks in our fleet, and are gathering information on electric truck options and what approaches have been successful in other municipalities. This will inform a potential strategy for alternative fuels for our fleet.

In waste treatment, technologies are ever improving for processing materials and converting residual waste into energy. Section 3.2.2 highlights the importance of recycling technologies for improving the

success of our recycling programs, and Attachment 3 provides details on the status of waste-to-energy technologies and the considerations for investing in these.

As with any significant investment, and especially when it comes to leading-edge technology, partnerships are very important. Universities, research companies, and waste management organizations can provide ideas and the latest information on new technologies; private companies can bring expertise and support with designing, building, and operating facilities or piloting new technologies; and other regional municipalities, the Province of Alberta, and the federal government can help in financing projects.

Next steps:

- Continue to test technology for in-truck data collection and cart inventory tracking.
- Continue to monitor status of waste-to-energy technology.
- Explore possibilities for fleet that use alternative fuel sources.

3. SUMMARY

Over the period of 2018 to 2025 WRS will continue to work towards our target of achieving 70 per cent diversion of waste by 2025. There is a progression of work that is being undertaken to strategically move Calgary towards this target.

Education and engagement is the key element for optimizing participation in our programs, and will continue to be required to ensure the success of existing programs and design and implement new ones. Targeted programs, and pricing and enforcement will also be important elements for continuing to move us towards 70 per cent diversion. While we continue to implement the overarching plan for achieving 70 per cent diversion by 2025, we will also continue to respond to the trends and opportunities that emerge.

WASTE & RECYCLING SERVICES

2018 Report on Waste to Energy

Table of Contents

1. INTRODUCTION

On 2015 December 7, as part of the Waste Diversion Target Update report (UCS2015-0835), Council directed Administration to report back in Q1 2018 on the potential application of waste-to-energy technology. In the interim, WRS provided a Waste to Energy Status Report to SPC on Utilities & Corporate Services in 2016 as part of the Waste Diversion Target Update (UCS2016-0470). On 2018 February 26, Council approved a Deferral Report (UCS2018-0147) allowing Waste & Recycling Services (WRS) to include this report on waste-to-energy as part of the Waste & Recycling Services Outlook report.

Waste & Recycling Services (WRS) is continually investigating, developing and implementing programs that enable the diversion and processing of materials otherwise destined for landfill to support The City's target of 70 per cent diversion from landfill by 2025. The intent of these programs is to enable the reuse, recycling and composting of solid waste materials in alignment with the waste management hierarchy (Figure 1).

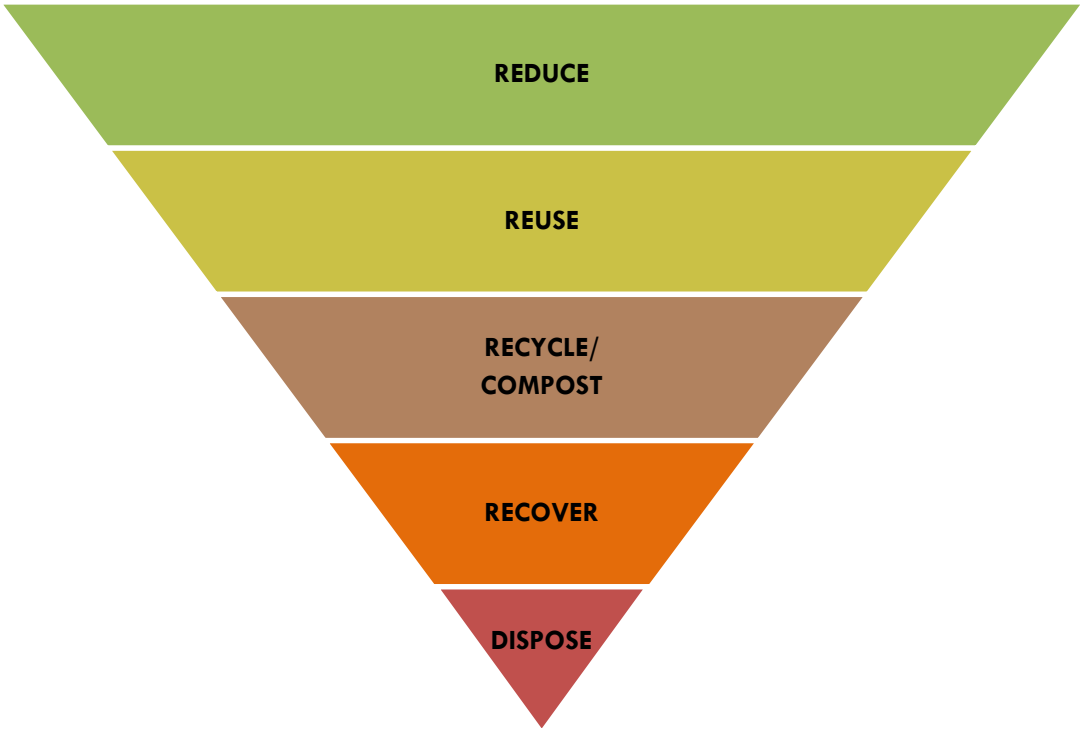


Figure 1: Waste Hierarchy

Reduction means consumption is decreased so that waste is not generated in the first place. Reuse and recycling activities return valuable commodities to the marketplace, avoiding the energy consumption and environmental impact of collecting virgin materials from renewable and non-renewable resources. When efforts to reduce, reuse, recycle and compost have been exhausted, Waste-to-energy (WTE) technology offers a final opportunity to recover energy from residual waste before waste is deposited in

a landfill. The evolution of WTE has shifted somewhat from the traditional mass burn incineration of waste to alternative technologies that output synthetic gases, chemicals and liquid fuels.

WTE is not required to reach the 70 per cent by 2025 goal, as described in the UCS2016-0470 target update report. However, WTE technology was included in the 2007 strategy, and WRS is still considering WTE, bearing in mind multiple factors that influence the decision to implement and choose a WTE technology. With the recent introduction of new diversion policies and programs, we don't fully understand what residual waste will remain as a feedstock for WTE. We need to let our programs mature and understand our residual waste before we can assess the potential fit for WTE. Therefore, the earliest estimated timeframe for the introduction of WTE technologies for the treatment of waste by The City is beyond 2025. Considerations are described in the next section.

2. CONSIDERATIONS FOR INVESTING IN WTE

WTE facilities require a significant investment, and there are many factors to consider to ensure that The City of Calgary makes an informed decision. Common considerations that influence decisions to implement WTE include:

- Life of existing landfills
- Feedstock Assessment
- Tonnage projection
- Choice of technology
- Greenhouse gas emissions
- Capital and operating costs
- Timeframe and Project Schedule

Each of these considerations are discussed in more detail below.

Life of City of Calgary Waste Management Facilities

City of Calgary landfills are an asset that require protection to ensure their effective life lasts as long as possible. The most recent forecast is that City of Calgary WMFs have over 30 years of combined landfill disposal life left. Efforts to protect landfill space to date include diversion initiatives such as Blue and Green Carts, Community Recycling Depots and Throw and Go's, Bylaws requiring recycling and organics diversion, and disposal tipping fees at WMFs that encourage diversion of recyclable and organic materials. In jurisdictions where landfills have reached capacity or will reach capacity in the short-term, and where siting a new landfill is difficult, WTE becomes a more attractive option as costs for other traditional methods of disposal increase.

Feedstock Assessment

Making an appropriate technology choice for the implementation of WTE is heavily influenced by the composition and volume of feedstock for the facility. With the introduction of multiple diversion policies

and programs over recent years, Calgary's waste composition is vastly different from our most recent composition studies, which were completed in 2014. WRS plans to begin another round of waste composition studies in late 2018, which will be completed in 2020. The results of those studies, combined with determinations of other suitability factors, will inform the assessment of the need and fit for WTE in Calgary.

Tonnage Projection

WTE facilities operated by third parties typically require guarantees on the volume of waste they will receive, as facilities run more efficiently when operated with as-designed waste volumes. Therefore, one of the considerations is the need for a steady and predictable volume of waste. As diversion programs mature, municipalities can see waste volumes drop below guaranteed volumes, making increasing diversion economically unattractive. In Calgary, waste disposed in landfill had been relatively static until 2014, when the economy, diversion and other external factors resulted in a steady decline to present day waste volumes (Figure 2). As new diversion programs mature we will have a more reliable projection of future waste volumes.

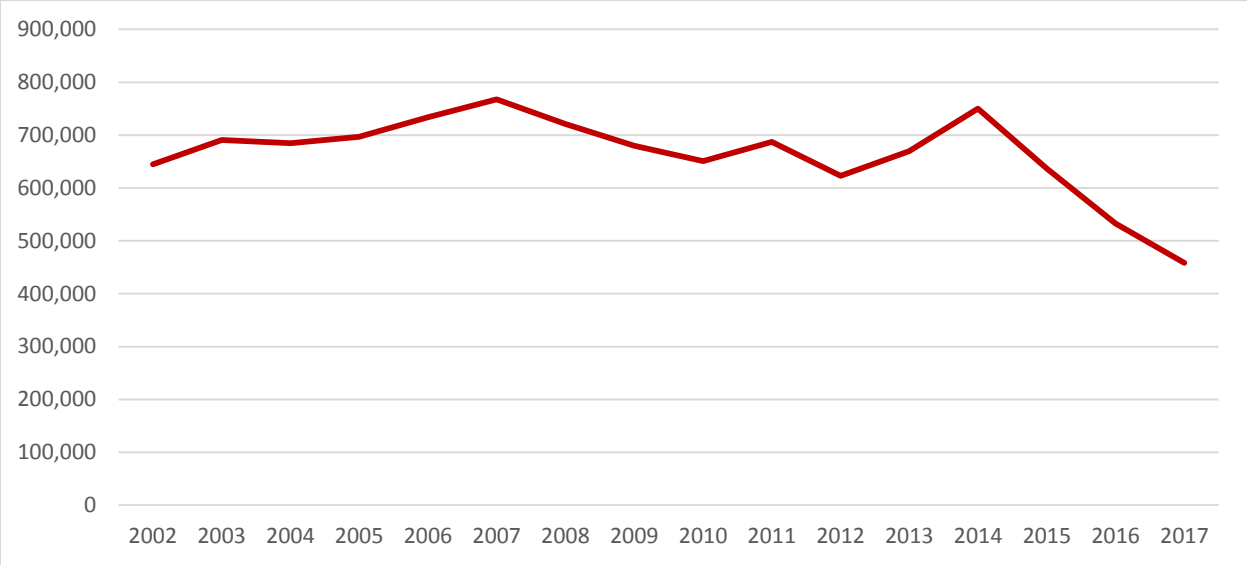


Figure 2: Historical Annual Waste to Calgary Landfills (Tonnes)

Choice of Technology

The table below provides detail related to common technologies used in the WTE industry and their state of use for municipal solid waste (MSW). Technologies are in varied states of reliability, commercialization and use in worldwide markets and as they continue to evolve, WRS will continue to monitor and evaluate their potential.

Table 1: Waste Conversion Technologies

Technology	State of Technology	Considerations
Mass Burn Incineration	Most common installation of WTE worldwide; however, new installations are rare.	Conventional combustion or mass burn incineration is the most common type of WTE used around the world to produce heat, power, or combined heat and power from MSW. In a direct combustion system, MSW is burned to generate heat, which is then used to boil water in a boiler to be used for heating/cooling applications, process applications, or driving steam turbines to generate electricity.
Gasification	Enerkem in Edmonton is the first example of a commercial gasification facility for MSW in Canada, but is not yet fully proven.	Gasification is an emerging WTE technology in which MSW is heated to high temperatures in a limited-oxygen environment. Gasification produces heat and combustible syngas (carbon monoxide, hydrogen and carbon dioxide), which can be burned directly in gas engines, used to produce methanol and hydrogen, or converted via the Fischer–Tropsch process into liquid hydrocarbons.
Pyrolysis	No pyrolysis facilities for a mixed MSW feedstock exist in North America with.	Pyrolysis is an emerging WTE technology in which MSW is heated to high temperatures in the absence of oxygen. Pyrolysis is a thermochemical decomposition of organic material and produces bio-oil, gases and heat as its principle products.
Plasma gasification	There are no commercial plasma gasification facilities for MSW in North America. Commercially implemented facilities exist in the UK, Japan, China and India.	Plasma gasification is less proven on a commercial scale and involves more complex technological processes. These systems utilize a plasma arc reactor in an enclosed chamber that contains plasma torches used to heat MSW to 3800 ^{o}C or higher. These high temperatures convert organic materials into synthetic gas and inorganic materials into a non-hazardous waste material (slag) that can be disposed of in landfill.
Anaerobic Digestion (AD)	AD is a standard technology in use in many jurisdictions across North America to manage biodegradable waste. The City	AD does not require high temperatures used in conventional and advanced thermal treatments. It is a biochemical process in which microorganisms break down the

	of Surrey's new biofuel facility (using AD and composting) began operations in March 2018	biodegradable fraction of MSW in the absence of oxygen, resulting in the production of methane and carbon dioxide, otherwise known as biogas. The biogas produced during AD can be used directly for heating in combined heat and power gas engines, or it can be upgraded to pipeline-quality gas called biomethane or renewable natural gas. The City currently manages residential organics through the composting facility, which might make this technology a less valuable option.

Greenhouse Gas Emissions

One of the necessary considerations for implementation of WTE will be the impact that it will have on greenhouse gas emissions related to management of residual waste. These impacts will be dependent on waste composition, effectiveness of landfill gas capture from our landfills, and the WTE technology chosen.

Capital and Operating Costs

Research into Canadian WTE facilities estimates capital costs may range between $100 million and $500 million, depending on facility size and technology chosen. Operating costs are also reliant on size and technology, but could reach up to $15 million per year. Construction of a Mixed Waste Processing Facility (MWPF) is often required to deliver waste to the WTE facility in a useful format. A MWPF can add an additional $40 million to the project cost.

WRS is considerate of costs and of its current financial situation. WTE remains a higher cost approach to managing residual waste than landfill. In light of this and the fact that the composition and volume of our potential feedstock is unknown, now is not the appropriate time to choose WTE as an alternative to landfill. Given that WTE is not needed to reach 70 per cent by 2025 target, there are currently no plans for the construction of a WTE facility.

Timeframe and Project Schedule

For the City of Calgary, delivering a project of this magnitude could take approximately 10 years from the time of Council approval. Finding a suitable location for a WTE facility may be challenging considering stringent permitting requirements and potential stakeholder opposition to the operation of a conversion-based waste treatment facility. The choice of delivery model for the project (public/private or a public private partnership) could also affect the timeframe of delivery.

3. UPDATE ON THE CURRENT STATE IN CANADA

There are currently four large-scale (>100,000 tonnes annually) mass burn incineration facilities operating in Canada. The facilities are located in Quebec City, QC; Burnaby, BC; Brampton, ON; and the Regions of Durham/York, ON.

There is only one alternate thermal conversion technology functioning commercially in Canada. Enerkem is using gasification technology in Edmonton to produce methanol and ethanol from MSW. Enerkem continues to work on modifications that will allow their processes to operate in the most efficient manner possible. This is a leading technology and accordingly there are some growing pains. It is an opportunity for us to learn from our neighbours and apply those lessons to any future WTE initiatives.

Descriptions of the facilities listed above were provided in the Waste to Energy Status Update as part of the Waste Diversion Target Update in 2016 (UCS2016-0470). Surrey's $68 million biofuel facility began operations in March 2018. The new system is described as North America's first closed-loop organic waste management system. The facility converts curbside organic waste from homes into renewable energy using anaerobic digestion to power the city's fleet of waste collection trucks. Excess fuel will be transferred to the new district energy system that heats and cools Surrey City Centre.

WRS is unaware of any further WTE initiatives approved in Canada.

4. SUMMARY

Recent experiences in other municipalities suggest that WTE technology is still evolving. As with the Green Cart Program development, The City is in an advantageous position to learn from other municipalities and provide clear, cost-effective direction for future capital investment. We do not have a financial incentive to invest in WTE, and can meet our 70 per cent diversion by 2025 goal without investing in WTE; however, we are monitoring to ensure the choice of recovery and disposal options is appropriately managed.

The estimated cost to implement a WTE facility is between $100-500 million in capital investment, with operating costs that could reach up to $15 million per year, and would require a guaranteed volume of waste. To narrow this investment range and identify an appropriate technology and facility size, more certainty regarding feedstock composition and volume will be required. The waste composition studies will be completed in 2020 and will contribute to the evaluation of the business case for this type of technology.

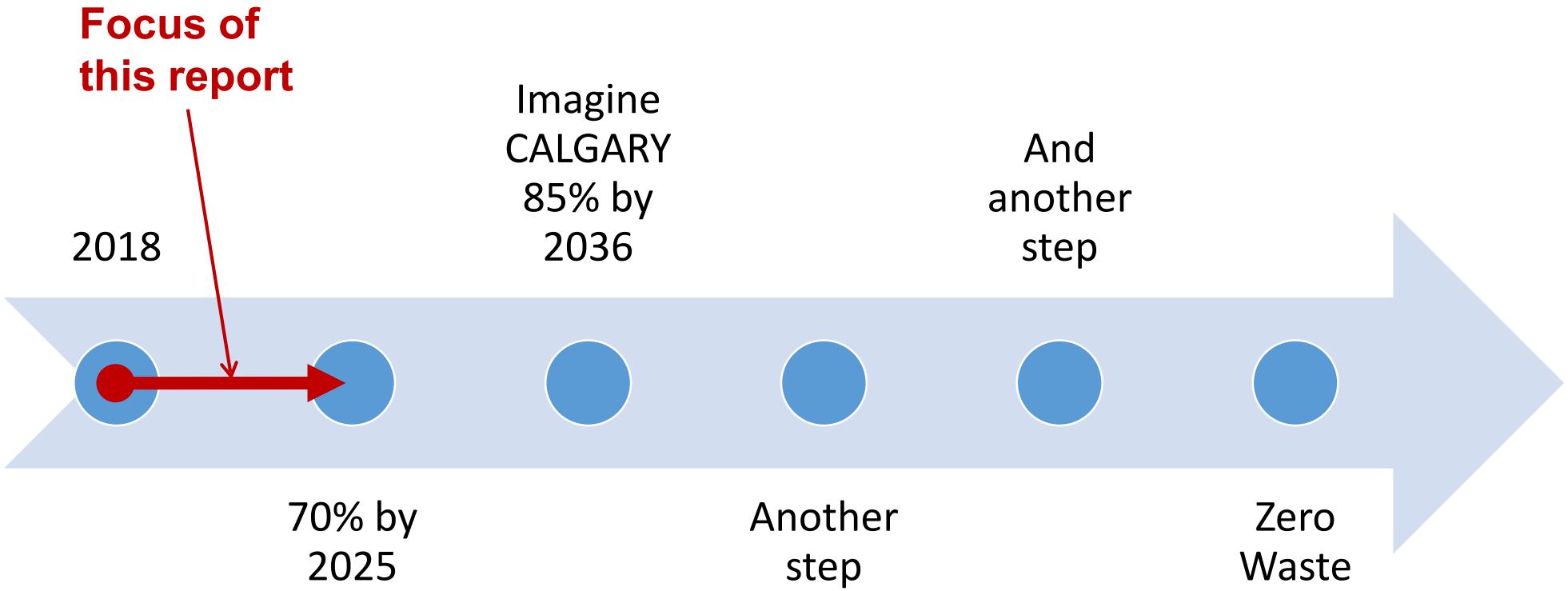
Waste & Recycling Services Outlook for 2018 to 2025

Standing Policy Committee on Utilities and Corporate Services
UCS2018-0153
2018 April 18

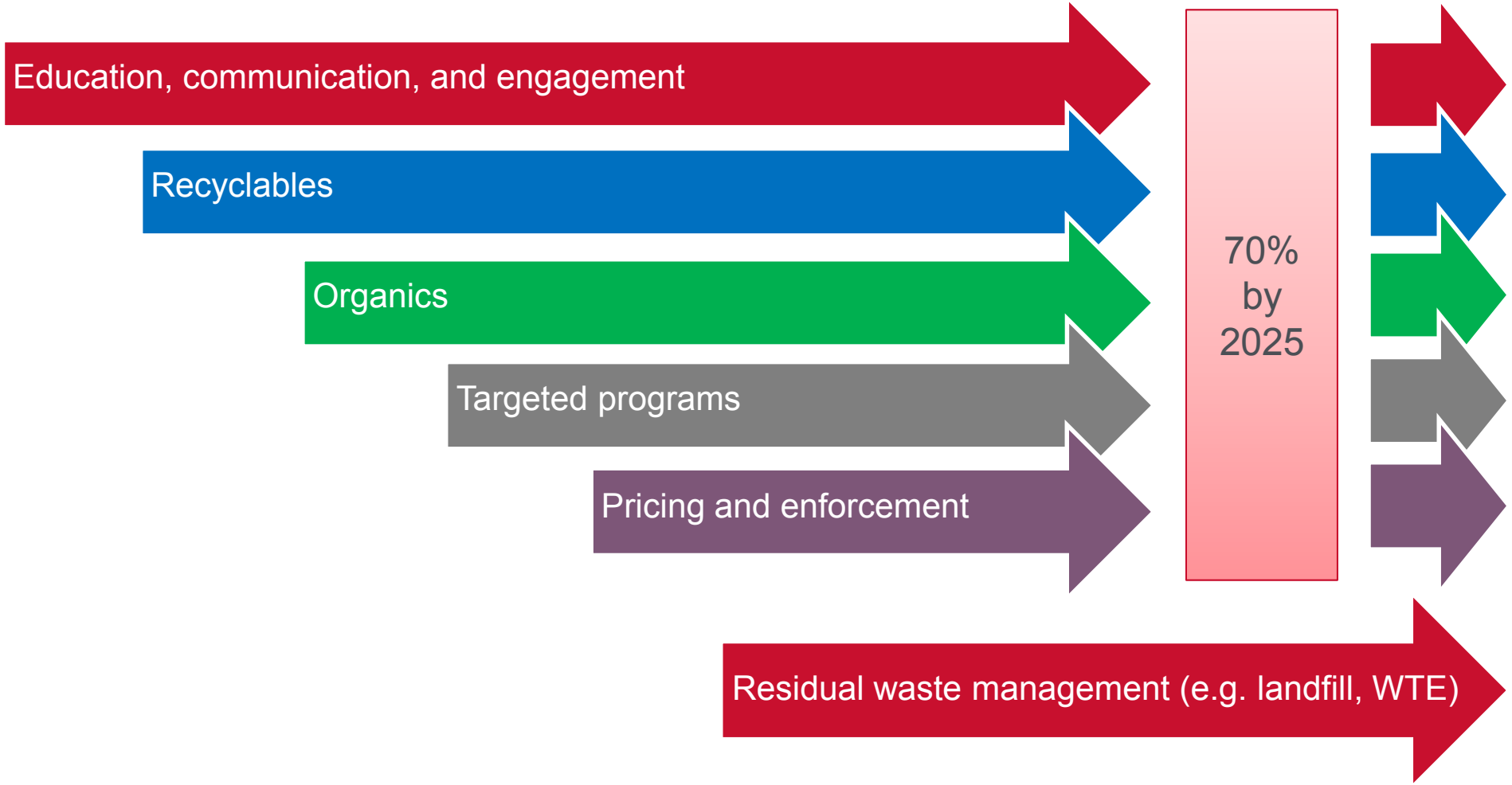
Objective of this report

Present the Waste & Recycling Services outlook for 2018 to 2025, including key trends, opportunities, and initiatives.

Leading the community towards zero waste



The plan for achieving 70% by 2025



Trends and opportunities

Trend #1: Increasing customer expectations

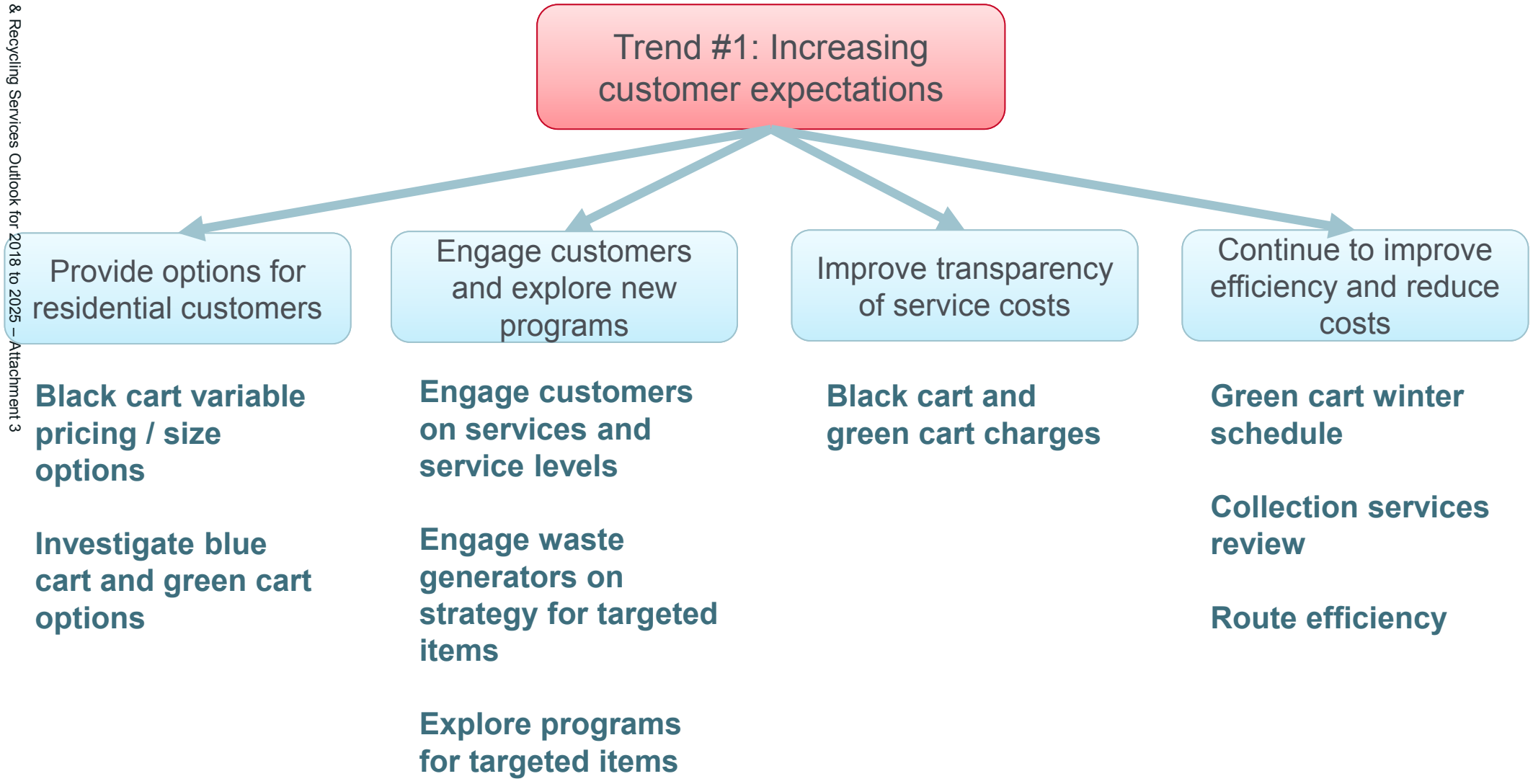
Trend #2: Changing market standards for recycled materials

Trend #3: Increasing contamination of recyclables

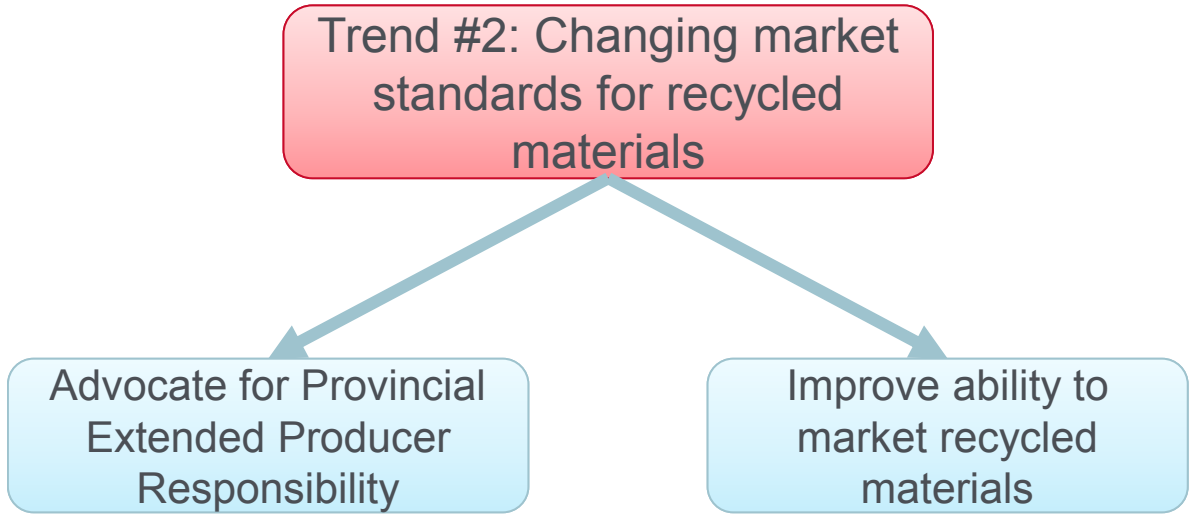
Trend #4: Decreasing tonnage of waste for disposal

Trend #5: Advancing technology

Trends and opportunities



Trends and opportunities



Alberta Urban Municipalities Association

Recycling Council of Alberta

Explore alternative markets

Improve quality of recycled materials

Trends and opportunities

Trend #3: Increasing contamination of recyclables

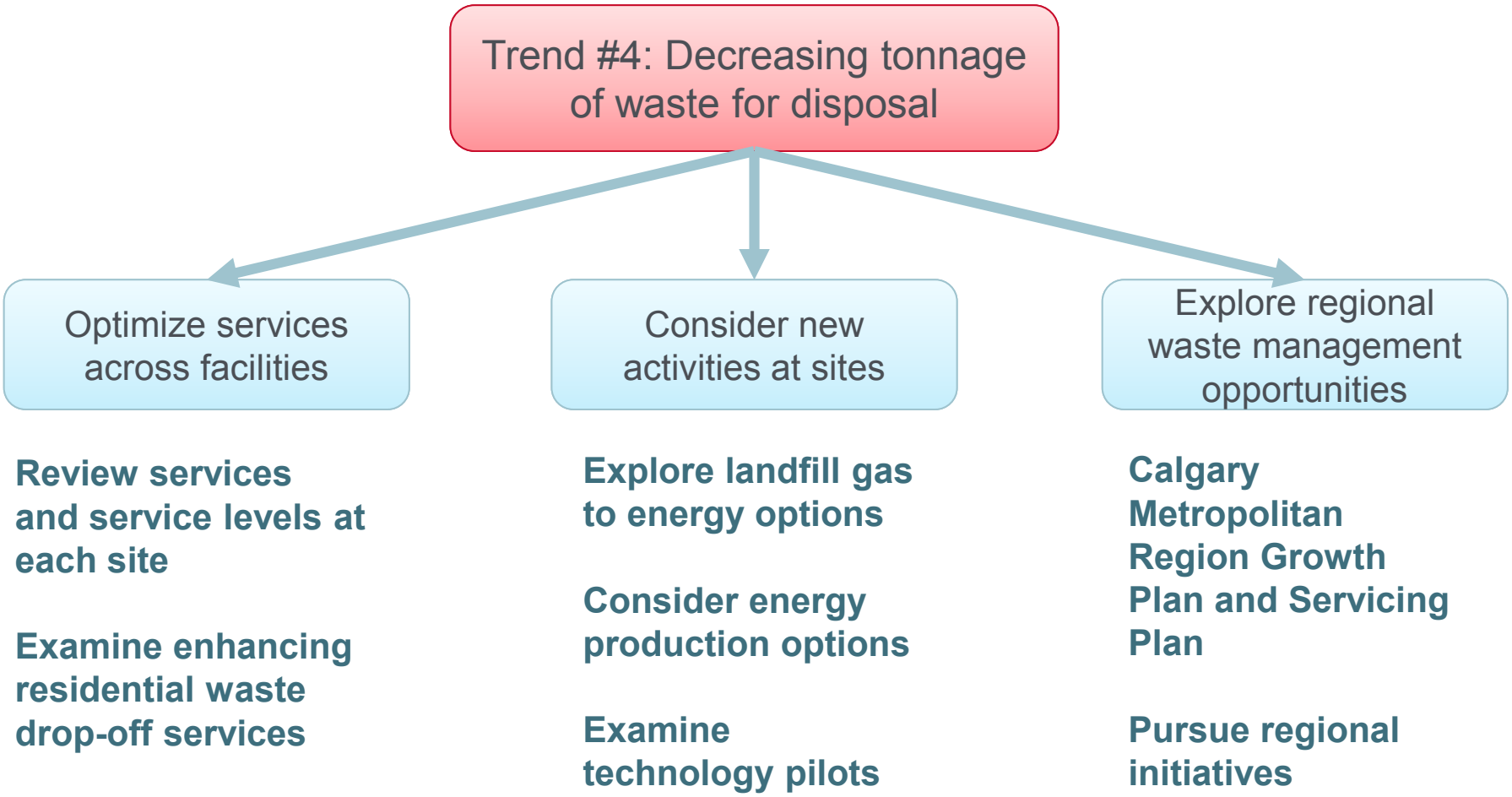
Enhance education and enforcement

Targeted communication and education campaigns

Communication and education plans for diversion programs

Explore enforcement of programs

Trends and opportunities



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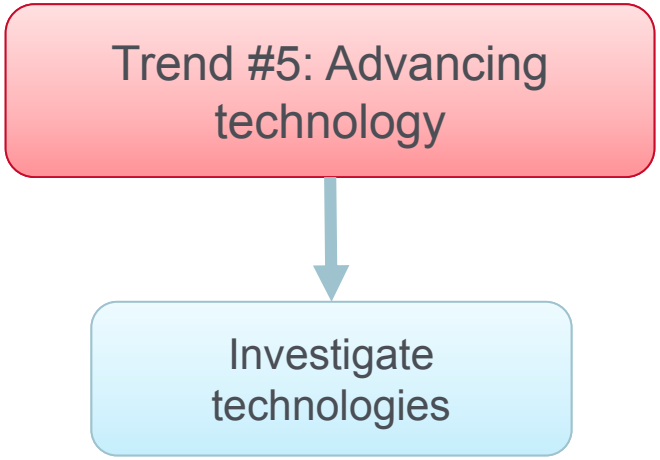

Continue to test technology for in-truck data collection and cart inventory tracking

Continue to monitor waste-to-energy technology

Explore alternative fuels for fleet

Climate

WRS Operations

- Landfill gas capture
- Solar energy production
- Fleet management

Community-wide

- Organics diversion
- Waste reduction

Recommendation

That the SPC on Utilities & Corporate Services receive this report for information.

Calgary

Waste & Recycling Services Outlook for 2018 to 2025

Standing Policy Committee on Utilities and Corporate Services
UCS2018-0153
2018 April 18

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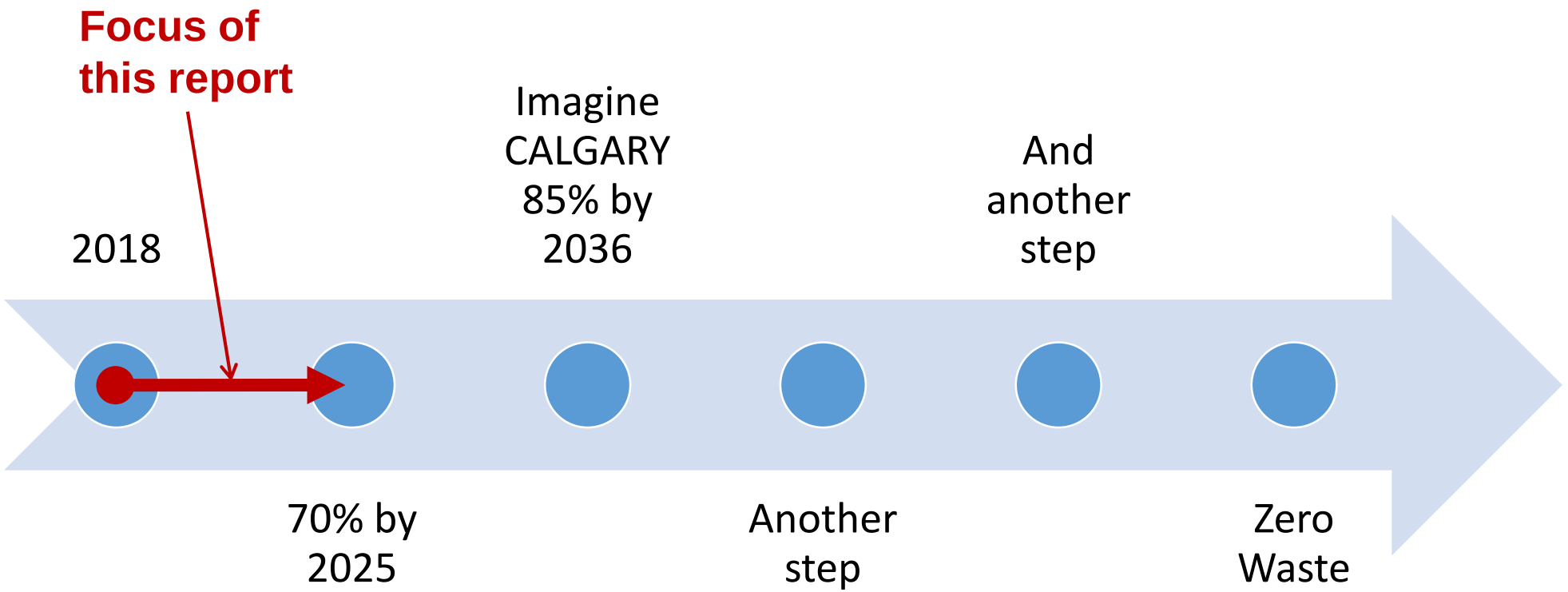
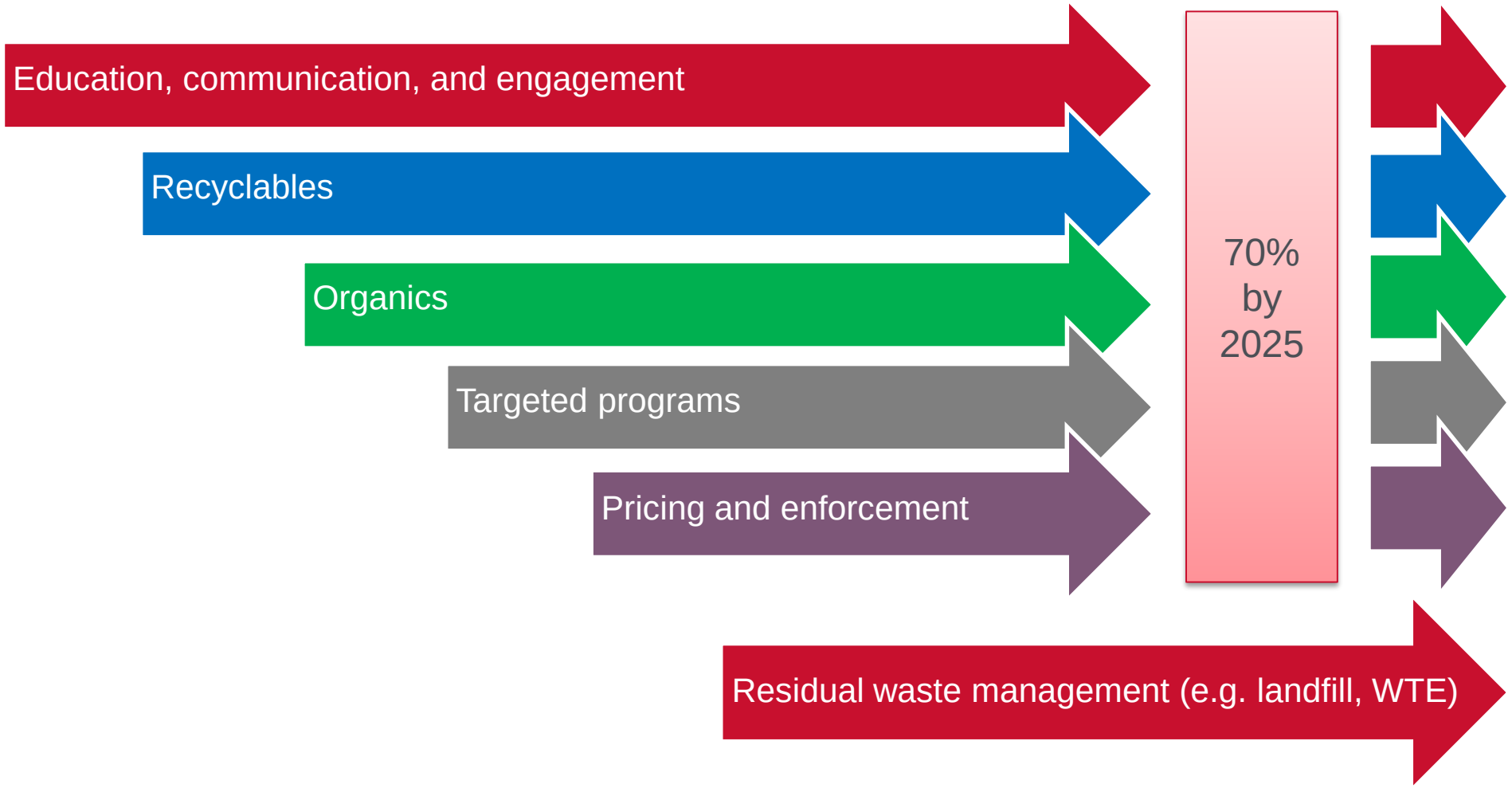


The plan for achieving 70% by 2025



Trends and opportunities

Trend #1: Increasing customer expectations

Trend #2: Changing market standards for recycled materials

Trend #3: Increasing contamination of recyclables

Trend #4: Decreasing tonnage of waste for disposal

Trend #5: Advancing technology

Trends and opportunities

Trend #1: Increasing customer expectations

Provide options for residential customers

Black cart variable pricing / size options

Investigate blue cart and green cart options

Engage customers and explore new programs

Engage customers on services and service levels

Engage waste generators on strategy for targeted items

Explore programs for targeted items

Improve transparency of service costs

Black cart and green cart charges

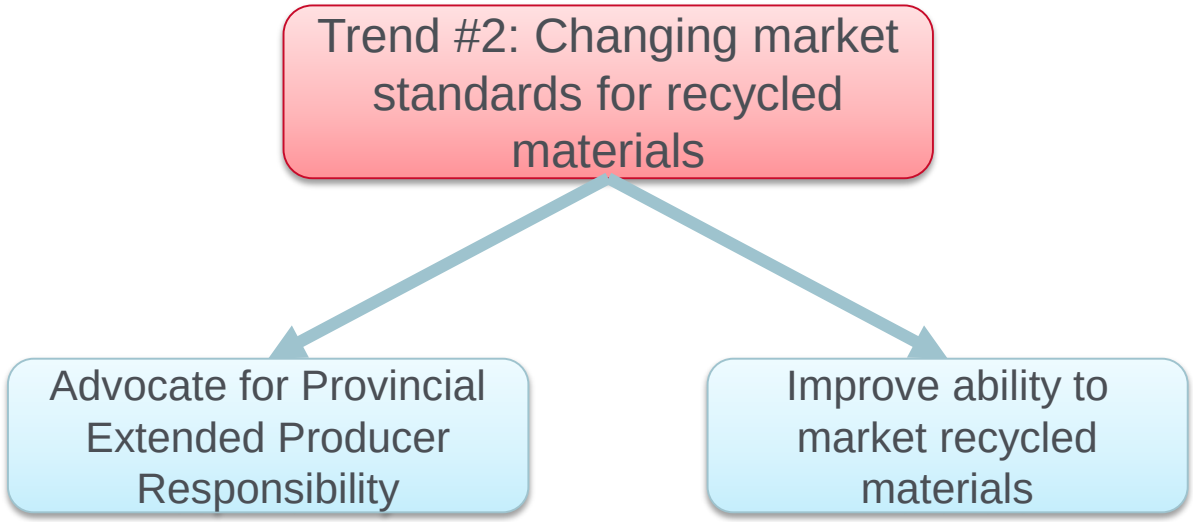
Continue to improve efficiency and reduce costs

Green cart winter schedule

Collection services review

Route efficiency

Trends and opportunities



Alberta Urban Municipalities Association

Recycling Council of Alberta

Explore alternative markets

Improve quality of recycled materials

Trends and opportunities

Trend #3: Increasing contamination of recyclables

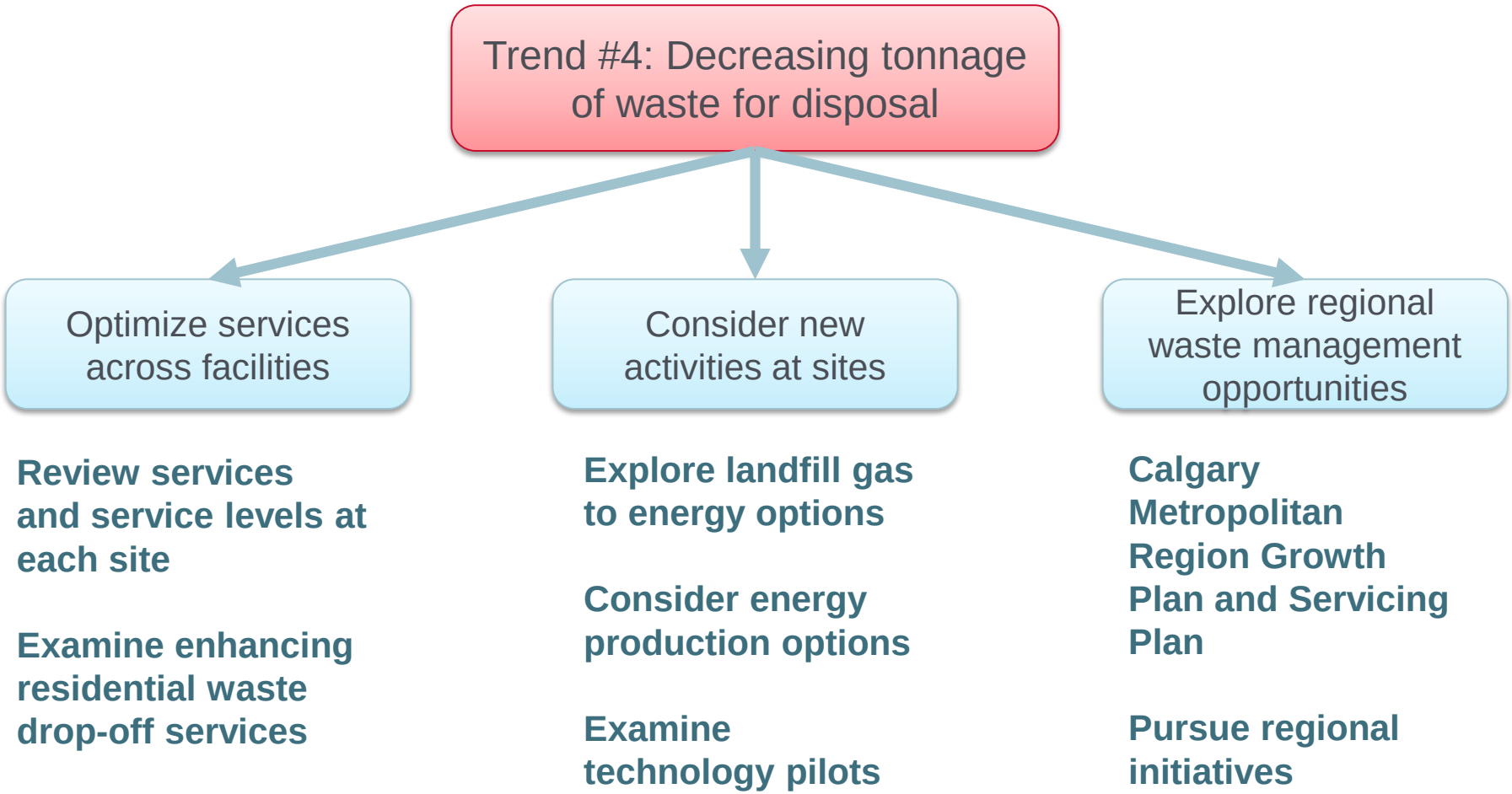
Enhance education and enforcement

Targeted communication and education campaigns

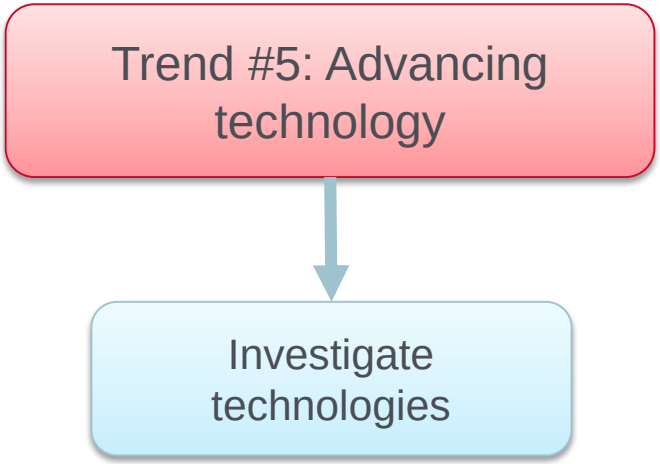
Communication and education plans for diversion programs

Explore enforcement of programs

Trends and opportunities



Trends and opportunities



Continue to test technology for in-truck data collection and cart inventory tracking

Continue to monitor waste-to-energy technology

Explore alternative fuels for fleet

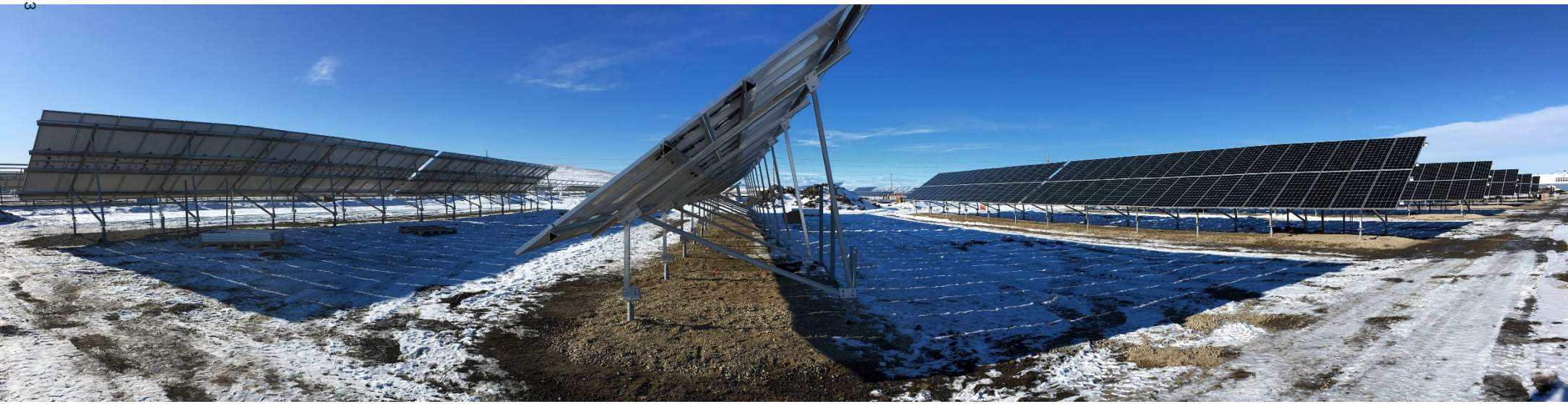
Climate

WRS Operations

- Landfill gas capture
- Solar energy production
- Fleet management

Community-wide

- Organics diversion
- Waste reduction



Recommendation

That the SPC on Utilities & Corporate Services receive this report for information.

The City of Calgary 2017 Infrastructure Status Report

EXECUTIVE SUMMARY

The 2017 Infrastructure Status Report (ISR) is a key document helping City Council make informed infrastructure investment decisions. It is produced every business cycle, providing information on overall infrastructure condition to inform and guide decisions to ensure that The City's infrastructure maintains the ability to deliver required services to the citizens of Calgary.

ADMINISTRATION RECOMMENDATION:

That the Standing Policy Committee on Utilities and Corporate Services recommends that Council receive the 2017 Infrastructure Status Report for information.

PREVIOUS COUNCIL DIRECTION / POLICY

City of Calgary's Asset Management Policy – ALT2016-0829 (GN-001(B))

BACKGROUND

The Infrastructure Status Report (Attachment 1) is prepared every business cycle in alignment with the business planning and budgeting process. It supports Council's Fiscal Plan for Calgary and Calgary's Municipal Development Plan. The 2017 Infrastructure Status Report is the fifth iteration of the document since the initial publication in 2004.

Calgary's Asset Management Strategy identified 11 essential elements of an effective asset management system. The four elements listed below guide the development of the ISR:

- An accurate and consistent inventory for all municipal infrastructure.
- Continual infrastructure status reporting to enable asset stewards to develop infrastructure investment priorities.
- Alignment between service and infrastructure decisions with future urban form goals.
- Benchmarking to measure infrastructure performance.

As a result, the ISR provides answers to five key questions:

- What do we own?
- What is it worth?
- What condition is it in?
- What is its remaining service life?
- What is the infrastructure funding gap?

The benefits of knowing the answer to these questions assists with:

- Ability to plan for and manage the delivery of the required level of service
- Avoidance of premature asset failure
- Risk management associated with asset failures, and mitigation of the consequences of failure
- Accurate prediction of future expenditure requirements through understanding remaining asset life and capital investment needs

The City of Calgary 2017 Infrastructure Status Report

An essential element of a successful asset management program is an understanding of the condition and needs of a corporation's infrastructure that enables educated investment decisions. The ISR provides The City of Calgary with a reference point to benchmark infrastructure needs. It identifies investment shortfalls and provides future direction for managing corporate assets.

The current replacement value and age data for the 2017 ISR represents post-flood data, reflective of The City's portfolio of assets as of January 1, 2017.

INVESTIGATION: ALTERNATIVES AND ANALYSIS

The 2017 Infrastructure Status Report has the following key findings:

- Since the last Infrastructure Status Report (2013), The City's infrastructure assets have increased in value, from $60.48 billion to $84.70 billion. The primary reasons for this increase in inventory replacement value include implementation of new cost evaluation methods, improvement in The City's understanding of its asset inventory, addition of new assets built by The City and acquired from developers, cost escalation factor and the delivery of a broader portfolio of services.
- Average life expectancy of the infrastructure, on a weighted scale, is currently about 68 years with the remaining life at 29 years. Since 2013, remaining asset life has decreased slightly.
- 88% of The City's infrastructure assets are in good or very good physical condition and 9.70% are in fair condition. Approximately 2.30% of The City's assets are in poor physical condition.
- Over the next 10 years, The City of Calgary will require an additional investment of $5.67 billion to fund infrastructure maintenance, growth and operating requirements.
- Budget cuts in 2017-2018 will have an impact on service levels and capital maintenance which can affect this 10-year funding gap forecast and hence, service delivery.
- The 10-year operating gap forecast has dropped by $1.04 billion since 2013.
- The capital maintenance gap forecast has dropped by about $0.29 billion indicating that additional commitments have been made to maintaining The City's assets based on business units' better understanding of levels of service and risk.
- Currently identified financing sources for service growth over the next 10 years, also fall short by $3.19 billion. This was identified in 2013 as $3.23 billion.

Stakeholder Engagement, Research and Communication

The 2017 Infrastructure Status Report is a consolidation of corporate-wide asset data and has been developed from inputs from all City of Calgary asset managing business units. Business units have been involved in providing and confirming asset data as well as review and approval of the report. The report was communicated to business units through the Accommodation and Infrastructure Steering Committee (AISC) and the Asset Management Network.

Strategic Alignment

The 2017 Infrastructure Status Report is presented to Council to provide perspective regarding the state of The City's infrastructure to support capital allocations and infrastructure decision making. It aligns with the corporation's Asset Management Policy – ALT2016-0829 (GN-001(B)) and the four identified elements of an asset management system: Plan, Do, Check, Act. The 2017 Infrastructure Status Report supports the Check component of the Policy, specific to

managing the performance of asset management. The 2017 Infrastructure Status Report also supports Calgary's Asset Management Strategy (2005).

Social, Environmental, Economic (External)

The City can play its role in fostering the local economy through ongoing investments in infrastructure.

Financial Capacity

Current and Future Operating Budget:

The Infrastructure Status Report is presented to provide perspective regarding the state of The City's infrastructure to support capital allocations and infrastructure decision making.

Current and Future Capital Budget:

The Infrastructure Status Report is presented to provide perspective regarding the state of The City's infrastructure to support capital allocations and infrastructure decision making. The findings of this report will act as input to ongoing actions by business units in their actions and objectives in asset management and business plans.

Risk Assessment

The two key risk areas are:

- The quality of analysis and decision making resulting from nonaligned or nonstandard data and reporting between various Business Units.
- The ability or speed of adoption of the asset management practice as a result of embedded corporate culture and/or resource availability.

Significant risks are associated with deteriorating or failing infrastructure. At a Corporate level, the risk to The City includes, but is not limited to, the ability to provide appropriate level of service, injury or death, alignment with sustainability objectives and financial viability. In accordance with The City's Integrated Risk Management Framework the Infrastructure Status Report is one mechanism for monitoring and reporting on the status of The City's infrastructure health as a risk management strategy. Successful implementation of the asset management program and the continued use of the Infrastructure Status Report to enable budget decision making helps mitigate these risks.

REASON(S) FOR RECOMMENDATION(S):

The 2017 Infrastructure Status Report is presented to Council to provide perspective regarding the state of The City's infrastructure to support capital allocations and infrastructure decision making.

ATTACHMENT(S)

1. Attachment 1 – The City of Calgary 2017 Infrastructure Status Report

Calgary

2017 Infrastructure Status Report

ISC: Unrestricted | UCS2018-0116 | ATTACHMENT 1

Preface

Infrastructure Status Report (ISR) is a key component of The City of Calgary's asset management system. It is produced every business cycle to enable sustainable management of corporate infrastructure. The report highlights the status of all City-owned assets and identifies areas of short- and long-term infrastructure risk. This information helps The Corporation maintain its ability to deliver the required services to the residents of Calgary.

The 2017 report is the fifth iteration of the document. It serves as a guide for City Council to make informed infrastructure investment decisions by highlighting the needs and performance of its infrastructure ahead of the development of 2019-2022 service plans and budget – "One Calgary."

The data for the 2017 Infrastructure Status Report is based on The City's portfolio of assets as of Jan. 1, 2017 and is reflective of post-2013 flood data.

The following key principles guide the development of the ISR:

- The ISR benchmarks future infrastructure needs over a 10-year horizon.
- Infrastructure needs include operating, capital maintenance and capital growth costs.
- Operating and capital maintenance costs relate to maintenance and upgrade of existing infrastructure, and capital growth costs relate to investments required to support The City's expansion.
- Information used in this report was collected from 11 business units that own 99 per cent of the assets as well as Calgary Police Service, Calgary Parking Authority and Calgary Public Library. The data was rolled up to present an overall corporate picture.
- Since 2015, The City has been working with the Calgary Public Library and seven civic partners (Arts Commons, Calgary TELUS Convention Centre, The Calgary Zoological Society, Fort Calgary Preservation Society, Heritage Park Society, Lindsay Park Sports Society, and Calgary Science Centre Society) to support partner-specific asset studies and tools. Work with most civic partners is underway and will be complete for inclusion in the next report.
- The City of Calgary also reports the value of its infrastructure assets in its annual financial statements. These statements, however, report depreciated asset values in compliance with the Public-Sector Accounting Board's, PS3150 Tangible Capital Asset reporting requirements. Depreciated asset value[1] is an accounting concept which differs significantly from the current replacement value (CRV)[2]. CRV, as used in this report, is the cost to replace an asset at the current price.

[1] **Depreciated asset value is calculated by depreciating the original purchase cost over the useful life of the asset.**

[2] **Current replacement value is calculated by appreciating the original purchase cost using escalation rates that depend on market conditions and inflation.**

Table of Contents

Infrastructure Status Report (ISR) is a key component of The City of Calgary's asset management system.

It benchmarks future infrastructure needs over a 10-year horizon.

Executive Summary

The City of Calgary owns, operates and maintains a wide range of infrastructure assets. These assets support social, economic and environmental services that The City provides. To continue to provide these services, it is important to know the state of its current assets. This information helps The Corporation effectively and efficiently manage its infrastructure. With proper asset management, The City can play its role in fostering the local economy through ongoing investments in infrastructure. In addition, this information also helps us effectively plan quality services for the citizens of Calgary.

This report provides a snapshot of The City of Calgary's current infrastructure inventory. It informs and guides the decision makers as they plan for the next four-year business cycle. Information used in this report is based on the best available data, as of Jan. 1, 2017, supplied by various business units/service areas.

An analysis of corporate asset data shows that, over the past four years, The City's infrastructure assets have grown in value from $60.48 billion to $84.70 billion. This increase has been a result of the following:

- **Addition of new assets:** The City's asset base has expanded over the last business cycle to meet the growing demand. Assets created in the last four years include Airport Tunnel, new interchanges, new Treated Effluent Water Facility, Valleyfield Station, new Fats, Oils and Grease Facility, new Headworks Facility, capacity upgrades at the Bonnybrook Wastewater Treatment Plant and upgrade of its electrical system, as well as the addition of a Carbon Dioxide System, and Sodium Hypochlorite Facilities at Water Treatment Plants.
- **Asset management maturity:** The City's asset management practices have matured which has led to a better understanding of its asset base. This has resulted in an improved and more detailed inventory recording and subsequent reporting.
- **Cost escalation factor:** Current replacement value is calculated by using the inflationary index against the cost.
- **New cost evaluation methods:** New methods have been developed for certain asset types to help standardize the methodology going forward. These include the new unit rate for pavement and concrete and unit cost increase for water/sanitary services (e.g. pipe and valve replacements).

It should be noted that the asset value stated above does not include land holdings that The City owns. This is because land does not depreciate like other assets and, hence, does not require the same level of maintenance.

Asset condition is another useful indicator for The City because it helps us understand when interventions may be required to improve or maintain our levels of service. Analysis of past data shows a general upward trend over the last decade as efforts have been consistently made to improve the state of the assets. While the overall asset health is good (at 88 per cent), it is also seen that the condition profile has deteriorated since 2013 from 95 per cent. This indicates The City should consider additional expenditure on asset replacement, lifecycle maintenance and upgrades in order to maintain the desired service standards.


EXCEPT
BICYCLES
LIBERTINE
VIEW

Since 2013, The City's infrastructure assets have grown in value from $60.48 billion to $84.70 billion.

The 10-year infrastructure funding gap has been identified as $5.67 billion.

Executive Summary

It is also estimated that The City's total infrastructure needs, funded and unfunded, over the next 10 years is approximately $25.87 billion. The City forecasts the ability to fund approximately $20.2 billion during this time. The remaining $5.67 billion has been identified as the 10-year infrastructure funding gap. In the 2013 report, the 10-year gap was reported as $7.04 billion. Narrowing of this gap is an indication that The City is maturing in its asset management practices. This also reflects a dedication by City Council to invest in infrastructure.

To help close the infrastructure gap, Corporate Asset Management has continued its work with the business units. Focus has been to align condition assessments with a risk management strategy and well-defined levels of service. This integrated approach to asset management is vital in bringing about consistent asset management practices across all areas of The Corporation. This approach also ensures the use of assets is optimized. To continue to improve asset management at The Corporation, formalization of asset management planning/plans is taking place. This includes the following activities:

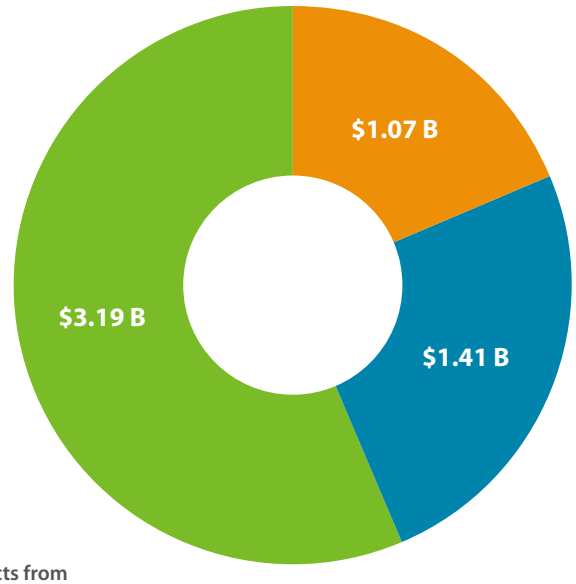
- Establishing standard performance monitoring mechanisms.
- Adopting risk management as a core business driver.
- Defining and aligning levels of service to asset performance.
- Developing comprehensive lifecycle management and financial plan.

Infrastructure Gap $5.67 ($ Billions)

$1.07 B
Total Operating Gap

$1.41 B
Total Maintenance Gap

$3.19 B
Total Growth Gap



*** Does not include Transit projects from RouteAhead including Green Line, as well as projects beyond the 10-year horizon.**

1.0 Introduction

1.1 History

The City of Calgary defines its assets as all physical infrastructure necessary to support social, economic and environmental services that it provides. In 2005, City Council approved an Asset Management Strategy and Corporate Asset Management Program to effectively and more efficiently use and maintain these assets. This set the stage for The City to develop an asset management system. This system is intended to monitor and maintain The City's assets. It is the foundation for infrastructure best practices that help The City provide effective municipal service while balancing smart growth and quality of life.

In general, the business units assess and maintain their assets and make recommendations for infrastructure growth. This work is completed with operational, strategic and governance support from the corporate asset management team and forms the basis of The City's asset management system. The asset management system is underscored by a process of continuous improvement based on the cycle of plan, do, check and act. The following three items are an important part of this cycle:

1. **Infrastructure Status Report (ISR)** – A corporate level document which includes business unit data. It reports on the overall state of City assets.
2. **Corporate Asset Management Plan (CAMP)** – A corporate plan which comprises individual business unit asset management plans and serves as an action plan for the improvement of The Corporation's Asset Management System (including practices, technology, people and business processes).
3. **Monitoring State of Asset Management or Asset Management Maturity** – This is measured within The City's Asset Management Plan.

1.2 Advancement of Asset Management System

Asset management provides a systematic, holistic, cost-effective and integrated approach to planning and management of assets. The purpose is to achieve agreed upon service levels with acceptable risk levels at the lowest lifecycle costs. Since the first-generation asset management strategy was developed in 2005, The City has evolved and improved its asset management capabilities. This has happened through the development of a more robust policy and updated strategy, the alignment of practices with international standards (ISO 50001), and the development of internal, made-in-Calgary-for-Calgary, corporate standards and frameworks.

Business units have developed investment forecasts that will begin to drive the development of business cases through the business planning period. In addition, there are clear actions for improvement identified by each of the business units. These actions include improving the understanding of performance and risk and using this information in decision-making, improving the quality of data and information, and integrating asset management into the core business planning processes.

Since 2008, The City has put a more concerted effort into developing asset management frameworks, plans, guidance and practice. This shows an improvement trend and to continue this trend, Corporate Asset Management and Infrastructure Calgary will need to collaborate further to ensure these initiatives are captured in business plans.

In 2016 and 2017, business units have identified more clearly the services they provide within their areas of responsibility. Most business units provide five or six clear service lines. Information provided by the business units with regards to infrastructure status or investment planning is not yet aligned with these service lines and a more aggregated view has been taken.

1.3 Role of Infrastructure Status Report

This report is a key component of The City of Calgary's asset management system, as noted earlier. The 2017 version of the ISR is the fifth iteration of the document. It continues to be an important document for helping to mitigate risk throughout The Corporation. It also serves as a guide for City Council to make informed infrastructure investment decisions.

This document helps The City understand the needs and performance of its infrastructure ahead of the development of 2019-2022 service plans and budget – "One Calgary."

We recognize the need to apply more robust decision-making processes that are founded on accurate data. This document seeks to build on these aspirations. It highlights the status of The City of Calgary's assets and provides an indication of its organizational capacity to deliver on strategic outcomes.

The infrastructure status is presented at an asset portfolio level, rolling up information and data from individual assets. This information provides an overall assessment of our assets and highlights how well these assets are achieving their strategic objectives. It consequently supports asset stewards to develop infrastructure investment priorities.

1.4 Purpose

Calgary's Asset Management Strategy identifies 11 essential elements for an effective asset management system. The four elements listed below guide the development of the ISR:

1. An accurate and consistent inventory for all municipal infrastructure.
2. Continual infrastructure status reporting to enable asset stewards to develop infrastructure investment priorities.
3. Alignment between service and infrastructure decisions.
4. Benchmarking to measure infrastructure performance.

As a result, the ISR provides answers to five key questions:

1. What do we own?
2. What is it worth?
3. What condition is it in?
4. What is its remaining service life?
5. What is the infrastructure funding gap?

The benefits of knowing the answer to these questions assist with the:

- Ability to plan for and manage the delivery of the required service level.
- Avoidance of premature asset failure.
- Risk management associated with asset failures, and mitigation of the consequences of failure.
- Accurate predication of future expenditure requirements through understanding remaining asset life and capital investment needs.

1.5 Report Overview

This report begins by answering the five key questions noted above. Answers to these five questions are first provided at a corporate level, followed by trend analysis based on the historical data. Answers to the questions are then provided at the asset portfolio level. The report ends with conclusions and next steps. More detailed information is available in the appendices. Information regarding service level and risk analysis can be found in the Corporate Asset Management Plan.

In June 2013, Southern Alberta and The City of Calgary experienced severe flooding because of a major rainstorm. The City of Calgary was faced with extensive damage to public infrastructure assets including bridges, roadways, public transit, a wastewater treatment facility, numerous City buildings, parks and pathways. Information technology and communications infrastructure was also impacted. The initial assessments quantified a total of 185 projects with an estimated cost of $445 million to repair or rebuild.

As of July 2017, the program of work to repair and replace infrastructure damaged by the 2013 flood has evolved into a total of 220 projects of which 194 have been completed at a total estimated cost ranging from $320 to $340 million. It is expected that the full program of work will be completed by the summer of 2019 (due to anticipated delays in provincial government approvals).

The data for the 2017 Infrastructure Status Report is based on The City's portfolio of assets as of Jan. 1, 2017 and reflects post flood data.

1.6 Methodology

Although there are many commonalities across business units, in terms of how they manage their assets and record asset data and transactions, there are also many differences. To complete the ISR in a consistent manner, the following methodology was adopted:

- The largest business units (that comprise over 99 per cent of The City's asset value) were contacted to provide their asset data.
- Corporate Analytics and Innovation (CAI) acted in a supporting and co-ordinating role to collect asset data from the business units. This included:
  - Developing a template in the RIVA system to input the data. Business units were given the option to directly enter the required information into the RIVA system. They were also contacted on a regular basis to identify any concerns and answer questions.
  - CAI collected the responses, consolidated the data, conducted analyses, compiled the report and made recommendations for next steps.

The ISR provides answers to five key questions:

1. What do we own?
2. What is it worth?
3. What condition is it in?
4. What is its remaining service life?
5. What is the infrastructure funding gap?

2.0 Five Questions – Corporate Level Overview

2.1 What do we own?

In a broad sense, The City's asset base is comprised of five major asset portfolios:

1. **Engineered structures** – A broad portfolio of assets including roads, bridges and associated assets, track and stations, water treatment and distribution, wastewater collection and treatment infrastructure, communications towers and cabling conduits, and landfill sites.
2. **Buildings** – All buildings including the corporate accommodation portfolio (69 properties), fire halls, recreation centres, laboratories and affordable housing portfolio.
3. **Land improvements** – Includes parks, playgrounds and sports pitches, as well as boulevards, carparks and other land improvements.
4. **Vehicles** – Includes all bus and light rail vehicles as well as trucks and other vehicles to support all business unit operations.
5. **Machinery and equipment** – Includes plant and equipment used in supporting fleet maintenance for transit and other vehicles to work landfill facilities, create asphalt for roads, fire fighting equipment as well as computer hardware/software.

Engineered structures (88.16 per cent) make up the majority of The City's asset base, followed by buildings (5.35 per cent), land improvements (3.39 per cent), vehicles (2.14 per cent), and machinery and equipment (0.95 per cent).

In addition to these major asset portfolios, The City also has land holdings. Land does not, however, depreciate like the other assets and does not require the same level of maintenance.

2.2 What is it worth?

As of Jan. 1, 2017, The City's total asset base has a replacement value of $84.70 billion, up from $60.48 billion in 2013.

A breakdown by asset category is summarized in the chart. Engineered structures comprise approximately $74.68 billion of the total, followed by buildings at $4.53 billion, land improvements at $2.87 billion, vehicles at $1.81 billion, and machinery and equipment at $0.81 billion.

Asset Value

Engineered Structures	Buildings	Land Improvements	Vehicles	M&E
88.16%	5.35%	3.39%	2.14%	0.95%

Asset Value $84.70 Billion*

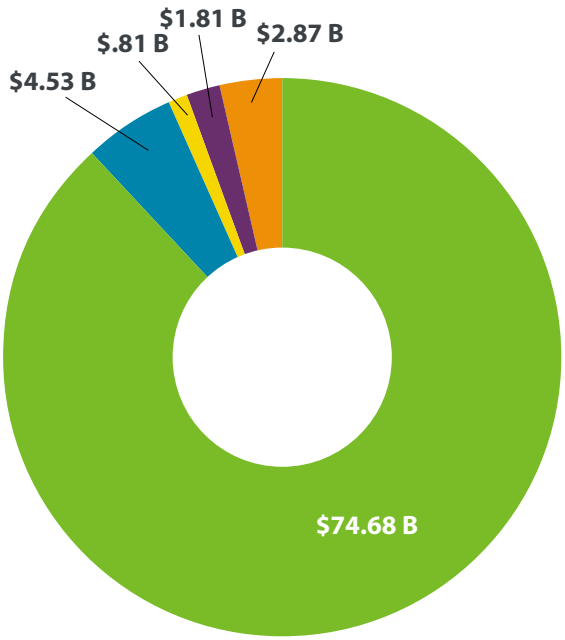
$74.68 B
Engineered Structures

$4.53 B
Buildings

$.81 B
M&E

$1.81 B
Vehicles

$2.87 B
Land Improvements



* Does not include $4.22 billion land holdings owned by The City. Land does not depreciate like other assets and does not require the same level of maintenance.

2.3 What condition is it in?

More than 88 per cent of The City's infrastructure assets are in good or very good physical condition. Approximately 2.29 per cent of The City's assets are in poor or critical physical condition.

In previous infrastructure status reports, the focus was on three types of condition assessments: physical, demand and functional. The current report only focuses on physical condition. Demand and functional conditions are addressed in the asset management plans.

Physical condition reflects the physical state of the asset, which may or may not affect its performance. The performance of the asset is the ability to provide the required level of service to customers in terms of reliability, availability, capacity, and meeting customer demands and needs. All of this is critical information for determining the remaining useful life of an asset. More importantly, it helps identify the timing for possible intervention steps to help bring levels of service to a desired standard.

Condition Assessment Rating Scale

Condition Category	Description	Rating Scale
Physical	Physical deterioration of the asset.	**Very good** – Sound or "as new" condition
		Good – Acceptable physical condition. Asset shows only minor deterioration.
		Fair – Tolerable physical condition. Moderate deterioration evident.
		Poor – Major deterioration evident.
		Critical – Asset deteriorated to such an extent that it is generally inoperable or unsafe.

Overall Physical Condition (Based on Business Unit Averages)

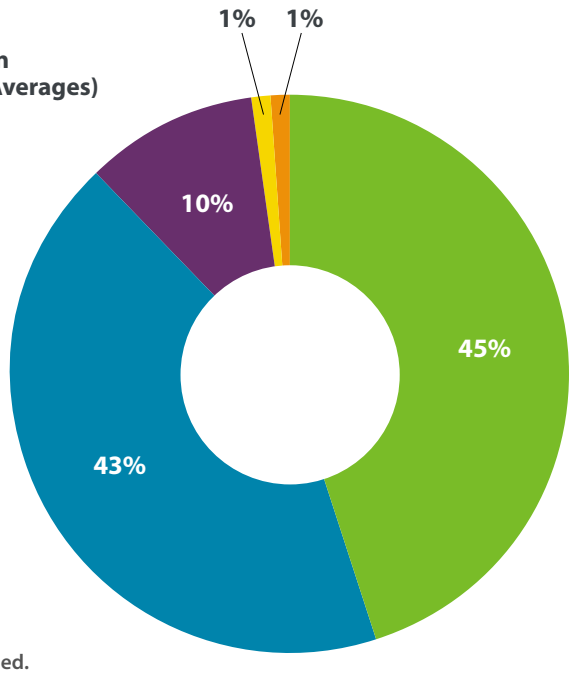
45% Very Good

43% Good

10% Fair

1% Poor

1% Critical



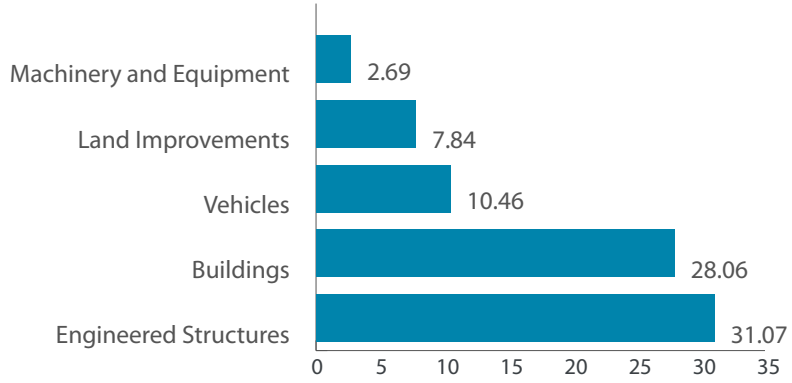
*** Percentages have been rounded.**

2.4 What is the remaining asset life?

Another important piece of information required, when making infrastructure investment decisions, is the remaining asset life within each major asset portfolio. This metric can help to illustrate where and when upgrades and replacements may be required.

The average remaining life varies by asset portfolio as shown in the chart below. It is important to understand that a long remaining useful life doesn't necessarily mean that the asset is in good physical condition. On the other hand, a negative useful life doesn't always mean the asset requires replacement. The asset still may be meeting its required level of service or can continue with maintenance.

Average Remaining Asset Life (Years)



2.5 What is the infrastructure gap?

The City of Calgary has identified that the current replacement value of its existing assets is approximately $84.70 billion. With such an extensive asset base, it is important to understand the requirements for maintaining and upgrading these assets because as a municipality's overall capital stock grows, so do the funding requirements to help maintain, upgrade and repair these assets.

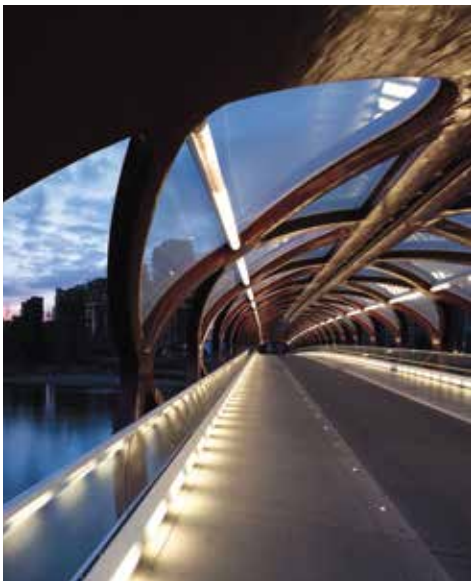
Capital investments are mostly long-term. Infrastructure spending, hence, relates not only to building long-term capital assets but also includes plans to repair and eventually replace these assets. Infrastructure gap, therefore, is an estimate of the total unfunded investments and is grouped into the following three categories:

1. **Capital growth gap:** Unfunded investments required to support The City's expansion. Primary drivers of growth-related expenditures are economic growth, population growth and demographic changes.
2. **Capital maintenance gap:** Unfunded investments required to maintain and upgrade existing infrastructure assets.
3. **Operating gap:** Funding shortfall required to bring existing assets to a minimum acceptable level for operation over their service life.

The City's 10-year projected infrastructure funding gap is $5.67 billion. This has dropped from $7.04 billion reported in 2013.

The table on the next page, outlines the estimates for operational, maintenance and growth funding requirements over the next 10 years.

Funded operating budget figures are based on approved 2016 operating budget extrapolated over the next 10 years. Funded and unfunded 10-year capital budget numbers are based on long-term data available in The City's capital budget system. These numbers have been calculated by individual business units and the data was rolled up to arrive at the total corporate gap.



	Operating	Capital Maintenance	Capital Growth	Total
Required	$14.12 B	$5.14 B	$6.61 B	$25.87 B
Funded	$13.05 B	$3.73 B	$3.42 B	$20.2 B
Gap	$1.07 B	$1.41 B	$3.19 B	$5.67 B

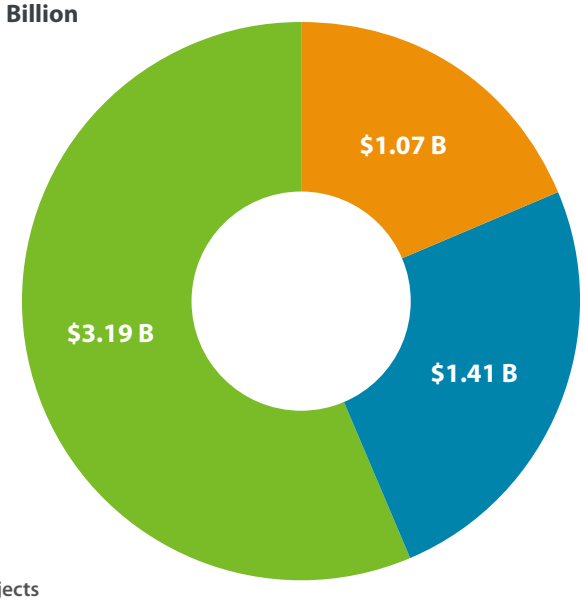
Based on the above data provided by the business units and civic partner outlining their infrastructure funding projections over the next 10 years, it is estimated that The City's total infrastructure needs, funded and unfunded, over the next 10 years is approximately $25.87 billion. Business units/civic partner anticipate the ability to fund approximately $20.2 billion during this time. The remaining $5.67 billion is the 10-year infrastructure gap. Of this, $1.07 billion is attributable to operating, $1.41 billion to infrastructure maintenance and $3.19 billion to capital growth. As the business planning and budgeting process spans four-year periods, the long-term portion of the funding gap has not been fully realized.

Infrastructure Gap $5.67 Billion

$1.07 B
Total Operating Gap

$1.41 B
Total Maintenance Gap

$3.19 B
Total Growth Gap



*** Does not include Transit projects from RouteAhead including Green Line as well as projects beyond the 10-year horizon.**

3.0 Trends

The tables below show the value of The City of Calgary's infrastructure assets, remaining life, infrastructure gap (forecast) as well as assets' physical condition over the five business cycles.

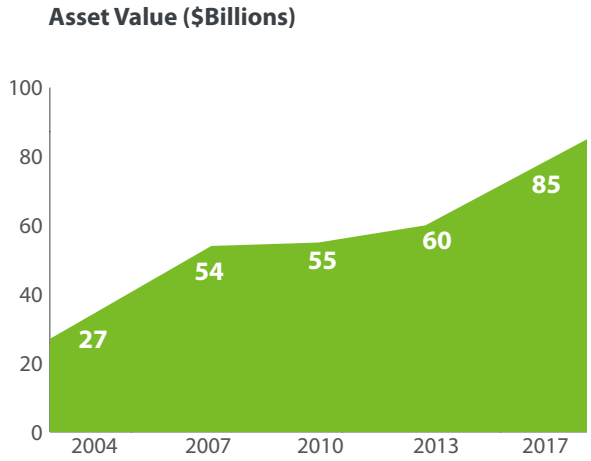
		2004	2007	2010	2013	2017
Value ($Billions)		**27**	**54**	**55.14**	**60.48**	**84.70**
Age (Years)	**Expected**	**68**	**65**	**67**	**59**	**68**
	Remaining	**31**	**31**	**43**	**32**	**29**
Gap ($Billions)	Operating	0.50	0.76	0.86	2.11	1.07
	Maintenance	2.30	2.67	3.23	1.70	1.41
	Growth	2.50	6.96	3.31	3.23	3.19
	Total Gap	**5.30**	**10.39**	**7.40**	**7.04**	**5.67**

	Physical Condition		
	Good* (combined with V. Good)	**Fair**	**Poor* (combined with Critical)**
2004	80%	14%	6%
2007	76%	17%	7%
2010	78%	16%	6%
2013	95%	3.50%	1.50%
2017	88%	9.70%	2.30%

3.1 Asset value

There has been a continual upward trend in the value of our assets.

The most recent $25 billion increase is largely because of newly built assets, new cost evaluation methods/rates and corporate-wide asset management maturity leading to a better understanding of asset inventory.




Calgary Transit
Calgary Transit
2401

3.2 Physical condition

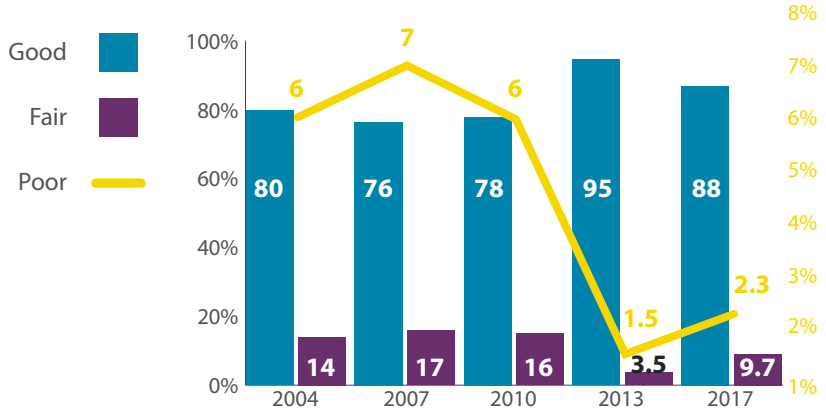
Physical condition reflects the physical state of the asset, which may or may not affect its performance. The performance of the asset is the ability to provide the required level of service to customers in terms of reliability, availability, capacity, and meeting customer demands and needs. Physical condition helps determine the remaining useful life of an asset and more importantly, the timing for possible intervention steps to help bring levels of service to a desired standard.

Efforts are consistently being made at The City to improve the state of its assets as evident from the graph, which shows an overall improvement over the past decade. However, from 2013 to 2017, there has been a decline in the condition. This indicates The City should consider additional expenditure on asset replacement, lifecycle maintenance and upgrades. As an example, it has been reported in the Roads Asset Management Plan that maintaining overall pavement conditions over the next 10 years requires an estimated budget of $35 million each year. Pavement rehabilitation projects beyond the current year, however, are tentative and will be determined by funding availability, construction costs and strategic priorities.

In this context, it is important to understand that repeated maintenance spending shortfall over years can lead to a decline in asset condition, which can impact asset performance and ultimately service performance. This indicator, hence, should be actively managed so service targets can continue to be achieved.

Given the extent and confidence in the data, it is difficult to accurately determine whether The City's operational and technical performance is improving or declining. Customer satisfaction, however, can be impacted by declining condition which, if allowed to continue, may have to be propped up by extensive operational customer service and response efforts.

Asset Physical Condition



*** Good and fair percentage reflected on the left axis and poor on the right axis**

3.3 Age of assets

The life span of The City's diverse assets varies from a few years (e.g. information technology) to over 70 years (e.g. water network). On a weighted scale, average life expectancy of the infrastructure is currently about 68 years with the remaining life at 29 years.

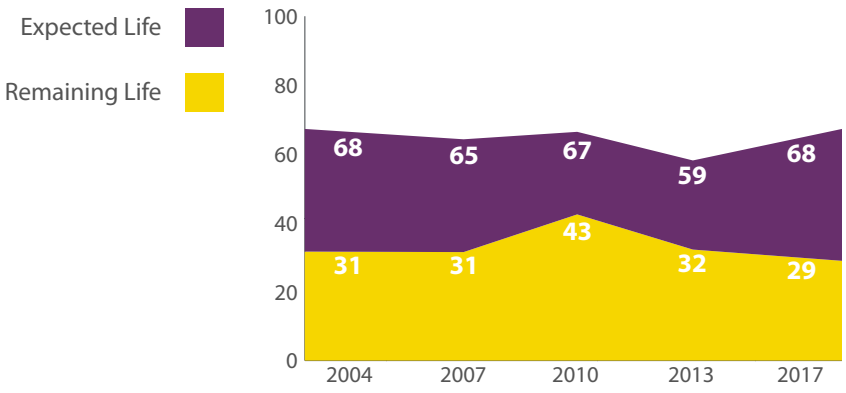
At an aggregate level, expected life of assets has increased to 68 years. This increase can partially be attributed to the addition of new assets that have offset the deteriorating life expectancy recorded in 2013. Another reason may be related to improved asset inventory recording.

Remaining asset life values, in contrast, have slightly decreased. This indicates that some existing in-service infrastructure requires upgrades or replacement.

The life span of The City's diverse assets varies from a few years (e.g. information technology) to over 70 years (e.g. water network).

Age of assets shown below is derived from a weighted average scale.

Age of Assets (Years)



3.4 Infrastructure gap

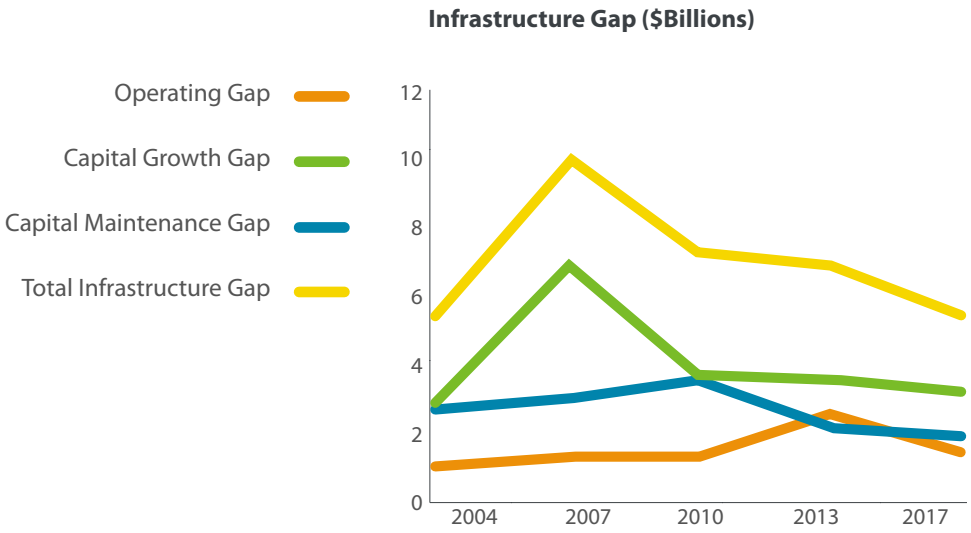
With such an extensive asset inventory, it is important to understand the requirements for maintaining and upgrading growing assets.

As the inventory expands to support growth, operating and maintenance costs associated with these new assets also go up. If there is not enough funding to repair, maintain and upgrade these assets, it creates a backlog of maintenance related projects. This affects The City's ability to deliver quality public service to its citizens and, in turn, has an impact on Calgarians' quality of life.

Since the last business cycle, total projected infrastructure gap has dropped by $1.37 billion. However, any budget cuts in 2017-2018 can potentially impact capital maintenance and service levels which can affect this 10-year funding gap forecast and, hence, service delivery.

Declining operating gap over the last business cycle indicates that there is a growing awareness and an improved understanding of the operating impacts of capital across The Corporation. The capital maintenance gap has also dropped by almost $0.29 billion since 2013. This indicates that additional commitments have been made to maintain The City's assets as business units gain a better understanding of how to manage levels of service and risk.

The capital growth gap has decreased as well by $0.04 billion since 2013, but remains steady since 2010. This is because growth projections have not changed significantly so there is little change in funding projections.



4.0 Asset Portfolio Overview

4.1 Engineered structures

4.1.1 What do we own?

Engineered structures are defined as permanent structural works such as roads, bridges and associated assets, track and stations, water treatment and distribution, wastewater collection and treatment infrastructure, communications towers and cabling conduits, and landfill sites.

Examining the engineered structures portfolio of assets reveals that majority of The City's engineered structures are located within Water followed by Roads.

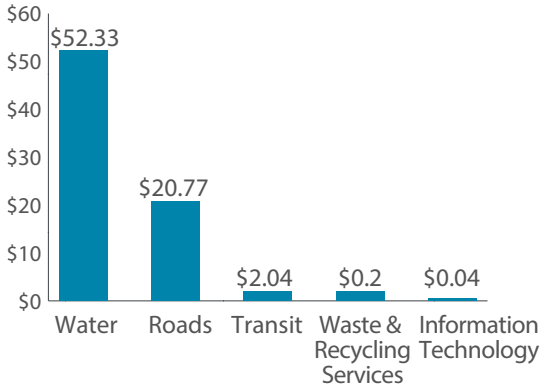
4.1.2 What is it worth?

The total value of the engineered structures portfolio is approximately $74.68 billion or 88.16 per cent of the total asset base.

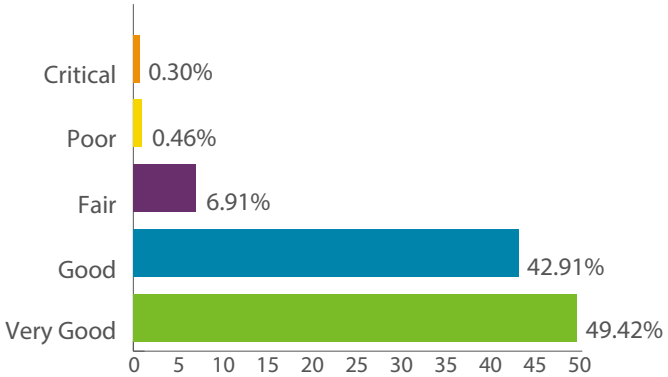
4.1.3 What condition is it in?

A significant majority of The City`s engineered structures are in very good/good physical condition.

Engineered Structures Value by Business Unit ($Billions)



Engineered Structures Condition



*** Aggregate view of all corporate engineered structures.**

4.1.4 What is the remaining asset life?

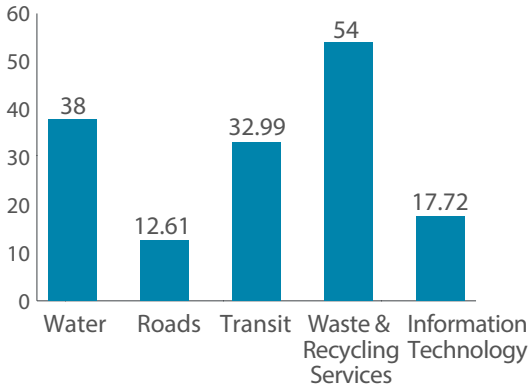
The average remaining asset life for the engineered structures portfolio is approximately 31.07 years. Business unit specific average remaining life is reflected in the graph below.

4.2 Buildings

4.2.1 What do we own?

Buildings are defined as permanent, temporary or portable building structures intended for shelter and working space. Buildings include the corporate accommodation portfolio (69 properties), fire halls, recreation centres, laboratories and affordable housing portfolio.

Engineered Structures Average Remaining Asset Life (Years)



Examining the buildings portfolio of assets reveals that most of The City's buildings are located within three business units: Facility Management, Recreation and Calgary Housing.

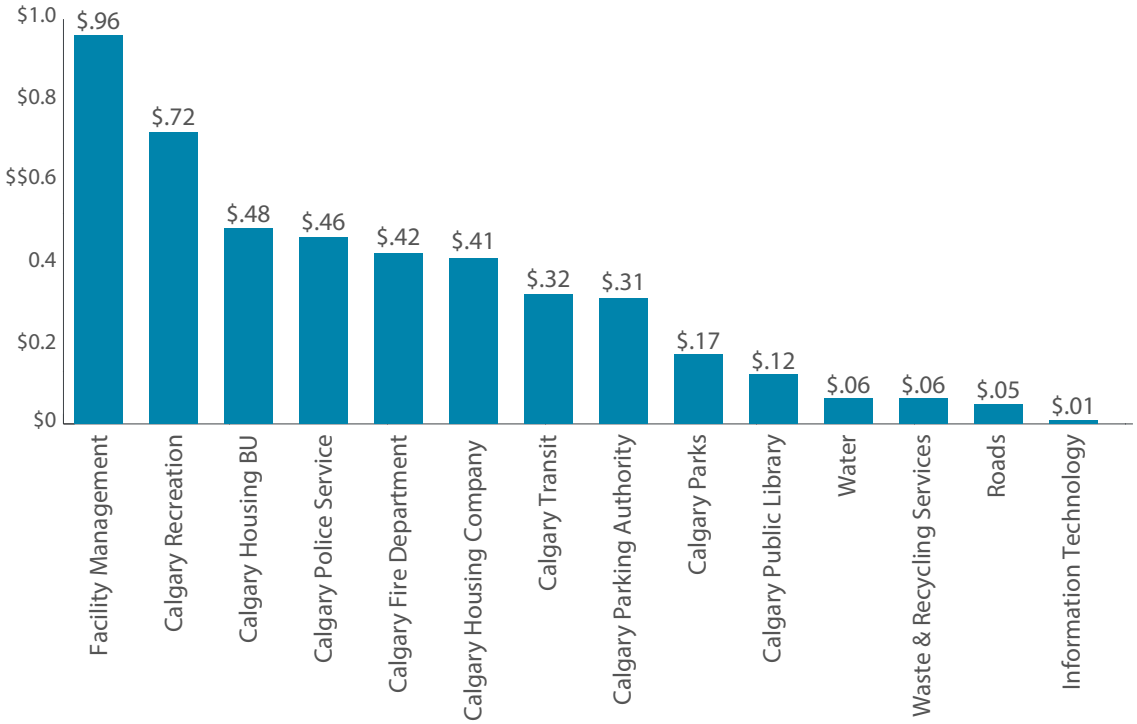
4.2.2 What is it worth?

The total value of the buildings portfolio is approximately $4.53 billion or 5.35 per cent of the total asset base.

4.2.3 What condition is it in?

Although the physical condition of buildings is overall good or fair, almost 20 per cent (at an aggregate level) are rated as poor or critical. There is a high risk of further deterioration of buildings which can severely impact the services provided by this asset class. Services that come under this category are recreation facilities, libraries, operational storage, safe and healthy workspace, public use space, laboratories, fire halls and affordable housing portfolio.

Buildings Value by Business Unit ($Billions)

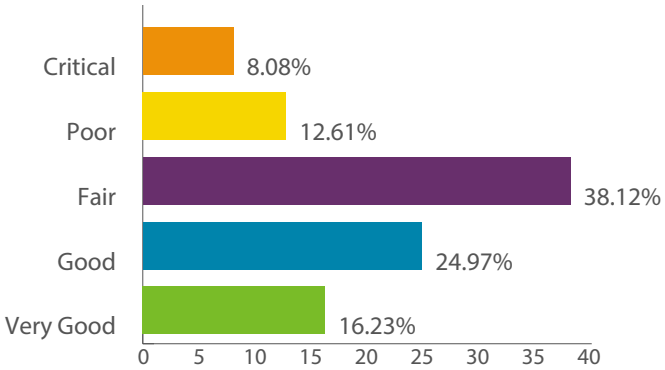


Recreation has reported almost 44 per cent of its buildings in poor or critical condition followed by Library at 37 per cent, Roads, Facility Management and Transit at 32 per cent, 30 per cent and 27 per cent respectively. Waste & Recycling Services, Calgary Police Services, Parks, Calgary Fire Department and Calgary Housing have also categorized a portion of this asset class under poor or critical condition.

4.2.4 What is the remaining asset life?

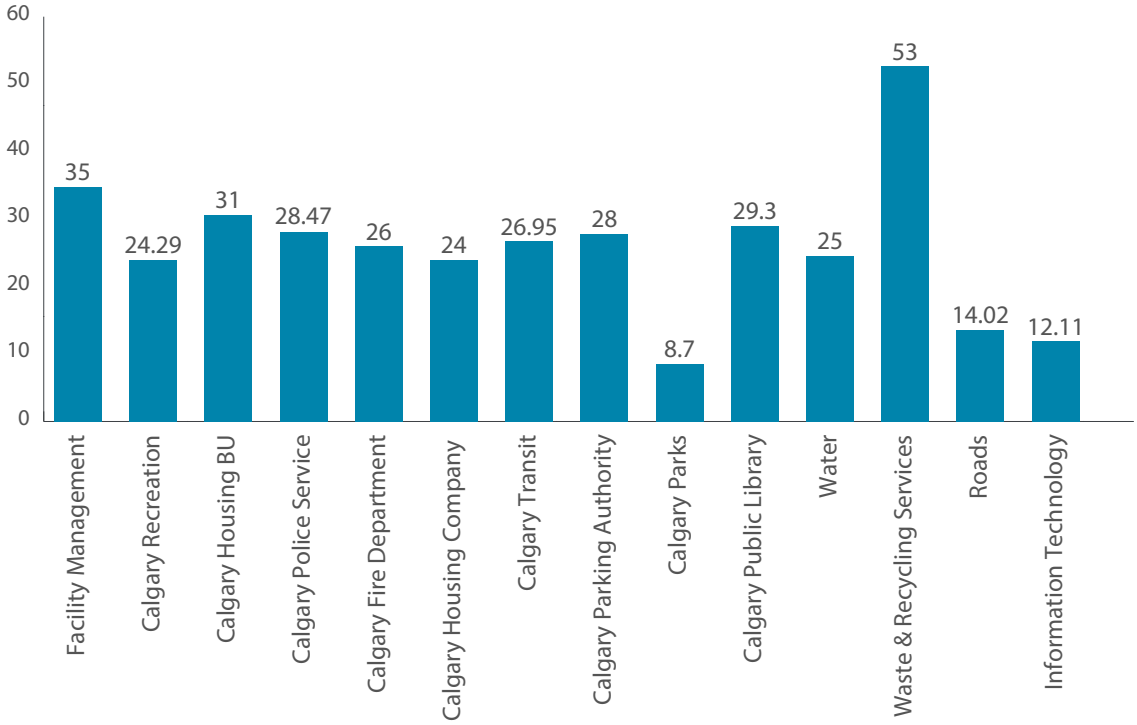
The weighted average remaining asset life for the buildings portfolio is approximately 28.06 years. Business unit specific average remaining life is reflected in the graph below.

Buildings Condition



*** Aggregate view of all corporate building.**

Buildings Average Remaining Asset Life (Years)



4.3 Land improvements

4.3.1 What do we own?

Land improvements are defined as all improvements of a permanent nature to land such as parks, boulevards, parking lots, landscaping, lighting, pathways and fences.

Examining the land improvements portfolio of assets reveals that the majority of The City's land improvements are located within Parks.

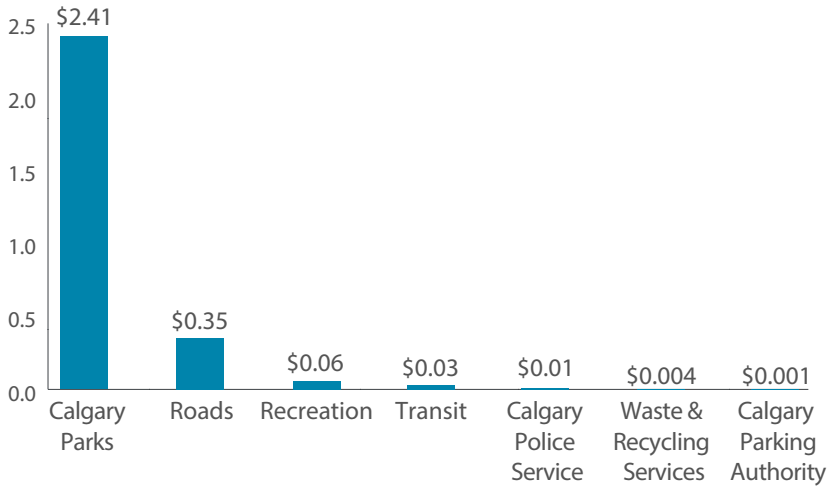
4.3.2 What is it worth?

The total value of the land improvements portfolio is approximately $2.87 billion or 3.39 per cent of the total asset base.

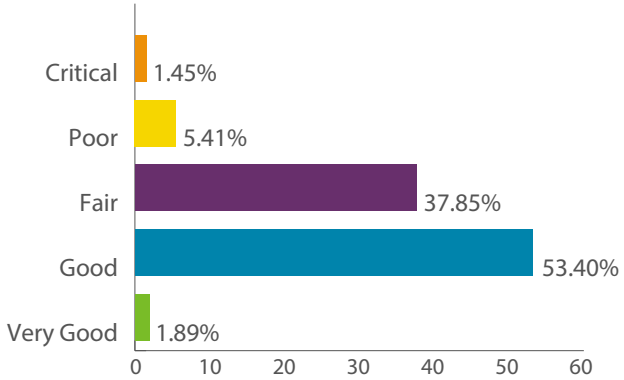
4.3.3 What condition is it in?

The physical condition of The City's land improvement is generally good or fair. They should be monitored to ensure these assets do not fall into the poor or critical categories. Land improvements that fall into poor or critical condition mostly belong to Transit with a small percentage belonging to Parks. At an aggregate level, 6.86 per cent are currently in poor or critical condition and require maintenance or upgrades.

Land Improvements Value by Business Unit ($Billions)



Land Improvements Condition



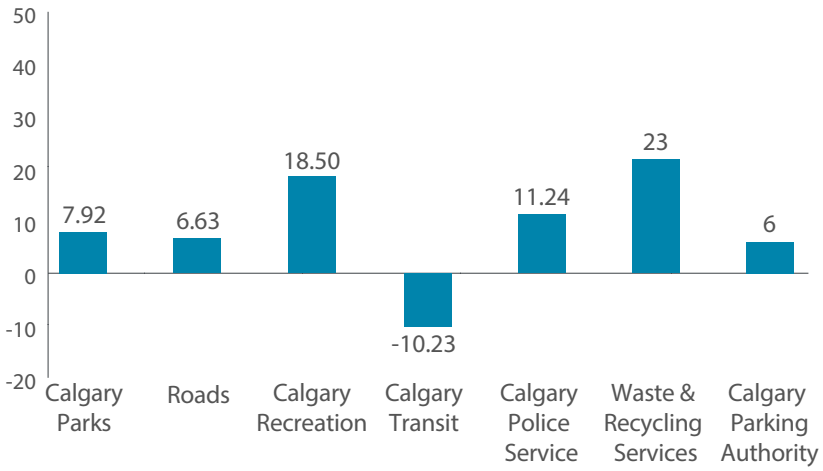
*** Aggregate view of all corporate land improvements.**

4.3.4 What is the remaining asset life?

The weighted remaining asset life for the land improvement portfolio is approximately 7.84 years, however, there are some areas where assets appear to have exceeded their useful life and should be further examined. It is also important to understand that a long remaining useful life doesn't necessarily mean that the asset is in good physical condition. On the other hand, a negative useful life doesn't always mean the asset requires replacement. The asset still may be meeting its required level of service or can continue with maintenance.

Business unit specific average remaining life is reflected in the graph below.

Land Improvements Average Remaining Asset Life (Years)



*** Asset lifecycle review is underway in Transit.**

4.4 Vehicles

4.4.1 What do we own?

Vehicles are rolling stock primarily used for transportation purposes and include all bus and light rail vehicles as well as trucks and other vehicles to support all business unit operation.

Examining the vehicles portfolio of assets reveals that Transit holds the majority of vehicles (by value) followed by Fleet.

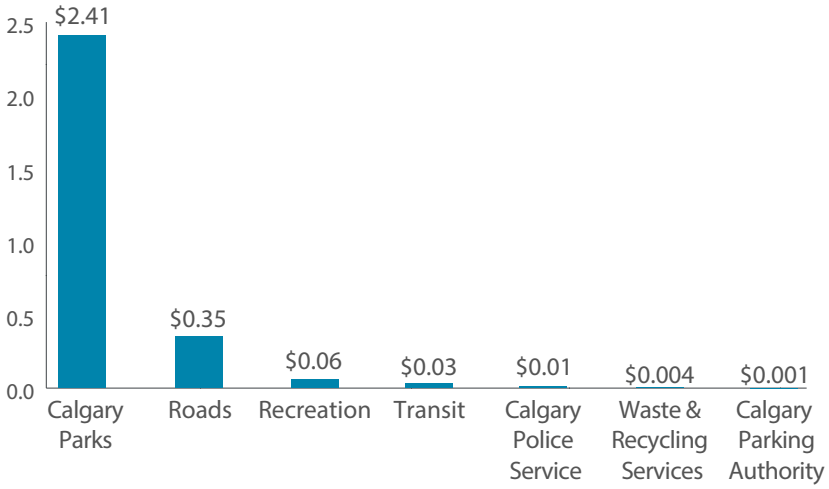
4.4.2 What is it worth?

The total value of the vehicles portfolio is approximately $1.81 billion or 2.14 per cent of the total asset base.

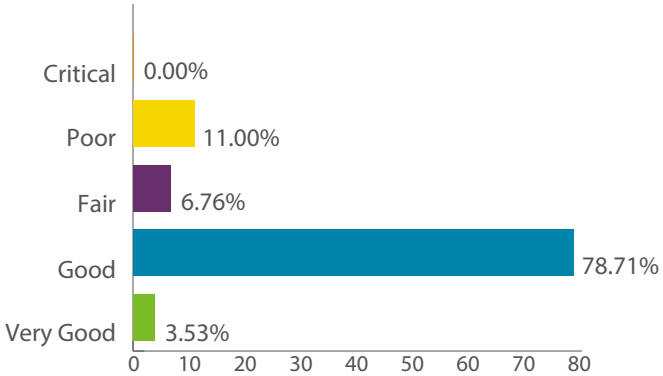
4.4.3 What condition is it in?

The physical condition of The City's vehicles is, on average, good. Some business units and partners, however, have reported poor condition for part of their fleet (Calgary Housing Company: 12 per cent, Fire: 16 per cent, and Transit: 13 per cent).

Vehicles Value by Business Unit ($Billions)



Vehicles Condition



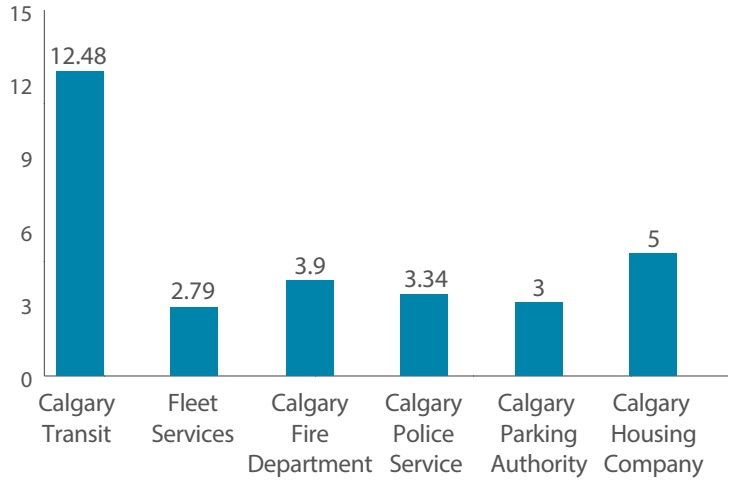
*** Aggregate view of all corporate vehicles.**

Poor condition is typically a result of gap in maintenance spending and is a lead indicator for asset performance and ultimately service performance. Declining condition, if allowed to continue, is associated with the risk of declining service delivery for these areas of service.

4.4.4 What is the remaining asset life?

The weighted remaining asset life for the vehicles portfolio is approximately 10.46 years. Business unit specific average remaining life is reflected in the graph below.

Vehicles Average Remaining Asset Life (Years)



4.5 Machinery and equipment

4.5.1 What do we own?

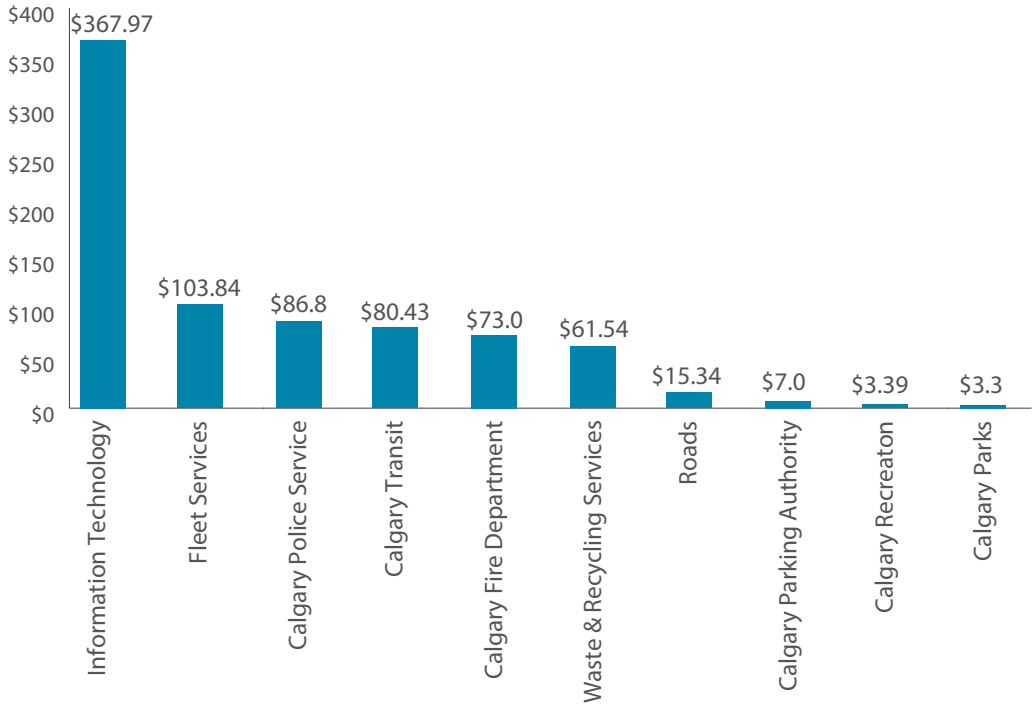
Machinery and equipment include plant and equipment used in supporting fleet maintenance for transit and other vehicles to work landfill facilities, equipment to create asphalt for roads, firefighting equipment and computer hardware and software.

Examining the machinery and equipment portfolio of assets reveals that most of The City's machinery and equipment assets are located within Information Technology followed by Fleet.

4.5.2 What is it worth?

The total value of the machinery and equipment portfolio is approximately $806.81 million or 0.95 per cent of the total asset base.

Machinery and Equipment Value by Business Unit ($Millions)



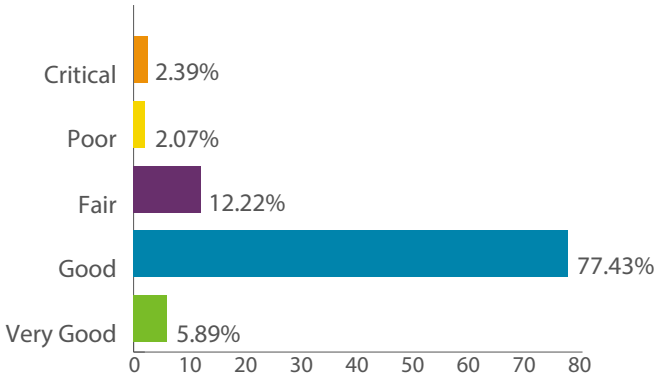
4.5.3 What condition is it in?

The physical condition of The City's machinery and equipment is generally good. At an aggregate level, however, 4.46 per cent of The City's machinery and equipment is in poor or critical condition that requires attention to maintain the service levels.

4.5.4 What is the remaining asset life?

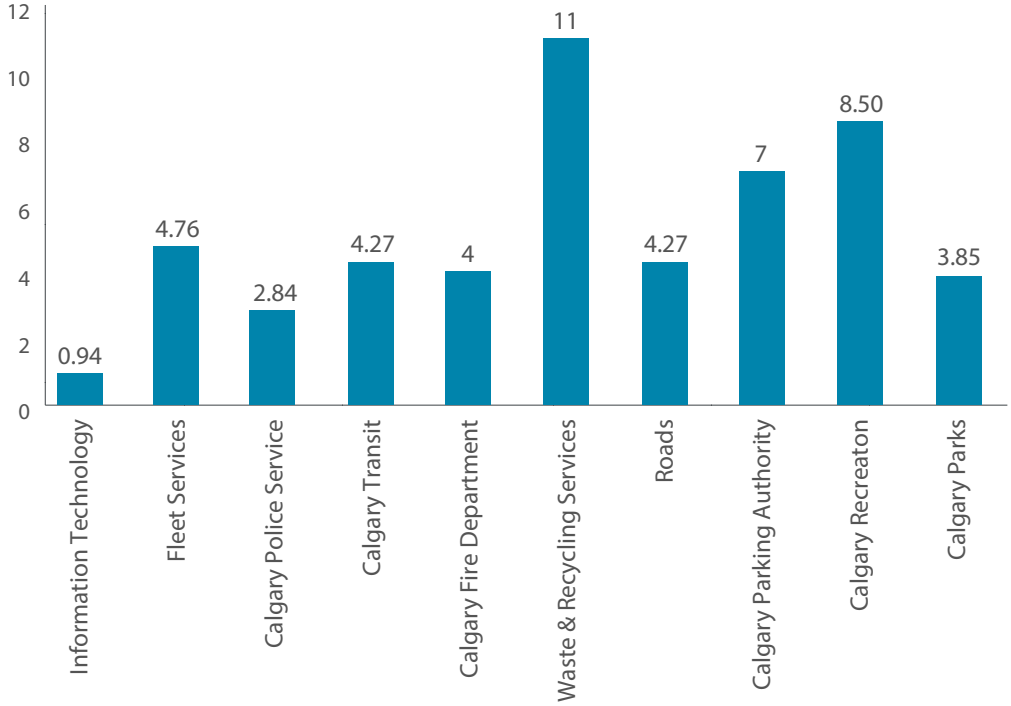
The weighted average remaining asset life for the machinery and equipment portfolio is approximately 2.69 years. Business unit specific average remaining life is reflected in the graph below.

Machinery and Equipment Condition



*** Aggregate view of all machinery and equipment.**

Machinery and Equipment Average Remaining Asset Life (Years)



5.0 Conclusions

This report provides a snapshot of our current infrastructure inventory and informs and guides the decision makers as they plan for the next four years' business cycle. Information used in this report is based on the best available data, as of Jan. 1, 2017, supplied by various business units/service areas.

An analysis of corporate asset data reveals that, over the past four years, The City's infrastructure assets have grown in value from $60.48 billion to $84.70 billion. This increase has been a result of the following factors:

- Addition of new assets
- Asset management maturity
- Updated cost escalation factor
- New cost evaluation methods

Asset condition is a useful indicator of the extent of asset deterioration and remaining life of the asset. Assets in poor condition are more likely to be unreliable, leading to asset failures and potentially service failures. Asset condition is, therefore, critical information for The City to understand to support the timing of possible interventions to improve or maintain the levels of service at a desired standard. While overall asset health is still good, with a general upward trend over the last decade, it is seen that the condition profile has deteriorated since 2013.

Over the next 10 years, it is estimated The City's total infrastructure need, funded and unfunded, is approximately $25.87 billion. As The City anticipates the ability to fund approximately $20.20 billion during this time, it has been identified that the total 10-year infrastructure gap is approximately $5.67 billion. Of that, approximately $ 1.07 billion is attributable to operating, $1.41 billion is unfunded infrastructure maintenance and $3.19 billion is for new construction due to growth. As the business planning and budgeting process spans four-year periods, the long-term portion of the funding gap has not been fully realized.

As The City of Calgary prepares for the next four-year business planning cycle, it is important The City looks to close the infrastructure funding gap through comprehensive asset management. The current economic environment has created additional funding constraints which means the allocation of scarce resources must be prioritized efficiently and effectively. The corporate asset management plan draws on the business unit asset management plans to highlight the investment needs through the next business plan period from 2019 to 2022, for infrastructure based on service performance objectives, asset performance trends, asset condition and risks. This work is critical to ensure citizens are provided the services they expect.

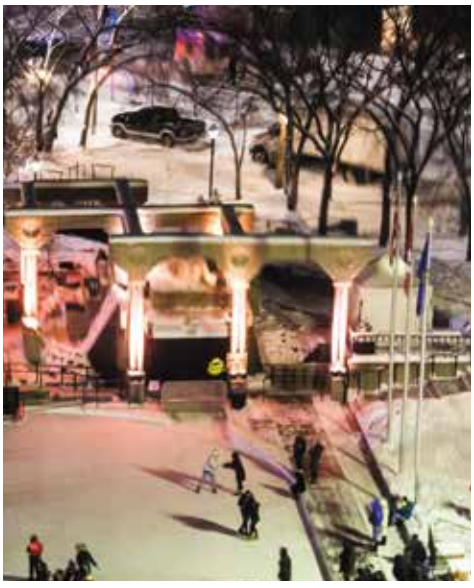
Appendix 1

Total asset replacement value by business unit/civic partner/related authority

(Does not include land)

Business Unit/Civic Partner/Related Authority	Replacement Value ($Billion)	Percentage
Calgary Fire Department	$0.58	0.69%
Calgary Housing BU	$0.48	0.57%
Calgary Housing Company	$0.41	0.48%
Calgary Parking Authority	$0.34	0.40%
Calgary Parks	$2.58	3.07%
Calgary Police Service	$0.60	0.70%
Calgary Public Library	$0.12	0.15%
Calgary Recreation	$0.78	0.92%
Calgary Transit	$3.89	4.59%
Facility Management	$0.96	1.13%
Fleet Services	$0.34	0.41%
Information Technology	$0.42	0.49%
Roads	$20.48	24.19%
Waste & Recycling Services	$0.32	0.38%
Water	$52.39	61.85%
Total		100.02%*

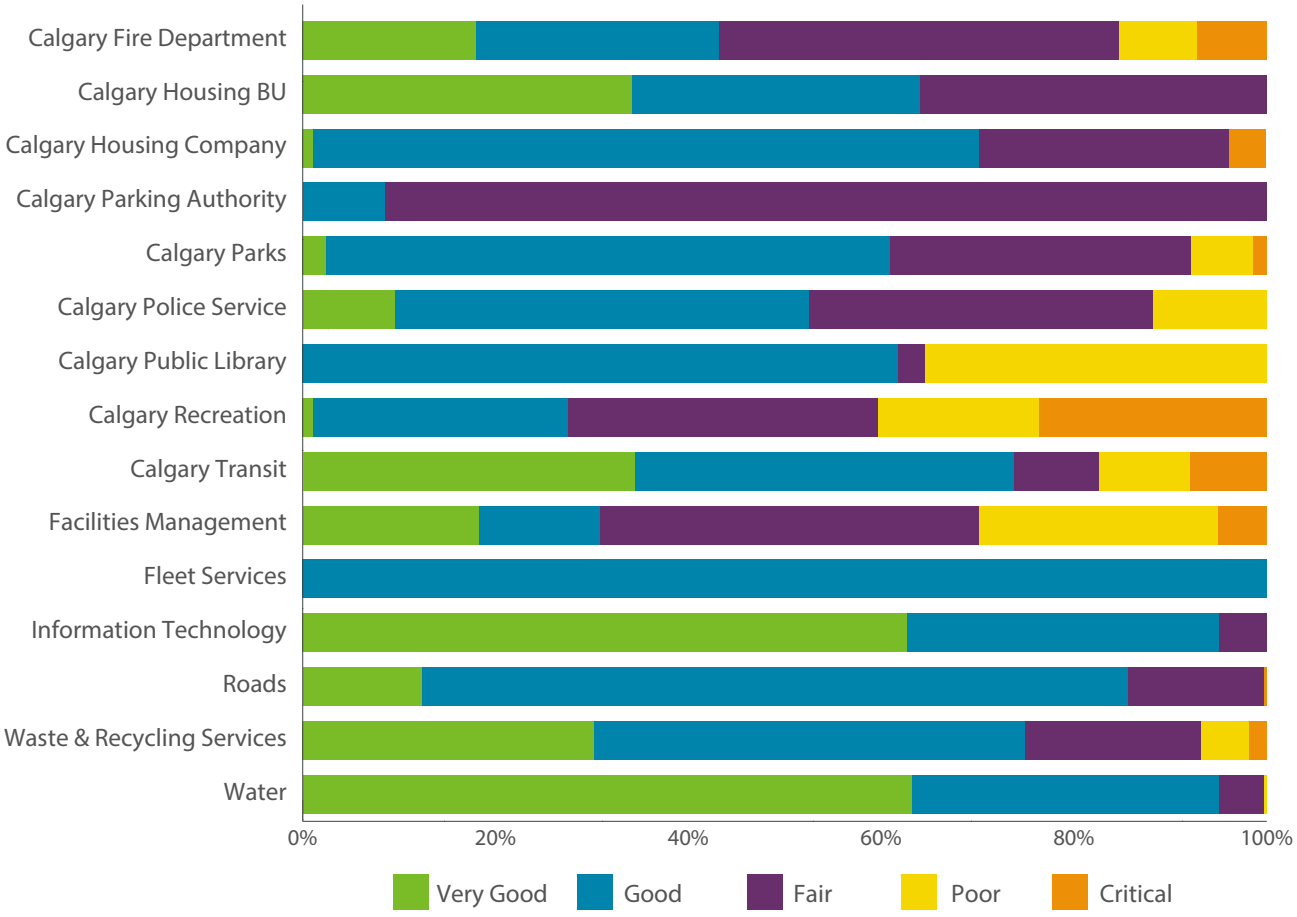
*** Adds to more than 100 per cent due to rounding.**



Appendix 2

Physical condition by business unit/ civic partner/related authority (percentage)

Physical Condition by Business Unit

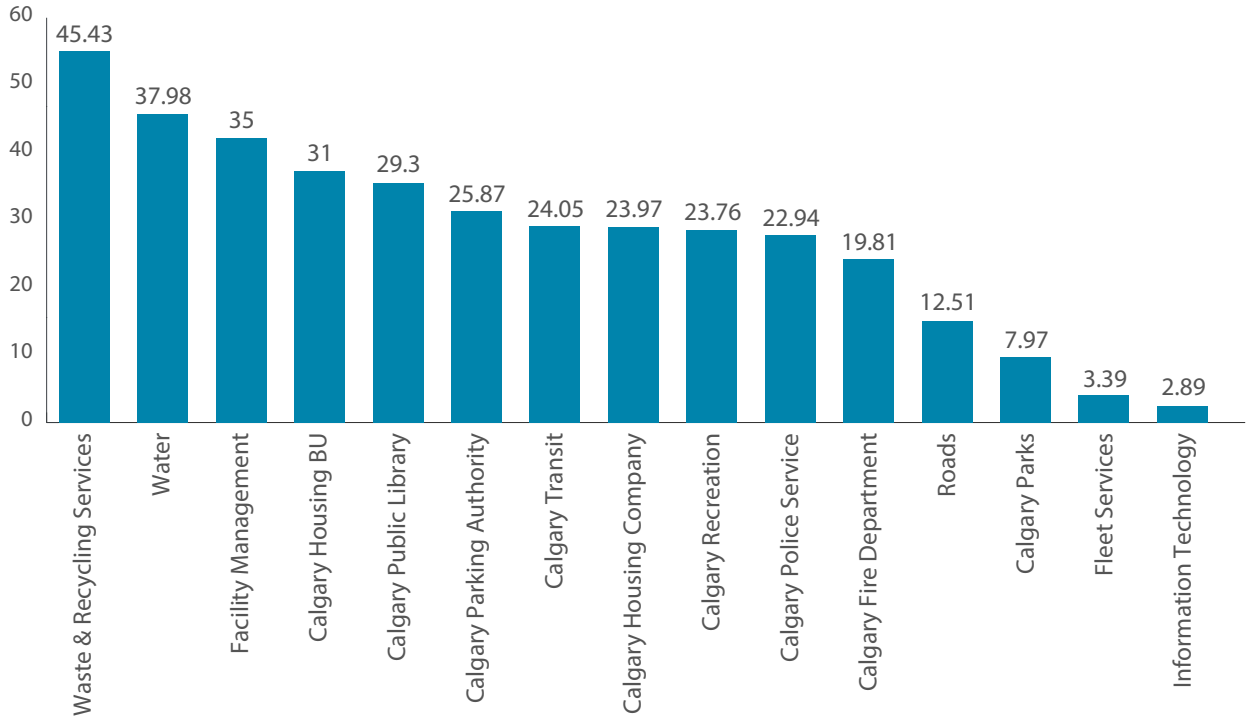


*** Based on the aggregate of a business unit/civic partner/related authority's asset portfolio.**

Appendix 3

Remaining average asset life by business unit/civic partner/related authority (years)

Remaining Average Asset Life by Business Unit (Years)



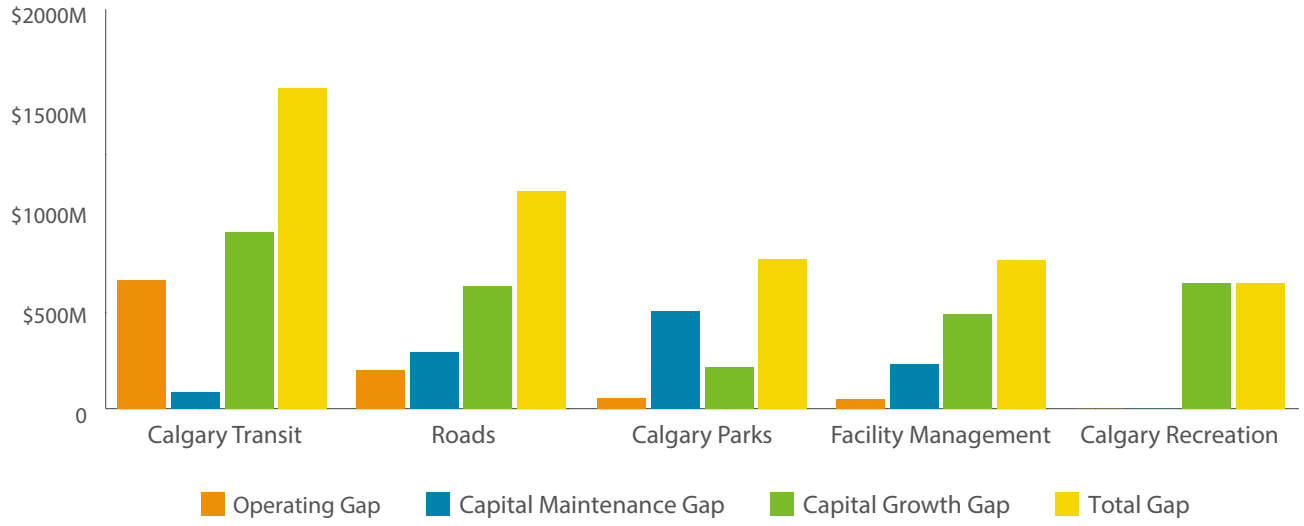
*Represents weighted average remaining life of the entire asset portfolio owned by the business units/civic partner/related authority.

Appendix 4

10-year infrastructure funding gap by business unit/civic partner/related authority

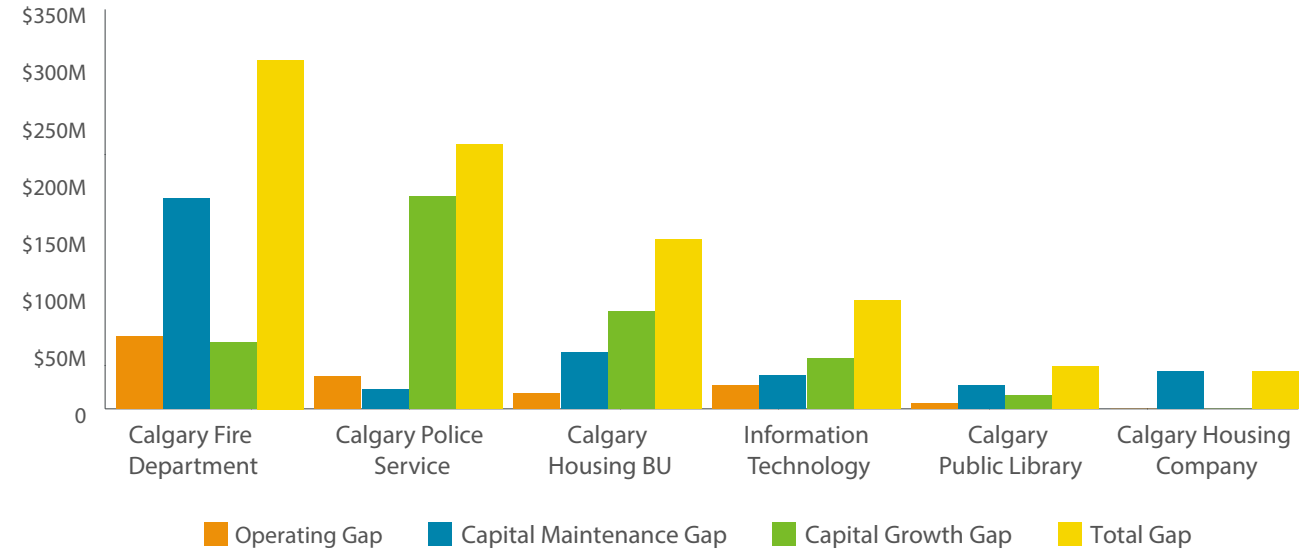
Total Corporate Gap = $5.67 billion ($5670 Million)

Business units with a 10-year infrastructure funding gap of $600 million or more



*Recreation's capital maintenance requirements for assets that would be replaced as part of capital growth have been deducted from the overall maintenance requirement value resulting in capital maintenance cost savings of approximately $101 million over 10 years, and hence, closing the capital maintenance gap.

Business units with a 10-year infrastructure funding gap of less than $350 million



Appendix 5

Business unit (BU), civic partner and related authority narratives

The following provides an overview of the services, standards, infrastructure and management strategies for the individual participating business units, civic partner and related authority.

Chief Financial Officer

Information Technology (IT)

The main purpose of IT is to provide a large and diverse asset portfolio to support the delivery of core and essential services to the citizens of Calgary.

Information Technology services include:

- Technology architecture, infrastructure governance and security to ensure the privacy and confidentiality of customer and corporate information.
- Partnership and collaboration with business units to provide effective systems solutions and hosting services.
- Information management to ensure the integrity of access, use and storage of customer and corporate data.
- Management of corporate technology lifecycle planning and portfolio management.
- Guidance to business units on change management and business process management.
- Leadership on web innovation and emerging technologies to address growing demands within a changing environment.

A common thread that runs through all City services, Information Technology owns and operates a pool of assets with a replacement value of $414 million (reported end of year 2016, cost based BI report). These assets have been divided into four groups:

Hardware

IT hardware assets are comprised of the physical components such as computers, servers, peripherals, storage and computer networks.

Software

IT software assets include corporate enterprise systems, databases, desktop software, cloud applications and software tools.

Data Centre

IT Data Centre group is focused on assets specific to the enablement of the data centre function (i.e. raised floor, UPS, fibre interconnects, environmentals) and not general building assets. IT does not report or manage actual buildings.

Fibre plant - towers

Two main categories of engineered structures are The City's fibre optics network (over 400 kilometres) and wireless network towers.

Condition

Asset condition ratings are based on straight-line deterioration. Most technology asset types do not display visible physical deterioration, but the physical, demand or functional condition decrease over time. At an aggregate level, the IT asset base is in good/very good condition.

Lifecycle Management

IT owns and manages a variety of asset types, which in turn require a range of lifecycle management approaches. Information held on all the assets is updated on an ongoing basis as assets are continually replaced, upgraded and retired. The lifecycle of IT assets is typically shorter than other City-owned infrastructure assets and replacement is often based on age rather than on condition due to high consequences of assets failing and the lack of a visible deterioration profile. The need to keep existing information technology infrastructure current and compatible with industry and product lifecycles is also a key driver of asset replacement on relatively short lifespans.

ITAM Practice

The IT asset management strategy and action plan is founded upon continuous improvement across the three ITAM pillars of:

- Managing "the Assets."
- Maturing "the Practice."
- Managing "the Information."

IT supports a significant percentage of non-IT, business unit reported technology assets with significant interdependencies between planning for and managing these assets. To address the gap, IT is moving to horizontally integrate the IT BU asset management plans with other BUs.

IT leverages ITIL v3.0 Service Management frameworks, International Association of Information Technology Asset Managers (IAITAM) best practices and the development of a formal ITAM practice, and continues to define Levels of Service (LOS) across distinct three layers (Backbone/Systems, IT Services and Outward Facing Services).

Community Services

Calgary Fire Department

Calgary Fire Department's (CFD) vision is, "To be the international fire service leader" and its mission is, "To serve the community through excellence in fire prevention, education, protection and safety." Safe, reliable and well-maintained infrastructure is essential for the delivery of CFD's emergency and non-emergency services to the citizens of Calgary. The performance and reliability of CFD's infrastructure provides a critical foundation for Calgary's economic development, competitiveness, prosperity, reputation and overall quality of life of its citizens.

CFD has three service portfolios:

Fire and emergency response
This service provides emergency response services, including responses to fire, fire-related and medical incidents, as well as motor vehicle accidents, hazardous material releases, other specialized rescue services needed to save lives, protect property and the environment for residents, businesses and visitors of Calgary.

Fire inspections and enforcement
This service provides fire inspections and enforcement, saves lives, protects property and the environment by providing services to business and property owners to ensure compliance with Safety Codes Act regulations to minimize fire-related risks to Calgarians.

Fire safety education
This service provides home safety and injury prevention education and initiatives to citizens in order to increase knowledge and awareness of safety, and promote behaviours that contribute to safe living in our communities.

In 2016, close to 1,500 women and men, both uniformed and civilian, responded to over 57,000 incidents, made over 17,000 non-emergency public contacts with safety and prevention messages, and provided essential training and support to front-line emergency personnel.

CFD uses a variety of specialized assets to meet its operational demands for emergency services.

Assets include:

Buildings and land

- 40 active emergency response stations (including multi-service and leased facilities).
- Emergency Operations Centre.
- Fire Headquarters.
- Apparatus & Equipment Maintenance Facility.
- Wellness Centre.
- Fire Training Academy.
- Former Station #10.
- 46 Buildings and land improvement.

Fleet, machinery and equipment

- 112 heavy apparatus (pumpers, tankers/ladders and emergency response units).
- 156 light duty vehicles (including trucks, boats and trailers).
- 35,148 pieces of fire equipment (including life safety, hazardous, communications and personal protective equipment).

Key challenges and solutions

- Changing demographics (e.g. aging population) and intensification due to redevelopment could significantly change the volume and nature of emergency calls.
- Economic cycles could affect level and sourcing of funding.
- Changes in provincial and federal regulations (e.g. climate change programs) could impact cost to build and operate assets.
- Increased severity and frequency of weather events and disasters could put a strain on resource capacity.
- Changes in workforce and culture (i.e. due to retirement and generational difference) could impact level of service and implementation of identified initiatives.

Funded and unfunded capital priorities (2017-2026)

To address aging infrastructure and respond to growth, the key funded capital projects for CFD include:

- NE Industrial Emergency Response Station
- East MacLeod Emergency Response Station (Temporary)
- West MacLeod Emergency Response Station (Temporary)
- South MacLeod Emergency Response Station
- Cornerstone Emergency Response Station
- Tuscany Emergency Response Station
- Station 17 Emergency Response Station (Replacement)
- Station 7 Emergency Response Station (Replacement)
- General lifecycle of facilities, apparatus and equipment

Identified but unfunded key capital projects are:

- Station 1 Emergency Response Station (Replacement)
- Station 2 Emergency Response Station (Replacement)
- Station 12 Emergency Response Station (Replacement)
- Station 36 Emergency Response Station (Replacement)
- Keystone Hills Temporary Emergency Response Station
- Belvedere Emergency Response Station

Community Services

Calgary Parks

The mission of Calgary Parks is to "enable, contribute and sustain dynamic communities through great parks and open spaces." As the steward of open space in Calgary, we provide a diverse range of services to Calgarians and visitors. This broad spectrum of services includes planning and development, education and front-line management of all assets that contribute to the enhancement of those spaces.

There are a variety of parks in Calgary including regional and local community parks, cultural landscapes, sport sites, environmentally sensitive areas and urban plazas. Calgary Parks manages both living and non-living assets for the long-term sustainability and enjoyment of the public.

The following is an overview of the 2016 assets Calgary Parks stewards:

- 2,600 local community parks
- 39 regional park sites
- over 8,300 hectares of parkland
- 131 joint use sites (shared with school boards)
- 10 spray parks/wading pools
- over 475 soccer fields
- over 430 ball diamonds
- over 60 tennis/pickleball courts
- 1,100 playgrounds
- four Parks public buildings
- four restaurants in parks
- 150 off-leash areas in parks
- over 465,000 public trees
- 800 kilometres of pathways/100 kilometres of unpaved trails
- five cemeteries and an indoor mausoleum

Calgary Parks maintains physical conditions on all assets as well as Citizen Level of Services (CLOS) on a regular basis. The data collection process and the analysis of data from the Parks Asset Reporting & Information System (PARIS) allow for improved lifecycle funding projections and project planning.

Land and land improvement

Calgary Parks oversees assets within geographic areas of parks and open spaces that is approximately 12 per cent of the city's footprint. This extraordinary land base is approximately 10,800 hectares and includes river valleys, ravine systems, areas of environmental reserve as well as community and regional parks. 8,300 hectares of the 10,800 is captured as official park system. Approximately 3,900 hectares (45 per cent) is managed as ornamental parks space (i.e. mowed grass, planted vegetation, recreation areas such as sport fields). The balance, 4,400 hectares is comprised of primarily natural vegetation with infrastructure such as pathway/trail system, seating and parking areas. Outside of the official parkland, Calgary Parks still manages the natural environment for public use and safety, hazardous conditions, and invasive weeds.

Buildings

Calgary Parks public buildings include facilities at Ralph Klein Park, Inglewood Bird Sanctuary, Reader Rock Garden and Devonian Gardens. Parks public buildings are utilized for programs and booked for special events, weddings, etc. Parks is landlord to four restaurants at parks sites: River Café at Prince's Island Park, Reader Café at Reader Rock Garden, Provisions at Central Memorial Park and Seasons at Bowness Park. City buildings for staff and equipment include both permanent, portable trailers, depots, garages and c-cans. There are also year-round and seasonal washroom facilities throughout various parks across the city.

The data collection process through tools like RIVA DS and RIVA CP allow for improved capital and operational lifecycle funding projections and project planning. The EAM system is utilized for daily work orders and preventative maintenance scheduling.

Machinery and equipment

Calgary Parks utilizes technology such as hand-held GPS units and smaller equipment such as tablets for use in offices and the field. Calgary Parks acquired four small aerial trucks after Snowtember to improve response and resiliency to extreme weather events and proactively prune trees to mitigate future damage from extreme events.

Culture, Parks and Recreation Infrastructure Investment Plan (CPRIIP)

Calgary Parks uses a systematic approach to identify priority projects for capital funding. The investment plan uses research and current conditions to prioritize renovations and park redevelopment. CPRIIP also outlines funding requirements to support this work.

Community Services

Calgary Recreation

Calgary Recreation provides more than registered programs. It also oversees the development, maintenance and enhancement of recreation infrastructure. Capital Development is a division within Calgary Recreation responsible for the planning, development and maintenance of public recreation infrastructure.

Our current inventory of City-owned and operated recreation facilities includes:

- 15 ice arenas
- two multi-use leisure centres
- 12 indoor pools
- two arts centres
- Glenmore reservoir facility, including a sailing school and boat patrol site
- nine outdoor pools (in collaboration with community partners)
- 12 athletic parks and associated buildings
- Calgary Soccer Centre
- Centennial Planetarium
- eight golf courses (at six locations) and associated buildings

Culture, Parks and Recreation Infrastructure Investment Plan (CPRIIP)

Calgary Recreation uses a systematic approach to identify priority projects. The Culture, Parks and Recreation Infrastructure Investment Plan (CPRIIP) uses research, current Building Condition Assessments (BCAs), and growth and maintenance requirements to prioritize needed renovations, upgrades and new developments. CPRIIP also outlines funding requirements to support this work.

Facility Development & Enhancement Study (2016)

In 2014, Calgary Recreation initiated the Facility Development & Enhancement Study (2016) to review current service levels at City-owned and operated recreation facilities. The study measures existing levels of service against current and future demand to identify any gaps or opportunities for improvement. Results reveal an urgent need to replace inadequate, deteriorating or operationally costly facilities, and address underserved areas of Calgary. Results also show that existing facilities are deficient in terms of space and amenities based on model amenity plans for optimized service delivery. This information was used to develop a 10-year capital growth requirement (see Capital Growth below).

Buildings

Building values are based on the Recreation Capital Planning Tool (ReCaPT). Note: We are currently in the process of transitioning to new capital planning software (centerRivaDS). ReCaPT Current Replacement Values (CRV) have been inflated from 2013 to 2016 values. Values for deferred maintenance are also reported. These values are derived by subtracting the capital investment requirement from maintenance requirement values for each facility between 2013 and 2016. This calculation yields the Facility Condition Index (FCI) per cent, allowing us to assess the current and future maintenance needs of our assets.

Since 2013, Calgary Recreation has added several new assets to our inventory, including New Brighton Athletic Park, the Centennial Planetarium and the Calgary Soccer Centre (formerly Subway Soccer Centre). The CRVs for the Planetarium ($42.1 million) and Calgary Soccer Centre ($15.9 million) were generated using PeopleSoft Asset Management (PSAM) values. These values were then appreciated and inflated at three per cent per year.

Capital maintenance

ReCaPT also allows us to project capital maintenance requirements for each facility over the next 10 years ($351.4 million). This number does not include the approximate $101 million savings on capital maintenance requirements due to future implementation of capital growth projects. Funding for capital maintenance is estimated by increasing annual budget allotments for the current budget cycle by three per cent annually. For facilities where a current BCA already exists, the FCI rating was taken directly from the BCA instead of being calculated.

Capital growth

Results of Calgary Recreation's Facility Development and Enhancement Study (FDES) were used to develop the 10-year capital growth requirement ($661.7 million). Maintenance requirements for assets that would be replaced as part of capital growth have been deducted from the ReCaPT maintenance requirement value (resulting in potential capital maintenance cost savings of approximately $101 million over 10 years).

Land improvement, machinery and equipment

Values for land improvements, machinery and equipment use PSAM values. These values are lower than in previous years due to changes in TCA reporting requirements. While the quantity of equipment owned and managed by Calgary Recreation has not decreased, the definition of what constitutes a TCA has changed.

Operation funding

Operation funding requirements ($361.4 million) are based on averaging annual funding and inflating this by three per cent annually from 2015-2018. Based on this escalation, we assume there will be no gap in funding. We are currently undertaking a Zero-Based Review (ZBR) of our operations to identify gaps and redundancies to help improve efficiency.

Key challenges and opportunities

Calgary Recreation faces several challenges that could impact our ability to maintain current service levels:

- Aging infrastructure requires more resources to maintain.
- Aging mechanical systems are inefficient and operationally costly. They may also not be environmentally sustainable.
- Several facilities are past their useful life and require redevelopment or complete replacement. Other facilities are deficient in terms of space and amenities.
- There is a service gap in growth areas of The City.
- Rapid population growth has resulted in increased demand. Citizen dynamics, expectations and preferences are also changing.
- Changes in legislation and best practices are outpacing upgrades and investment.
- Service maintenance contract fees are escalating beyond inflation rates.
- There is a shortage of available land for expanded/ new developments to meet service requirements in some of the existing community catmint areas

As Calgary continues to grow and change, so do the needs of Calgarians. Using CPRIIP, ReCaPT and FDES data, Calgary Recreation has identified several opportunities to address challenges in a strategic way. The following approaches will help maintain and improve service levels while ensuring investments are based on sound evidence of where investment will have the greatest value for citizens:

- Prioritized funding requirements submitted through the CPRIIP.
- The Facility Management Framework Project.
- Increased funding from Council for recreation lifecycle.
- The possible conversion of facilities for alternative uses.
- A comprehensive annual lifecycle plan for Calgary Recreation.
- Modernization of facilities and new asset management software to allow for better monitoring and forecasting of high priority projects.
- Possible closure or repurposing of some facilities.

Community Associations (CA) and Social Recreation Groups (SRGs)

Community Associations (CA) and Social Recreation Groups (SRGs) assets have not been reported in this report.

Partner infrastructure is being reported through "Status of Community Associations and Social Recreation Organizations on City-owned Land." They are not included in the ISR because it is only the land that is owned by The City of Calgary. These facilities are operated and maintained by the organization or lease holder, and are governed by the lease or License of Occupation (LOC) that is in place with The City. With this unique legal agreement, all regular maintenance and lifecycle work is the responsibility of the organizations, and not The City of Calgary. While the assets are not directly owned by The City, they do represent replacement cost liabilities in the range of $950 million. If a group does not have adequate funding for the maintenance of the building, or decides not to renew the LOC, the infrastructure would become The City's responsibility and/or assets. The City does provide support to groups through the Capital Conservation Grant (Council Policy CSPS006), which was created to recognize the increasing challenges faced by community associations in operating and maintaining facilities.

Community Services

Calgary Housing

The Affordable Housing service line is supported through Calgary Housing (CH – Calgary Housing Business Unit) that includes services provided by the Calgary Housing Company (CHC - wholly Owned Subsidiary).

CH provides safe and affordable housing solutions to citizens of Calgary through property management of:

- 2,723 units owned by the Province of Alberta
- 2,173 units owned by The City
- 1,930 CHC-owned units

CHC also administers approximately 1,500 private landlord rent supplements.

Calgary Housing is a business unit within the Community Services Department of The City of Calgary and owns 2,146 units managed by CHC. These units reside in The City Partnership (affordable) and City-owned community housing (Social Housing) portfolios.

Calgary's City-owned Community housing portfolio (CHP) represents 1,048 affordable housing units constructed between 1969 and 1973, the majority of which are in a fair condition. Properties are on average more than 44 years old and are showing deterioration due to deferred maintenance as a result of insufficient funding for operating subsidies and underfunded capital investment. This portfolio is 100 per cent deep subsidy social housing units, therefore, Calgary Housing Company is limited in generating rent revenue because eligibility and rent calculation for the units is provincially legislated in the Social Housing Accommodation Regulation (SHAR). Operating agreement funding for maintenance of building structures and systems (90 per cent Province of Alberta, 10 per cent City) in their present form are set to expire between 2021 and 2024. These expiring operating agreements represent a risk to The City of Calgary who will then become responsible for the operations and maintenance deficit for these assets estimated to be $3 million annually (not including required capital investments).

Calgary Housing Company and the Affordable Housing Division within the Calgary Housing Business Unit are currently in discussions regarding establishing an asset management program for City-owned properties. CHC's newly developed asset management program is being considered for City-owned units which will support City of Calgary corporate asset management compliance.

$2.5 million of grant funding for 2017 has been received from the province to address outstanding lifecycle requirements in the CHP portfolio. CHC has identified additional capital requirements of $27 million over the next 10 years. There is currently no lifecycle maintenance capital reserve in place for this portfolio. The City of Calgary's Partnership Portfolio represents 1,122 affordable housing units that range in age from 49 years to newly developed. The City is responsible for the maintenance costs for this portfolio which is managed through a self-funded operating model based on mixed tenant rental income. There are no operating subsidies received from other levels of government for this portfolio. Most of the units in this portfolio are either new construction or have had extensive renovations and are considered to be in good to excellent condition. Three new projects, were completed in 2017:

- Kingsland – 32 units
- Crescent Heights – 16 Units
- Bridgeland – 24 units

For the 2015 – 2018 budget cycle, Council directed the Office of Land Servicing & Housing (OLSH) to build 88 affordable housing units per year. This responsibility was later transferred to the Calgary Housing business unit. The following properties are expected to open:

- Wildwood – 48 units (2018)
- Rosedale – 16 units (2019)

The capital grant agreement that supports the construction funding to build these units contains a maximum rent restriction under a 20-year long-term agreement. This agreement limits revenue opportunities for these projects. A reserve has been established for this portfolio which is limited in compliance to CMHC guidelines. The annual maximum contribution is $500 per unit. As of 2016, this reserve has reached the maximum of $5.4 million as per operating agreement, and will continue to grow together with the increased number of units.

The Corporate Affordable Housing Strategy and Implementation Plan were approved by Council in July 2016. This plan identified six priority areas to grow affordable housing including the need to both develop new affordable housing units and create a long-term pipeline of prioritized projects. This 10-year plan would then be incorporated into the capital budget plan cycles for 2019-2022 and 2023-2026. A stable source of funding is required to commit to those development projects.

The six strategic areas are:

1. **Get the Calgary community building** – Support housing developers to get new homes into the ground for people in need.
2. **Leverage City land** – Provide City land to contribute to affordable housing development.
3. **Design and build new City units** – Model tenant-centered design and place making for inclusive communities.
4. **Regenerate City-owned properties** – Lead strategic reinvestment to preserve homes for the highest-need residents.
5. **Strengthen intergovernmental partnerships** – Recommend solutions to the federal and provincial governments.
6. **Improve the housing system** – Leverage research, programs and partnerships to transform outcomes for people.

Key challenges and solutions

The single most pressing challenge facing Calgary's affordable housing sector is inadequate housing supply. Only three per cent of households in Calgary are supported by non-market housing, as compared to six per cent of households nationwide. As population growth is far outpacing the creation of affordable housing units in Calgary, population forecasts suggest over 22,000 new non-market units could be required to house six per cent of all Calgary households in 2025.

The purpose of The City's development program is to contribute to creating non-market units towards that deficit as identified through Targets 1-3 in the Corporate Affordable Housing Strategy. It is also intended to illustrate the value and importance of providing safe and adequate affordable housing developments through community engagement, creative architecture and innovative operating models. A large focus of the program is to use municipal tools to enable the non-profit sector to increase affordable housing inventory. The development program leverages municipal, provincial and federal funding to create units in all Calgary communities. A variety of built forms are utilized. The City has made an effort to leverage other City funds (i.e. Parks, Centre City, Heritage, Integrated Civic Facilities and Transit Oriented Development) wherever feasible.

Calgary Housing Company (CHC)

CHC is a wholly-owned subsidiary of The City of Calgary. CHC owns and manages 1,930 affordable housing units the majority of which are in good condition. Capital and operating expenses for the majority of units are self-funded.

The portfolio is comprised of properties constructed between 1960 and 1994, and includes the recent acquisition of a 163-unit high-rise complex in East Village. In addition, CHC received $3.48 million capital project grant funding in 2017 from the province to help CHC improve the condition of its properties.

A portion of the CHC properties are managed under the terms of operating agreements. One such funding agreement related to 207 CHC-owned units will expire between 2027 and 2031.

In 2016, CHC's board of directors approved the CHC Asset Management Policy. This policy establishes the foundation and direction for CHC's asset management program and sets out the guidelines for required maintenance investment identification, prioritization and planning. It is intended that the policy will guide CHC through all stages of the asset lifecycle management and support the delivery of sustainable services, as well as consider divestiture or redevelopment once a property no longer meets sustainability criteria. In addition, CHC has completed a Strategic Asset Management Program (SAMP) and Asset Management Plan (AMP) documents which define key deliverables of the asset management program.

CHC is now focused on the building capacity asset management area. One of the critical elements is conducting building condition assessments on its properties which builds CHC's prioritized 10-year capital plan. Prioritization is based on risk and level of service criteria.

To improve CHC asset management decision support, CHC is migrating to a new integrated Enterprise Software platform which is standard within The City of Calgary by the end of 2018.

Deputy City Manager's Office

Facility Management

Facility Management (FM) strategically plans, builds and operates a portion of The City's portfolio of municipal workplaces and public spaces which includes administrative buildings, operations workplace centres, multi-service facilities and emergency response stations. As the corporate accommodation planner and property manager, FM provides comprehensive services for each phase of facility development to help deliver quality frontline services to citizens of Calgary.

The business unit totals approximately 180 employees and delivers four lines of service:

- Facility Planning
- Facility Infrastructure
- Facility Operations
- Operational Co-ordination

Facility Management applies sustainability principles to inform decision-making, design, procurement and asset management. FM co-ordinates City service needs to achieve the best possible outcome when planning, providing and maintaining buildings, offices and work depots for The Corporation. FM's objective is to support other business units' service delivery and lower future operating costs, and minimize The City's impact on the environment. The FM asset portfolio is comprised of (approximately):

- Three million square feet of building space with an estimated current replacement value of $1 billion*. The portfolio excludes recreation centres, fire, police and Calgary Transit buildings. (*Current replacement value is the cost to replace all components of an existing building; the current replacement value is not generally equal to market replacement value.)
- 69 buildings which are erected on 368 acres of land (stand alone and OWC sites) valued at approximately $93 million, according to Tangible Capital Assets reporting.

Within the Facility Management's portfolio, the primary focus from a lifecycle maintenance perspective is on buildings. The weighted expected life for buildings in the portfolio is 75 years with an estimated 36 years remaining based on the weighted average (multiplying the buildings remaining life by the buildings replacement value divided by the total replacement value of the portfolio. Weighted years remaining for each building summed to determine the average years remaining for the whole portfolio.)

FM's asset base continues to age, and without sufficient capital lifecycle maintenance investment, there will be a serious risk to sustainable levels of service delivery to customers and ultimately service delivery interruptions to citizens. Data from condition analysis indicates that if we do not invest in the building portfolio, by 2026 the rehabilitation of 15 buildings (22 per cent of the portfolio) will be equal to the cost to replace them.

With limited and partial funding, FM has put in place a systematic approach to identifying, evaluating and mitigating lifecycle risk at a building asset level for the portfolio in order to make stronger risk-based decisions and to prioritize capital projects. Also, FM will be implementing Stage Gating and other business improvement initiatives like myFM, Corporate Co-ordinated Operations & Maintenance, and Integrated Civic Facility Planning to reduce the demand for funding.

Facility condition assessments

Industry standard facility condition assessments were completed on the majority of FM's building portfolio in 2015 and are monitored and updated regularly. As of the end of 2016, data indicates 22 buildings in the portfolio (31 per cent of portfolio CRV) are considered to be in good to excellent condition; 29 buildings (39 per cent of portfolio CRV) are considered to be in fair condition, and 18 buildings (30 per cent of portfolio CRV) are considered to be in poor to critical condition. Based on the analysis completed for capital maintenance requirements and an assumption that the current level of funding will continue (with an inflated rate of three per cent per year), additional funding of $224 million is required over the course of the next 10 years to bring the current condition of the portfolio to the target condition.

Project prioritization

FM continues to review buildings in the Corporate Accommodation Portfolio on an individual basis as well as portfolio level. Due to refined analysis, revisiting target conditions and the development of individual building lifecycle plans, the estimated cost from 2017-2026 to bring building conditions up to target conditions has been reduced from $50.6 million per year to $48.7 million per year. Using a risk-based approach in conjunction with the input from internal facility operators, asset planners and accommodation planners, FM has been able to perform a risk-based project prioritization in order to determine which facilities are required to be kept and maintained in operating condition and which can be allowed to deteriorate towards demolition. This prioritization incorporates numerous variables such as physical condition, facility use, service delivery, demand and asset substitutability. The risk–based model contains details of the changes in both the asset risk profile and the level of risk the customer will be exposed to as a result of the level of funding obtained. This analysis has resulted in a more accurate picture of capital lifecycle maintenance funding requirements and has positioned FM as an industry leader in asset management of public property.

Deputy City Manager's Office

Fleet Services

Fleet Services supplies vehicles and equipment on a lease basis to various City business units for their needs to provide services to the constituents of The City of Calgary.

Fleet provides full lifecycle management for approximately 3,000 Fleet-owned units. Services include budgeting of replacement and growth units, and purchase and commissioning into service. These activities are funded from self-supported debt.

All of Fleet's current assets are in good condition.

Fleet also provides preventative maintenance, repairs, fabrication, welding and body shop services for all Fleet-owned and non-owned units, as well as operator training.

Fleet maintains its assets in accordance with the following regulatory requirements:

- Traffic Safety Act (Provincial)
- Occupational Health and Safety Act (Provincial)
- National Safety Code (Federal)
- Canadian Motor Vehicle Safety Standards (Transport Canada)

Asset management strategy for replacement and growth requirements over the next 10 years includes:

- Maintenance: to maximize the use of the asset during its economic lifecycle Fleet will provide optimum preventative maintenance in compliance with manufacturer recommendations. Intervals of preventative maintenance and repair activities are optimized to provide maximum up-time for client operations.
- Growth is planned based on client needs and their operational budgetary constraints.
- Fleet is investing in upgrades and new system developments to support its asset management practices and decision support.

Transportation

Roads

Roads is one of four business units in the Transportation department, the others being Transit, Transportation Planning, and Transportation Infrastructure. Roads is responsible for operating, maintaining and renewing The City of Calgary's roadway infrastructure in a safe and sustainable manner in order to enable the movement of people and goods.

Roads is also impacted by the construction work done by other parties. The Transportation Infrastructure (TI) business unit delivers major projects like the addition of new interchanges and major roadway upgrades, while private developers build roadway infrastructure in new subdivisions. Roads inherits the ongoing operation, maintenance and renewal of this infrastructure.

Operational activities include snow and ice control (SNIC) and spring clean-up (SCU); street use and permitting; design and operation of electronic traffic control devices; traffic monitoring and control, including detours for roadway construction and special events; the production and sale of signs and construction materials; and pavement marking.

Maintenance and renewal activities include condition inspection, repair, replacement or rehabilitation, and minor upgrades in order to preserve and improve the safety and reliability of the roadway infrastructure. Roads also provides review, inspection and acceptance services for infrastructure constructed by developers and third-party contractors.

As of the end of 2016, the total replacement cost of all roadway assets under Roads stewardship was estimated to be $20.48 billion (excluding land). There has been an increase of $7.96 billion since the last report (2013 ISR). This increase in value is largely associated with the airport tunnel, Plus15 overpasses and new unit rates for pavement and concrete.

The Roads asset portfolio is described in the table below.

Asset Type	Quantity	Unit of Measure	Current Replacement Cost ($Millions)	Average Physical Condition
Boulevards	1,012.0	Hectares	$51.0	Fair
Bridges and Tunnels	363	Count	$1,514.4	Good
Curbs & Gutters	6,600.0	Linear kilometres	$2,514.1	Very Good
Facilities and Storage	n/a	Various	$46.6	Fair
Fences / Guardrails	317.6	Linear kilometres	$282.0	Fair
Guide Signs	276	Count	$34.5	Good
Lanes	3,067.1	Lane kilometres	$897.0	Fair
Machinery & Equipment	423.0	Count	$15.3	Fair
Engineered Walkways	96.4	Linear kilometres	$17.6	Fair
Pavement	16,254.6	Lane kilometres	$9,935.3	Good
Plants	2	Count	$22.3	Poor
Retaining Structures > 1 metre	35.8	Linear kilometres	$132.3	Good
Retaining Walls < = 1 metre	16.8	Linear kilometres	$16.5	Fair
Sidewalks	5,680.6	Linear kilometres	$2,627.7	Good
Signs	98,994	Sign posts	$48.0	Good
Street Furniture	1,799	Count	$3.2	Fair
Street Lights	83,792	Streetlight stands	$1,532.1	Fair
Timber Stairways	68	Count	$3.0	Fair
TMC	1	Count	$8.1	Fair
Traffic Barriers	112.1	Linear kilometres	$60.3	Fair
Traffic Signals	1,029	Signalized intersections	$208.3	Good
Pedestrian Passes (over 15)	90	Count	$515.0	Good
		Total:	**$20,484.6**	

The management of roadways is governed by the following legislation:

Municipal Government Act (2017)

City Transportation Act (2014)

Traffic Safety Act (2017)

Public Highways Development Act (2010)

Highways Development and Protection Act (2013)

Dangerous Goods Transportation and Handling Act (2010)

These do not articulate the standards for roadway construction, operation and maintenance, but do set out the guidelines by which transportation authorities must operate. Roads has developed internal design and construction standards, and maintenance and operation procedures based, where appropriate, on industry best practice guides.

City of Calgary policies that impact the provision of roadway services include:

TP001 Dangerous Goods Route Network Development Policy

TP002 Traffic Calming Policy

TP003 Surface Transportation Noise Policy

TP004 Snow and Ice Control Policy

TP005 Truck Route Network Development Policy

TP006 High Load Truck Route Network Development Policy

TP007 Installation of 'Out of Sequence' Traffic Signals Policy

TP008 Streetlight Standards and Sign Poles – Colour of Paint Policy

TP009 Environmental Capacity Guidelines for Roadways Policy

TP010 Pedestrian Policy

TP011 Bicycle Policy

TP012 Calgary Transportation Plan

TP013 Roadside Memorials Policy

TP014 Parking Governance Roles and Responsibilities

TP015 Calgary Parking Authority Financial Returns to The City

TP016 Roundabout Policy

TP017 Parking Policy Framework for Calgary

TP018 Residential Street Design Policy

TP019 Slop Stability Management Policy

TP020 Transportation Corridor Study Policy

TP021 Complete Streets Policy

LUP005 Visitor Parking Permit Policy

Roads performs regular and formal condition surveys for approximately 85 per cent of its asset base. The assets that are not formally assessed are primarily either supporting operational activities or replaced as failure occurs. Service levels are determined largely based on roadway classification, with high volume roads receiving increased inspection and maintenance, and being constructed to more robust specifications.

Roads services are primarily funded as follows (in 2017):

72% Tax Support

16% Internal Recoveries

10% User Fees/Other Sales

2% Grants and Invest Inc

Funding impact

Roads services are also impacted by the funding available for major capital projects delivered by Transportation Infrastructure. The Calgary Transportation projects that have been deferred as a result of this funding reduction are focused primarily on improving goods movement and accommodating traffic growth.

The deferral of these projects, along with Calgary's continued and rapid growth, is expected to generate additional traffic that will increase both congestion for roadway users and also the deterioration rate of existing roadway assets. As with many of Calgary's business units, Roads faces the challenge of maintaining current service levels while usage increases and capital funding decreases.

Roads is committed to facing this challenge in a number of ways. Two examples include the implementation of solutions to improve peak traffic flows, such as the lane reversal systems on Centre Street, Memorial Drive and Fifth Avenue S.W.; and the use of new technologies and tools that can increase staff efficiencies and reduce asset lifecycle costs.

Transportation

Calgary Transit

Calgary Transit connects people and places by providing mobility (the ability to move from place to place) and accessibility (the ability to reach a destination). Calgary Transit's mission is, "Connecting you with people and places you care about by providing safe, accessible, reliable and courteous public transportation services."

To realize this mission, Calgary Transit:

- Delivers safe, clean, reliable and well-maintained public transit.
- Provides service through community shuttle, bus, bus rapid transit (BRT) and light rail transit (LRT).
- Provides specialized transportation services for disabled or limited mobility persons (Calgary Transit Access).
- Plans future transit service and supports transit-oriented development.

The following regulatory standards have the largest impact on the management of Calgary Transit assets:

- Air quality regulations set out by the Alberta government.
- Vehicle weight restrictions as mandated by Alberta Transportation.
- Fuel storage regulations as outlined by the Petroleum Tank Management Association of Alberta.
- Alberta Building Code (Alberta Government).
- Alberta Fire Code.
- Access Design Standard 2016 – City of Calgary.

Other groups or policies that have an impact on the management of Calgary Transit assets include:

- American Public Transportation Association (APTA).
- Alberta Transportation.
- Canadian Urban Transit Association (CUTA).
- National Fire Protection Association 130.
- City of Calgary Advisory Committee on Accessibility.
- City of Calgary – Environmental Policy.

Currently, Calgary Transit assets include:

Buildings

- Anderson garage and maintenance facility for buses and LRVs.
- Spring Gardens administration building and maintenance and storage facility for buses.
- Victoria Park administration building and maintenance and storage facility for buses.
- Oliver Bowen maintenance and storage facility for LRVs.
- Haysboro garage storage facility for LRVs.
- Westbrook administration building.
- Calgary Transit Access garage.
- Canyon Meadows and 69th Street parkades.
- 45 LRT stations.

Engineered structures

- 57 major structures, bridges and tunnels.
- 44 parking lots comprised of 16,978 parking stalls.
- 45 LRT platforms.
- 48 LRT traction power substations.
- LRT signal systems including wayside ABS, crossing systems, interlocking systems and signal rooms.
- 119 kilometres of single track.
- Communications infrastructure including closed circuit television cameras, communications rooms, help phones, public announcement systems, passenger information systems, radio systems, SCADA (supervisory control and data acquisition) systems, train tracking systems and underground infrastructure.

Vehicles

- 733 40-foot standard buses.
- 93 60-foot articulated buses.
- 159 community shuttle buses.
- 200 LRVs.
- 109 light and heavy duty support vehicles.

Machinery and equipment

- 244 ticket vending machines.
- 1,036 fare boxes and other cash processing equipment.
- Other equipment including containers, radios, software, fuelling infrastructure and alerting systems.

Land and land improvements

- 144 land parcel areas.
- 80 land improvement items such as fencing, outdoor lighting, signs, bike racks and pathways.

Asset condition

Calgary Transit initiatives align with long-term Council priorities, including assessing the condition of assets. These assets have various condition ratings ranging from very good to critical. While a significant number of Calgary Transit assets are in very good or good condition, there are also assets that are in fair, poor or critical condition. As assets age and with an increased demand on the transit system, impacts on the assets are encountered in areas that include asset availability, condition and lifespan.

Various divisions in Calgary Transit ensure that transit assets remain in a state of good repair, and work in a reliable and safe manner. This is achieved through tracking asset conditions relative to life expectancy, years in service and other applicable factors. Calgary Transit also tracks the replacement costs associated with asset conditions.

Key issues and challenges

Transportation is a priority issue for Calgarians. In addition, transit has been identified as one of the Calgary Transportation Plan (CTP) policy areas that contribute most to achieving the Key Directions for Land Use and Mobility. Infrastructure-related key issues for Calgary Transit include:

- **Service provision:** The provision of sustainable transit service in a safe, efficient and cost-effective manner.
- **Asset management:** Enhanced asset management of all infrastructure and asset categories to meet defined levels of service in the most cost-effective manner for present and future transit consumers.
- **Financial requirements:** The acquisition of funding related to operating and capital budgets, including areas of growth, while also assessing the impacts of future demands on the transit system.
- **Climate change:** There is a commitment towards environmental awareness and considerations. This includes designs for new buildings that are based on meeting LEED standards, recycling, energy efficiency and the elimination of timber creosote-treated ties from the Light Rail Transit system.

The plan for the implementation of asset management practices in Calgary Transit include the following high-priority areas:

- Develop and implement processes for collecting, assessing and maintaining asset condition information for each asset category.
- Develop measures and processes for tracking asset performance for each asset category.
- Develop a 10-year capital plan and an accompanying long-term operational expenditure plan.
- Review established preventative maintenance schedules and other types of maintenance occurrences for opportunities to optimize asset reliability.
- Identify required asset management competencies and address opportunities for development.

- Develop a resource plan for capital project implementation and long-term asset stewardship.

Some of the challenges Calgary Transit faces include:

- Aging infrastructure which impacts service availability and delivery.
- The acquisition of funding to address the infrastructure gap — due to uncertainty regarding guaranteed funding, estimated funding based on an inflationary index has been provided in this report for years beyond 2018.
- Increased customer demands in terms of levels of service.
- The need to keep up with transit growth in developing or existing communities.
- Varying currency exchange rates related to asset procurement or contractor services.

Infrastructure risk

Calgary Transit is committed to identifying risks and operational changes which relate to the continual improvement of transit service and its asset management framework. These include a plan to assess and monitor risks related to the achievement of required levels of transit service provision. The following are some key areas regarding Calgary Transit infrastructure risk:

- The age of the infrastructure and rate at which assets reach specified lifecycles.
- The availability of capital and operating funds to ensure sustainable service provision.
- Climate change concerns including the increase in the number of flash floods and lightning strikes was observed. Colder and wetter weather will have an impact on all transit assets.
- The ability of the transit system to accommodate an increase in ridership and adjust to decreases in ridership.
- Supply chain requirements and the inability to procure parts or assets for upgrades, replacements or repairs.
- The availability of the required human resources for sustained service provision.

In some cases, addressing a risk in one area can affect or generate risks in other areas. In 2016, four-car trains were implemented, including the new S200 model CTrains. While this is a service improvement to ensure that Calgary Transit can transport larger numbers of people, there is an associated drain on other infrastructure components such as traction power requirements. Changes in ridership also require opportunities for service flexibility and adjustments.

Utilities & Environmental Protection

Waste & Recycling Services

Investment planning and funding

The 2015-2024 Waste & Recycling Services Infrastructure Investment Plan (WRIIP) is a strategic capital plan that supports the delivery of critical waste and recycling services. The WRIIP is structured in terms of investment drivers and programs. The four drivers common across UEP are: (i) maintaining assets (ii) regulatory and environmental protection (iii) service and (iv) growth. The three programs specific to Waste & Recycling Services (WRS) are: (i) landfill (ii) diversion and (iii) facilities and equipment. Within a program, the projects are prioritized based on their customer service and environmental objectives, affordability, and available delivery resources. The current WRIIP presents capital investments of $626 million through the 2015-2024 planning period. The development of the next iteration of WRIIP (2019-2028) is currently underway.

Action Plan is the Council approved budget for the active four-year business cycle. The capital component of WRS's action plan is a subset of WRIIP, and is approved initially for the entire four-year term with an opportunity to amend once every year through the cycle. The operational component of the action plan is approved by Council each year as part of the annual budget process. In November 2014, Council approved $326.0 million in capital and $671.6 million in operational expenditures under the WRS Action Plan for the 2015-2018 business cycle.

WRS capital expenditures are met entirely through Gas Tax Fund (GTF) grant, self-supported debt, and self-funded Sustainment (Capital) Reserve capitalized from user fees and revenues. WRS capital expenditures are not funded through general municipal revenues or property taxes. As such, with regards to the terminology used in this ISR report, WRS operates under a financial model which does not identify an "infrastructure funding gap."

Portfolio overview

WRS has a waste diversion goal of diverting 70 per cent of waste generated from all sectors from City landfills by the year 2025. The approach to managing day-to-day operations and service delivery is based on the following four pillars of Customer Focused Services:

(i) We Educate, Engage and Empower
(ii) We Collect Waste
(iii) We Divert Waste
(iv) We Manage Garbage

Consistent with the corporate Asset Management Policy, assets are considered a means to provide service and value, and asset management as the practice of delivering service and value by utilizing the assets optimally. An overview of the infrastructure assets under WRS stewardship, in service as of Jan. 1, 2017, follows.

Collections infrastructure

- Blue (recycling) carts and black (garbage) carts serving over 320,000 single-family residential houses
- More than 5,900 collection bins serving businesses and organizations
- 40 community recycling depots
- Specialized and custom-developed software tools

Waste management facilities

- Three active waste management facilities (WMF) at (i) East Calgary, (ii) Spyhill and (iii) Shepard landfill sites
- Two biocells, one each at East Calgary and Shepard landfill sites
- One industrial waste facility at Shepard landfill site
- Five inactive landfill sites with closure dates between 1950 and 1994
- Significant land areas designated as future airspace at the active landfill sites

Landfill management and operations support infrastructure

- Leachate extraction systems consisting of nearly 30 kilometres of pipe network and over 250 wells and sumps with an average daily yield of 81 cubic metres of leachate.
- One leachate treatment pilot plant at East Calgary WMF (decommissioned as of Jan. 1, 2017).
- Gas extraction systems consisting of nearly 14 kilometres of pipe network and over 40 wells and monitoring points with annual yields of 7.3 million cubic metres of landfill gas and nine million cubic metres of soil vapour.
- 30 kilometres of paved and gravel roads and pads, and 45 kilometres of light trails.
- Eight stormwater retention ponds, peripheral engineered wetlands, ditch drainages and culvert structures.
- Over 1,200 environmental monitoring wells.
- 60 kilometres of litter and security fences.
- Various specialized equipment and devices for waste management and environmental control operations.

Diversion infrastructure

- At each of the three active WMF: one Throw N' Go pad (accepting general recyclables drop-off), one electronics recycling drop-off receptacle, one household hazardous waste (HHW) drop-off receptacle, one construction and demolition waste drop-off pad, and one compost pad.
- Six HHW receptacles at designated fire stations.

Buildings

Buildings provide for offices, material storage, labs, vehicle parking, vehicle washing, maintenance shops, equipment storage, trailers, transfer station, scalehouses, landfill gas control rooms and environmental control facilities. The buildings under WRS stewardship are as follows:

- 18 buildings at Spyhill WMF.
- 23 buildings at East Calgary WMF.
- 12 buildings at Shepard WMF.
- Two fully-owned and one partially-owned buildings at Shepard operational workplace centre.
- Three buildings at Springbank landfill (inactive).
- Three buildings at Nose Creek landfill (inactive).
- Two buildings at Spring Gardens operations base.

Infrastructure being acquired

The completion of the following capital projects, which are ongoing, will result in substantial additions to the WRS asset portfolio.

- **Green Carts:** to accept compostable organic waste, have been deployed to serve 320,000 single-family residential houses in 2017.
- **Composting facility:** being constructed at Shepard WMF with a capacity to process 100,000 tonnes of organics and 45,500 tonnes of biosolids annually. This is a covered (indoor processing) facility producing Category 'A' compost all year round.

Valuation and condition

The inventory, valuation and condition information of the assets is derived from the datasets developed for implementation of the Waste & Recycling Services Asset Management System (WRAMS). In contrast to the information provided in previous editions of ISR which were based on the accounting-oriented TCA (Tangible Capital Assets) records and came with broad assumptions, the current information provides a more realistic representation of the actual asset portfolio.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The valuation and condition profiles, as of Jan. 1, 2017, are summarized in the table below.
The notes that follow clarify the assumptions made in the group calculations of condition and remaining life.

Asset	Replacement Value ($M)	Condition Profile (see Note 1)					Avg. Remain Life (Yrs.)
		Very Good	Good	Fair	Poor	Very Poor	
Buildings							
No. of buildings (Total 63)		29	8	14	11	1	
Buildings	$56.1	47%	24%	10%	10%	9%	53
Category Sub-total	**$56.1**	**47%**	**24%**	**10%**	**10%**	**9%**	**53**
Engineered Structures							
Liners	$10.3	–	100%	–	–	–	120
Caps	$68.4	31%	43%	26%	–	–	75
Leachate	$41.9	21%	55%	23%	1%	–	49
Gas Collection	$25.1	45%	35%	15%	5%	–	16
Drainage	$21.6	10%	70%	15%	5%	–	56
Roadways	$22.4	55%	17%	26%	2%	–	15
Diversion Infrastructure (see Note 2)	$8.3	5%	60%	30%	5%	–	35
Category Sub-total	**$198.0**	**28%**	**48%**	**22%**	**2%**	**0%**	**54**
Machinery & Equipment							
Carts (Black and Blue only (see Note 3)	$36.8	30%	50%	15%	5%	–	11
Bins	$17.8	10%	50%	10%	25%	5%	13
Specialized Vehicles and Portable Equipment	$1.3	10%	55%	25%	10%	–	10
Fences (Litter)	$0.7	10%	90%	–	–	–	12
Specialized Software	$5.0	–	100%	–	–	–	4
Category Sub-total	**$61.5**	**21%**	**55%**	**12%**	**10%**	**1%**	**11**
Vehicles (see Note 4)	–	–	–	–	–	–	–
Land Improvements							
Fences (Security)	$3.9	59%	10%	29%	2%	0%	23
Category Sub-total	**$3.9**	**59%**	**10%**	**29%**	**2%**	**0%**	**23**
Portfolio Grand Total ($M)	**$319.5**	**31%**	**45%**	**18%**	**5%**	**2%**	**45**

Notes:

1. The class-level condition profile percentages and remaining life are calculated as weighted averages of replacement value.

2. "Diversion Infrastructure" excludes the Composting Facility which was not operational on Jan. 1, 2017.

3. "Carts" excludes the 240L green carts which were not operational on Jan. 1, 2017.

4. The standard vehicles used by WRS are leased from Fleet Services and reported under their portfolio. Specialized vehicles and portable equipment are reported under WRS Machinery & Equipment.

Integrated Risk Management

By implementing the Integrated Risk Management (IRM) processes, WRS has been proactive in identifying and managing risks. In terms of the risks impacting infrastructure, the WRS business unit risk register features a dedicated risk category of "asset." This category covers risks that are both strategic (e.g. planning and delivering assets to meet growth demands) as well as specific to an asset class (e.g. managing landfill leachate). Key infrastructure risk themes tracked on the WRS risk register are as follows:

- Evolving regulatory environment (e.g. more stringent requirements driven by greenhouse gas emissions and climate change considerations).
- Financial challenges (e.g. state of economy and competition from commercial enterprises).
- Customer expectations (e.g. level of service and effectiveness of waste diversion initiatives).
- Asset lifecycle maintenance and renewal (e.g. better asset information and decision processes).
- Extreme weather and natural disasters (e.g. severe floods and snow events).

Integrated Infrastructure Risk Management Framework

The Integrated Infrastructure Risk Management Framework (IIRMF) is a standard for infrastructure-specific risk management. It specifies minimum requirements and provides common definitions which enable structured evaluation and mitigation of risks at both the individual asset and infrastructure system levels.

WRS is currently undertaking a pilot exercise to implement IIRMF methods on leachate, liners and landfill gas asset systems. These groups of assets have the highest infrastructure risk for WRS. The pilot implementation basically involves applying risk-centric methodologies at various stages of infrastructure planning and management processes. The knowledge outcomes from this exercise will inform: (i) the business unit and department level IRM analyses regarding infrastructure risks and (ii) the development and investment prioritization of the next Waste & Recycling Services Infrastructure Investment Plan (WRIIP).

Strategies

Key ongoing asset management strategies are briefly described as follows:

- The implementation of WRAMS is in progress. When completed, this system will provide WRS with an asset registry along with the ability to capture, analyze and report information at the individual asset level. An automated work order system is planned for the next phase of this initiative.
- A consulting assignment is in progress to undertake condition inspections, quantitatively profile the condition of building assets and components, and develop the lifecycle management strategy and plans. Similarly, the condition inspections and lifecycle planning of landfill roads and pads is currently underway. In-house subject matter experts are conducting analyses to develop an inspections program and collect condition data in coordination with the WRAMS implementation initiative.
- Utilizing the insights learned from the pilot implementation of IIRMF, it is expected that the application of risk-based methods will be expanded to further asset groups.
- Development of the WRS Asset Management Plan is nearing completion. The emphasis of the current iteration has been to integrate asset management planning with the business and budgeting process, including the WRIIP process.
- Development of the WRS Strategic Framework as a 10-year planning document is in progress. When complete, the framework will provide better clarity and direction for prioritizing future infrastructure investments.

Utilities & Environmental Protection

Water Resources and Water Services

The Water Utility is a part of Utilities & Environmental Protection (UEP). UEP works with the community and The Corporation to protect land, air and water. The Water Utility business units (Water Resources and Water Services) contribute to this vision by helping to protect our watersheds, providing world class water and wastewater treatment, and conserving our water resources for future generations while supporting Calgary's growth.

Asset portfolio

The Water Utility provides valued and essential water, wastewater and stormwater services through development, operation and maintenance of a significant infrastructure system.

The infrastructure includes two water treatment plants, and a distribution network of reservoirs, water pump stations, pipes and service connections to deliver safe drinking water to customers. The Water Utility also operates the Glenmore Dam, which stores raw water in the Glenmore Reservoir. The wastewater infrastructure includes three wastewater treatment plants, a network of lift stations, sanitary pipes and services to collect and treat wastewater. The stormwater system includes stormwater pipes, wet ponds, dry ponds, wetlands and lift stations.

Asset condition

The majority of assets in the Water Utility range in physical condition from fair to excellent. A few exceptions exist for each category. These components have been identified for maintenance, upgrades or replacement in the future. The water, wastewater and stormwater infrastructure is able to meet the current demand requirements of The City; however, important infrastructure investments will be required to maintain our customer levels of service and continue to meet service demand into the future.

Water infrastructure investment drivers

In order to achieve business objectives and ultimately continue to deliver a sustainable and reliable service to our customers, the Water Utility has identified four main investment drivers:

- Maintain assets.
- Regulatory and environmental protection.
- Service.
- Growth.

Maintain assets

Effective asset management requires continued long-range infrastructure planning.

The Water Utility has ongoing condition assessment and maintenance programs, which have helped identify and eliminate potential service failures that could be costly to replace on a reactionary basis. For example, the yearly watermain break count has been steadily decreasing as a direct result of such strategies, thereby reducing service disruptions placing Calgary as one of the best performing municipalities in the country.

The condition assessment and maintenance programs are vital in order to ensure the reliability of our infrastructure. This infrastructure is critical to maintaining levels of service to all areas of The City. Asset Management strategies and maintenance investments ensure that the Water Utility continues to provide a high level of service to citizens.

In future years, The Water Utility will require reinvestments across all three lines of service (water, wastewater and stormwater) as assets approach the end of their useful life. Increased investments are required in maintenance and inspection programs to proactively replace assets coming to the end of their asset lifecycle and ensure reliable service and operational efficiency.

Areas of asset and investment management that are being reviewed and improved include:

- Maintenance plans to optimize asset lifecycle costs for all asset classes.
- Stage Gating was implemented for the Water Utility in June 2016. At that time, it was planned that a review of the process would be completed within six to eight months of implementation. That review process has taken place, incorporating feedback across various stakeholders groups, to get feedback to understand how well the process is working and identify areas for improvement.
- Condition and risk assessment programs for all asset classes to ensure investments are directed to higher risk assets.
- New and innovative technologies to improve the effectiveness of condition assessment, maintenance and rehabilitation programs.

Regulatory and environmental protection

The City must comply with regulatory requirements in order to prevent risks to public health and the overall environment, and maintain its approval to operate. This requires investment in our existing infrastructure to maintain compliance and the provision of new infrastructure as more rigorous regulatory requirements are put in place.

The City is dedicated to protecting and managing our precious water resources. Through an integrated approach, the entire watershed must be considered including reducing upstream risks to our water source, reducing Calgary's impacts on the rivers (Stormwater Management Strategy) and conserving this limited resource through its responsible and efficient use (30-in-30 Water Efficiency Plan). Watershed planning initiatives are aligned to the provincial Water for Life strategy and regional watershed management plans to protect the watershed.

The City's water treatment plants produce safe and reliable drinking water that meets existing regulatory standards. Drinking Water Safety Plans (DWSP) have been prepared to meet the requirement for all Water Treatment Systems in Alberta. The Wastewater treatment plants continue to meet the approval to operate requirements.

Over the next 10-year period, The City will need to make investments to meet future regulatory requirements. Some of the anticipated future regulatory requirements include the tightening of effluent discharge limits from wastewater treatment plants.

Service

Aging infrastructure and increasing demand are challenges that drive the need for continuous investment in order to maintain service levels to citizens. Work continues to identify opportunities to enhance resilience and protect The City's infrastructure and citizens' property. The City has made significant investments in past business cycles to ensure an appropriate level of resilience for key infrastructure. An example is the investment in upgrading pre-treatment facilities at two water treatment plants. The benefits of these upgrades were clear during the flood in June 2013, as The City was able to provide safe drinking water throughout the event.

The Water Infrastructure Investment Plan includes projects and programs such as Community Drainage Improvements (CDI), Watermain replacements and Local Water Quality Improvements to ensure the highest levels of service for The City, its citizens and its regional customers.

Growth

The Water Infrastructure Investment Plan includes significant investments to upgrade the existing infrastructure and provide new infrastructure to accommodate growth in both developed and developing areas. Although lower than expected growth levels were experienced in Calgary in 2016, there continues to be a need to invest in infrastructure to address capacity constraints.

The high growth levels experienced in Calgary in the first half of the decade have had an impact on the capacity at wastewater and water treatment plants. The Bonnybrook Wastewater Treatment Plant (BBWWTP) is currently servicing a population that is nearing its installed capacity. A capacity upgrade of one of the water or wastewater treatment plants is required on average every 10 years based on the last 20 years of historical growth.

The Water Utility is focused on delivering the best value for money to meet the citizens' current and future water needs, and support stable and predictable rates and service levels. This is only possible through robust asset management plans and practices, and strategic investments.

The Water Utility will continue to provide high service levels and ensure appropriate investments are made to extend the life of its aging assets. The Water Utility will continue to ensure strategic infrastructure investments are made to support growth and comply with current and future regulatory requirements, while protecting and managing our valuable water resources.

Calgary Police Service (CPS)

The Calgary Police Service (CPS) works to maximize public safety in Calgary through a community policing strategy that focuses on education, prevention, early intervention, enforcement and investigations.

This commitment to public safety is directly supported by our organizational support bureau, which includes infrastructure. In addition, public trust and confidence is central to the CPS's work on public safety.

The CPS infrastructure division aligns directly with the Council priority of a well-run city and continues to find efficiencies through increased use of smart technology and more efficient infrastructure.

Key issues and challenges

The key challenge for the CPS is to acquire, maintain and fully utilize infrastructure assets to deliver on its goals and commitments to the citizens of Calgary. That is accomplished by utilizing best practices in management of existing assets, as well as forecasting and identifying short, medium and long-term infrastructure priorities.

As part of the community policing approach, the CPS continues to increase its partnerships with other agencies to provide services focused on the needs of citizens. These partnerships have infrastructure implications with a number of community groups utilizing CPS facilities for meetings and events. As well, CPS staff and equipment are co-located with other service providers to form multi-agency collaborations, such as the Sheldon Kennedy Child Advocacy Centre (SKCAC) and the Safe Communities Opportunity and Resource Centre (SORCe).

Factors that may affect the management of infrastructure include:

- Community changes, such as population and demographic structure, socio-economic trends and traffic volume.
- Market changes, such as economic situation, industry standards and real estate volatility.
- Federal and provincial legislations.
- Operational changes, such as growth in staffing, volume and complexity of crime and social disorder, emergence of organized crime, and policy changes.
- Environmental standards, such as Leadership in Energy and Environmental Design (LEED) certification and The City's Triple Bottom Line commitments, modern waste management principles including composting, and right sizing of the fleet with energy efficient vehicles.

Assets

The assets which the CPS manages include:

Buildings

- 29 buildings which are owned by The City or leased from third parties. These include but are not limited to the Westwinds Campus, eight district offices (multi-service and leased facilities), stable, canine training centre and indoor shooting range.

Vehicles, machinery and equipment

- Approximately 1,270 vehicles.
- Two helicopters.
- Approximately 3,540 personal computers, laptops and printers.
- 521 vehicle-mobile workstations.
- 2,603 mobile or portable radio and other telecommunication systems.
- Various traffic equipment, robots and breathalyzer equipment.
- Digital traffic cameras and related infrastructure.
- Automated Fingerprint Identification System (AFIS).

Funded capital priorities

- Arrest Processing facility.
- North Deerfoot Campus facility improvement.

Unfunded capital priorities for the next 10 years

- Replacement of two district offices due to aging (more than 35 years old).
- Renovation and improvement of two district offices.
- Westwinds Campus expansion to include special purpose facilities.


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Related Authority and Civic Partners

Calgary Parking Authority

Overview

The mandate of the Calgary Parking Authority (CPA) is set out in CPA Bylaw No. 28M2002. The Authority's operations are governed by this bylaw. We fulfil the mandate by planning, developing and operating public parking services, parking enforcement services and municipal impound lot, parking advisory services, residential parking permit services and management services for parking facilities.

Public parking services: Our public parking facilities help fulfil Council's vision for the overall land use direction of The City and its transportation system. The Downtown Parking Strategy was updated and the new Integrated Downtown-TOD Parking Strategy (TT2016-0204) was approved by City Council on June 20, 2016. Other applicable policies include the Calgary Parking Policies (TT2017-0512) and Commercial On-Street Parking Policy (TT2013-0795).

Parking enforcement services and municipal impound lot: Our parking enforcement services enhance public safety, improve traffic flow and mobility, and encourage compliance with municipal and provincial parking regulations.

Parking advisory services: We advise stakeholders and our peers in the municipal and provincial governments and in business and community organizations on parking issues, policy and regulations.

Residential parking permit services: The residential parking program is governed by Bylaw 25M2017. We verify qualifications of applicants, and issue residential and visitor permits in this program designed to protect zone residents from the impact of non-local parking.

Management services for parking facilities: Our parking management program and expertise make our services valuable to municipal and third-party clients who wish to have their parking managed by specialists.

CPA projects and initiatives

CPA's new impound facility was completed in July 2016. This new facility includes 14,000 square feet of floor space and is LEED (Leadership in Energy and Environmental Design) gold certified. This facility houses CPA's enforcement support and enforcement staff, and provides frontline service to customers who have had their vehicles impounded.

CPA's first third-party joint venture project was completed in October 2016. This project is located in Kensington at the former Lido Café site. The new development includes a 34-space parkade that is owned by The City and operated by the CPA. This project also includes a residential tower, a residential parkade and at-grade retail.

On May 9, 2017, City Council approved amendments to the Calgary Traffic Bylaw, allowing the Residential Parking Permit (RPP) program to start using online permits in place of passes and hang tags for resident and visitor parking. The benefits of the updated program include a quick online permit application/renewal process for residents and a two-year permit versus the previous one-year permit. Additionally, permits will now be linked to licence plates which will allow for more effective and efficient enforcement practices in residential parking zones. The system will transition all residential parking zones to the new system over the course of a year beginning on Aug. 1, 2017.

CPA and the Calgary Municipal Land Corporation (CMLC) are partnering to develop the Ninth Avenue Parkade (9AP). The new parkade will service the East Village and area developments. The parkade will be located at 363-407 Ninth Ave. S.E. (Lot 62) and include over 500 parking stalls. The expected completion date is 2020.

Preventive maintenance program

The maintenance of our facilities is currently managed through an extensive database, which highlights all work required by our Facilities division. In addition to this, an in-house software program links our preventive maintenance program, parts inventory and work orders into one database.

Facility management

On an annual basis, all facilities are monitored by a structural engineer, HVAC, mechanical and electrical consultants. In each facility, critical areas identified as unique are examined and logged. Regular monitoring allows for long-term expenditure forecasting for structure maintenance. Monitoring includes reviewing roof condition, mechanical system operations, membrane wear and slab structural integrity. In addition, we continue to monitor our facilities in real time, using our Building Management System. This system has over 21,000 points of monitoring. In 2009, CPA completed a facility-wide energy audit and implemented upgrades where applicable. As a management strategy CPA is trying to ensure mechanical and structural compliance through best practices thereby extending the current lifecycle of these assets.

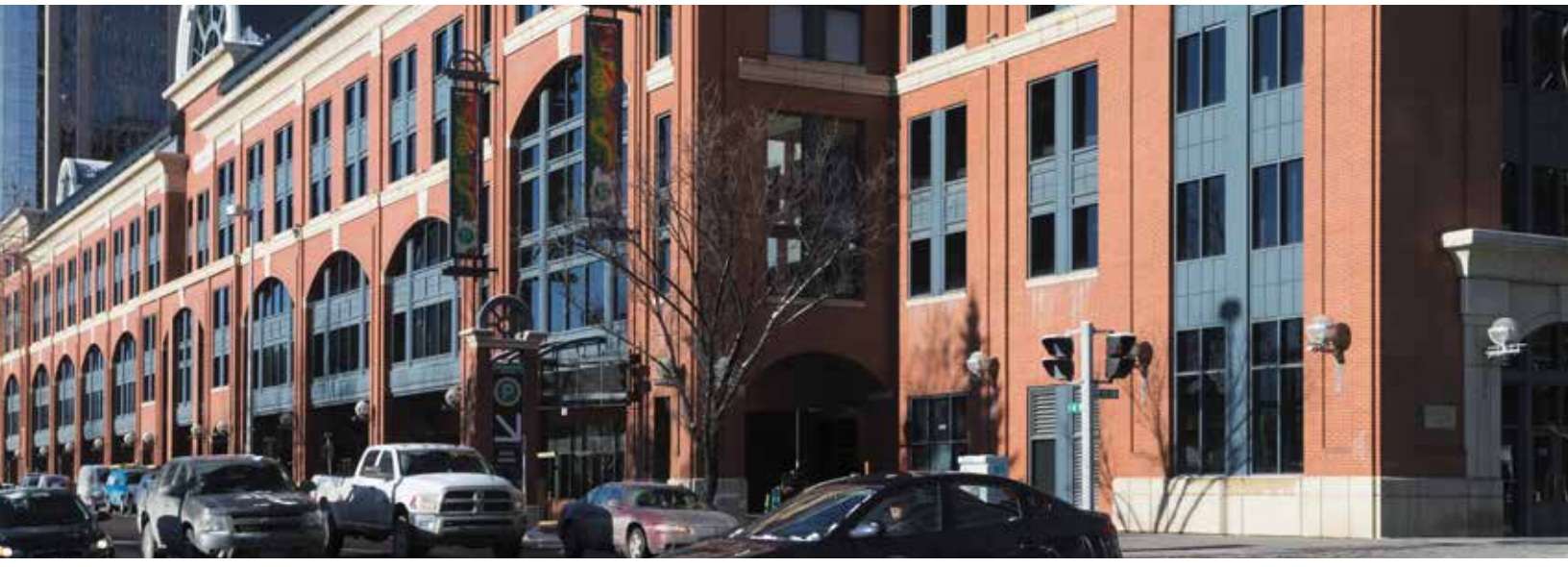
Funding plan

The CPA continues to monitor and fund initiatives for lifecycle review and asset management strategies. In the next four-year budget cycle (pending approval), the CPA will fund activities necessary for infrastructure lifecycle maintenance and energy and efficiency upgrades.

Key issues and challenges

Surface membranes

All of CPA's indoor parking structures have a protective membrane installed which protects the concrete and rebar in the floor slabs from wear and corrosive materials. As our infrastructure ages, the membranes wear off, particularly in the drive lanes, entry lanes and corners. Our continuous maintenance of these membranes is vital in preserving the structural integrity of the facility. This process continues to be vital in our structural maintenance program. Our preventive maintenance system identifies the need for consistent re-coating of the wear areas to maintain the protection of the structural slabs. As these systems reach the end of their expected life, extensive re-coating will be required.



Surface lots

Most surface lots require a regular repair and maintenance program. Several of our surface lots will require extensive surface and drainage upgrades. CPA aligns with The City's Triple Bottom Line policy, Crime Prevention Through Environmental Design (CPTED) and LEED. To support these programs, the CPA reviews surface lot lighting and evaluates the feasible use of permeable asphalt and recharge of the aquifer.

Structural preventive maintenance

Four of our parking structures have significant structural risk that is mitigated by ongoing inspection and repair programs. The most significant are City Centre, McDougall, City Hall and James Short parkades.

City Centre Parkade

This parkade is our oldest parking structure and the only open-air designed structure in our inventory. This structure requires major maintenance over the next few years. Exposure to the elements, specifically snow and road salt brought into the parkade by vehicles, has contributed to membrane failure and waterproofing issues. Built in the late 1970s, the major structural elements are the slabs, beams and columns. The underside of each slab is not protected with a membrane coating, therefore without consistent annual maintenance and a lifecycle program at five-year intervals, cracking and concrete delaminating will lead to corrosion and eventual failure. This facility has very aggressive turn patterns, specifically on the centre ramp, and an ongoing maintenance program is required to ensure that the membrane does not wear to the point that the structural slab integrity is compromised. This lifecycle program is currently scheduled at three-year intervals. Ongoing inspections and repair programs will mitigate concerns. Within the next five years a major rehabilitation of all structural elements will have to be undertaken on this facility.

McDougall Parkade

This underground parking structure was built in the early 1980s. This unique parking structure, built beneath the McDougall School heritage site, was constructed using a structural element of unbonded post-tensioned cables. This structure is typically below the water table during spring run-off and as such the concrete walls leak extensively every spring. The combination of leaking walls and the unbonded post tension cables could be disastrous if extensive corrosion of the cables were to occur. To ensure the structural integrity of this facility, a program of ongoing inspection, delamination repair and wall-crack repair has been developed. It has been determined that this facility is experiencing a higher than normal trend of structural failures, due to the abovementioned conditions. A monitoring program has been developed in consultation with expert engineers to provide remedial advice on a rehabilitation and preventative repair plan.

City Hall Parkade

This underground parking structure was built in the early 1980s. Due to the June 21, 2013 flood, the entire seven-floor parkade was submerged underwater for two weeks. The entire infrastructure (electrical, mechanical, venting, elevators, etc.) has been replaced and design measures have been put in place to mitigate the impact of potential future floods.

James Short Parkade

This underground parking structure was built in the late 1980s. Similar to the McDougall Parkade, this below-grade structure is situated under a City park. This facility is regularly monitored for possible geo-technical rebound or other structural movement issues, and a structural program to repair failing expansion joints is scheduled for 2017.

Mechanical upgrades

All mechanical upgrades have been completed with the exception of the James Short boiler replacement, which is anticipated to be complete by the end of Q4 2017. A heavy financial burden will arise when some of these facilities reach the replacement stage. CPA's three oldest parkades (City Centre Parkade built in 1978, McDougall Parkade built in 1983; and City Hall Parkade built in 1985) are nearing their 50-year lifecycle. The Parkade Structure Replacement Fund was established in 1999 for annual contributions of $2 million plus interest, which would provide for partial capital replacement funding. At the end of 2016, this fund had $88 million. Additionally, the land acquisition fund, which has a balance of $40 million, can be used for the replacement of existing cash-in-lieu stalls which are located within the subject facilities.

Vehicles

CPA's facilities department utilizes a fleet of vehicles and heavy-duty equipment to maintain parkades and surface lots. These vehicles experience increased maintenance due to operating primarily downtown. Furthermore, snow removal causes excess wear and tear. Facilities are aligned with The City of Calgary Fleet Asset Management Plan for vehicle replacement. Currently, half of the facilities vehicles are due for replacement, based on Fleet Management's lifecycle standards. A replacement strategy, averaging three vehicles per year over the next five years, will bring the vehicle inventory up to standard. Our fleet of vehicles for the enforcement and enforcement support officers sustains high mileage due to the area they cover. In order to minimize breakdowns associated with high mileage, the vehicles are turned over, on average, every three to four years.

Revenue control equipment

The Calgary Parking Authority utilizes the ParkPlus SystemTM which allows the option of paying at the pay machines or through various web options. The purchase of additional pay machines will be required to extend the payment system to new development areas, as well as into new areas of The City as parking demand requires.

Information technologies

Allowance must be made for funding the replacement of data storage, data network, server, desktop computer, uninterruptible power and other disaster recovery infrastructure systems to provide uninterrupted services for the various operations within the CPA. Costs associated with software development of both currently deployed and future software, that will provide enhancements and new services to make the business processes more efficient, must also be taken into consideration.

Systems such as the ParkPlus System™, payment of tickets online (PTO) and BITS are only a few of the current in-house software packages that require ongoing maintenance both on hardware and software levels. Security video, access and cellular wireless repeater control systems are integral parts in the support and maintenance of the corporate infrastructure. These systems are being supported by the IT department and are comprised of computer and data storage components which require regular upgrading and repairs.

All of the above information shows that both hardware and software funds are required to support these critical business systems on an ongoing basis.

What do we own/manage?

Parking spaces off-street

- 10 parking structures (5,694 parking spaces).
- 33 surface lots (6,249 parking spaces).
- Impound lot land (1,040 spaces for impounded vehicles).

Machinery and equipment

- 559 on-street ParkPlus System™ pay machines controlling payment for 6,689 parking spaces.
- 60 off-street (surface lots) ParkPlus System™ pay machines controlling payment for 4,991 parking spaces.
- 48 ParkPlus System™ pay machines in parkades as controlling payment for 6,249 parking spaces.
- 71 vehicles (six enforcement support, 43 enforcement, four technical services, 18 facilities).
- One utility trailer.
- Eight heavy machinery items (tenant sweepers and skid steers).

Buildings and land

- CPA administration office located on street level of the Centennial Parkade.
- Impound Lot building located at 400 39th Ave. S.E.
- Building on 615 Third Ave. S.W. (Veritas Building).
- Land on 830 Ninth Ave. S.W. (Knoxville's).

Systems

- ParkPlus System™.
- BITS (Bylaw Infraction Tracking System).
- Impound Lot Vehicle Tracking System.
- Computer Aided Dispatch (CAD) System.
- Pay Tickets Online (PTO) via web services linked to BITS.
- Mobile Citation Application.
- Access to the Internet through the CPA Corporate Connection complete with associated hardware and systems.
- Web services for external and internal users.
- Security video, access and cellular wireless repeater control systems for parkades and office areas.
- Corporate servers, data storage and data networking systems that support the collection and retrieval of information for The Corporation.
- Intranet.
- Smartphone ParkPlus System application.
- ParkOnline System (providing access for Calgary Zoo, Heritage Park, Telus SPARK and contract parking access).
- Residential Parking Permit System.

Related Authority and Civic Partners

Calgary Public Library

The Calgary Public Library's (CPL) asset portfolio consists of the following categories: materials, buildings, IT infrastructure and equipment, furniture and equipment, and vehicles. CPL does not own buildings or land, but is the steward of the buildings it occupies. Any land improvements are associated with a building and are included as a subset of those assets.

All asset conditions are good except for the following buildings:

Buildings	Asset Category	Condition
Central Library	Buildings	Poor
Memorial Park	Buildings	Fair
Village Square	Buildings	Fair

The Calgary Public Library Board currently conducts required lifecycle maintenance and replacement from the Library Lifecycle Grant that is provided annually by The City of Calgary. The asset management program is entirely dependent on this lifecycle grant as virtually CPL's entire operating grant is used to fund open hours at library locations, an extensive outreach effort to communities more distant from established locations, and to purchase items for borrowing purposes. The Library Lifecycle Grant is critical because without this support there would be no funds to repair or replace the assets on which this service delivery depends, and eventually the service delivery would be detrimentally affected.

Growth and major maintenance projects are dependent on funding from outside sources, which historically have been provided by The City of Calgary and the Province of Alberta.


EXIT

Related Authority and Civic Partners

Other civic partners

Since 2015, The City has been working with seven civic partners (and Calgary Public Library) to support partner-specific asset studies and tools. The tools include building condition assessments, asset management plans, underground utility assessments, asset management software and additional studies as required, e.g. lighting audit, hazardous materials assessment, aquatics audits, dock assessment and/or flood resiliency study.

In keeping with The City of Calgary's Corporate Energy Plan, the studies also identify opportunities to improve the energy efficiency to help reduce energy consumption and environmental impacts and lower operating costs. The suite of tools help civic partners make consistent, effective and informed infrastructure decisions; create standardized approaches to asset management; demonstrate responsible stewardship of assets; and identify the funding required to optimize the maintenance and longevity of the assets.

The organizations that The City has been working with to date include: Arts Commons, Calgary TELUS Convention Centre, The Calgary Zoological Society, Fort Calgary Preservation Society, Heritage Park Society, Lindsay Park Sports Society, and Calgary Science Centre Society. Two of the other civic partners (Arts Commons and Fort Calgary Preservation Society) have completed asset management plans. Work for the other civic partners is underway and will be complete for inclusion in the next report.

Appendix 6

Acronyms and abbreviations

AMP	Asset Management Plan
APTA	American Transportation Association
BBWWTP	Bonnybrook Wastewater Treatment Plant
BITS	Ticket Tracking System utilized by Calgary Parking Authority
BRT	Bus Rapid Transit
BU	Business Unit
CAD	Computer Aided Dispatch
CAMP	Corporate Asset Management Plan
CBS	Capital Budget System
CDI	Community Drainage Improvements
CCTV	Closed Circuit Television
CFD	Calgary Fire Department
CFO	Chief Financial Officer
CHC	Calgary Housing Company
CHP	Community Housing Portfolio
CLOS	Customer/Citizen Level of Service
CMHC	Canada Mortgage and Housing Corporation
CMLC	Calgary Municipal Land Corporation
CPA	Calgary Parking Authority
CPL	Calgary Public Library
CPRIIP	Culture, Parks, Recreation Infrastructure Investment Plan
CPS	Calgary Police Service
CPTED	Crime Prevention Through Environmental Design
CRV	Current Replacement Value
CS	Community Services
CTC	Corporate Technology Committee
CUTA	Canadian Urban Transit Association
CWMS	Computerized Work Management System
DCMO	Deputy City Manager's Office
ERIIP	Emergency Response Infrastructure Investment Plan
ESRD	Environment & Sustainable Resource Development
FCI	Facility Condition Index
FDES	Facility Development & Enhancement Study
FM	Facility Management
GTF	Gas Tax Fund
HVAC	Heating, Ventilation and Air Conditioning
IIP	Infrastructure Investment Plan
IIRMF	Integrated Infrastructure Risk Management Framework
IRM	Integrated Risk Management
ISR	Infrastructure Status Report
IT	Information Technology
LEED	Leadership in Energy and Environmental Design
LOS	Levels of Service
LRT	Light Rail Transit
LRV	Light Rail Vehicle
M&E	Machinery & Equipment
NFPA	National Fire Protection Association
OLSH	Office of Land Servicing & Housing
OWC	Operations Workplace Centre
PARIS	Parks Asset Reporting and Information System
PAYG	Pay-As-You-Go
PCI	Payment Card Industry
PSAB 3150	Public Sector Accounting Board, Standard 3150

PSAM	PeopleSoft Asset Management
PTO	Payment of Tickets Online
ReCaPT	Recreation Capital Planning Tool
RPP	Residential Parking Permit
SAMP	Strategic Asset Management Program
SCU	Spring Clean-up
SGCI	Strategic Growth and Capital Investment
SHAR	Social Housing Accommodation Regulation
SNIC	Snow and Ice Control
TBL	Triple Bottom Line
TCA	Tangible Capital Assets
TOD	Transit Oriented Development
TI	Transportation Infrastructure
TMC	Traffic Management Centre
UEP	Utilities & Environmental Protection
WMF	Waste Management Facility
WRAMS	Waste & Recycling Services Asset Management System
WRS	Waste & Recycling Services
WRIIP	Waste & Recycling Services Infrastructure Investment Plan
ZBR	Zero-Based Review
9AP	Ninth Avenue Parkade

17-00758747

2017 Infrastructure Status Report

Committee: Utilities & Corporate Services

Presenter: Steve Wyton

Date: March 14, 2018

The 2017 Infrastructure Status Report

The Infrastructure Status Report is a key component of The City of Calgary's asset management system:

- It provides a 10-year outlook, serving as a guide for City Council to make informed infrastructure investment decisions by highlighting the needs and performance of The City of Calgary's infrastructure ahead of the development of 2019-2022 business plans and budget – "One Calgary."

- It is completed once every 4-year business cycle and the 2017 version is the 5th iteration of the report.

- It highlights the status of all city owned assets and identifies areas of short and long-term infrastructure and service risk.

What Do We Own & What Is It Worth?

Asset Value $84.70 Billion*

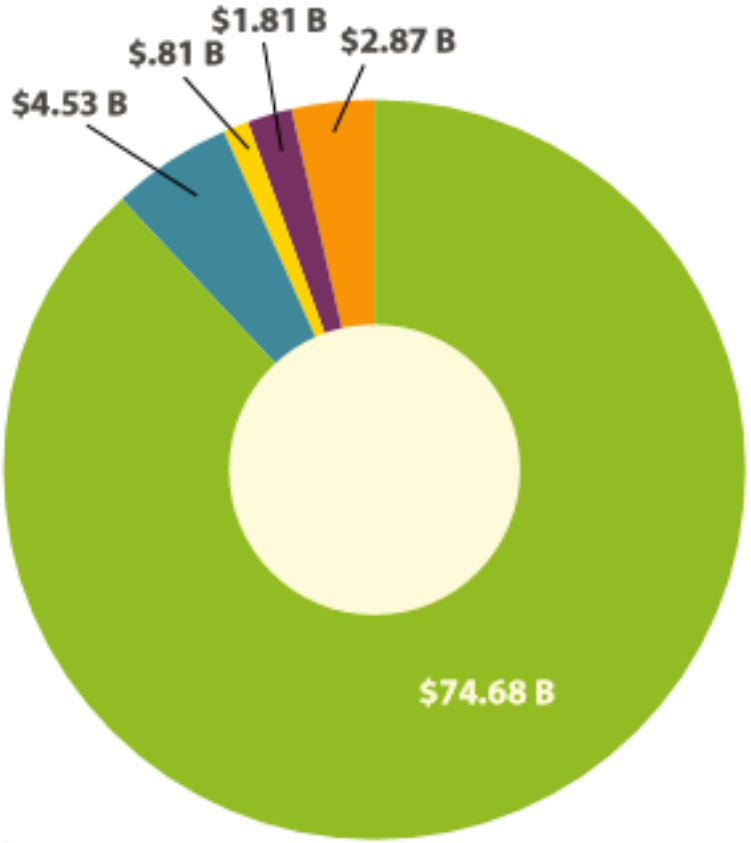
$74.68 B
Engineered Structures

$4.53 B
Buildings

$.81 B
M&E

$1.81 B
Vehicles

$2.87 B
Land Improvements



* Does not include $4.22 billion land holdings owned by The City. Land does not depreciate like other assets and does not require the same level of maintenance.

What Condition Is It In (Physical)?

Overall Physical Condition
(Based on Business Unit Averages)

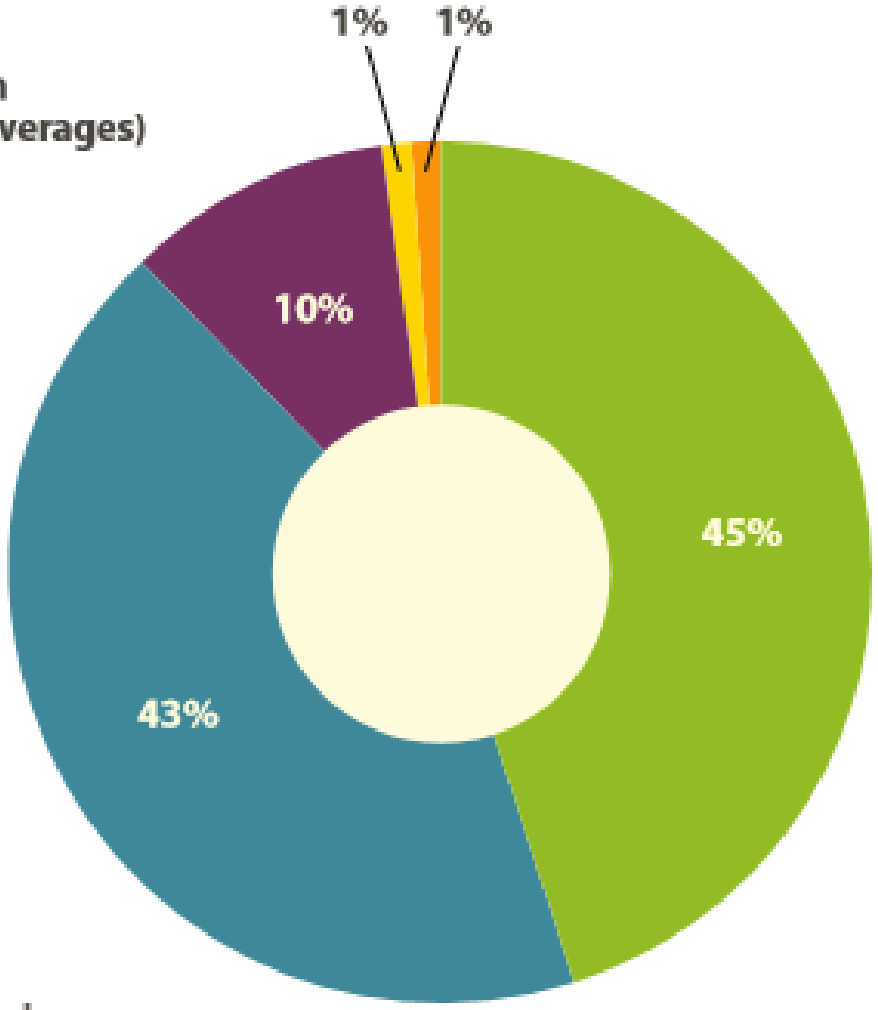
45%
Very Good

43%
Good

10%
Fair

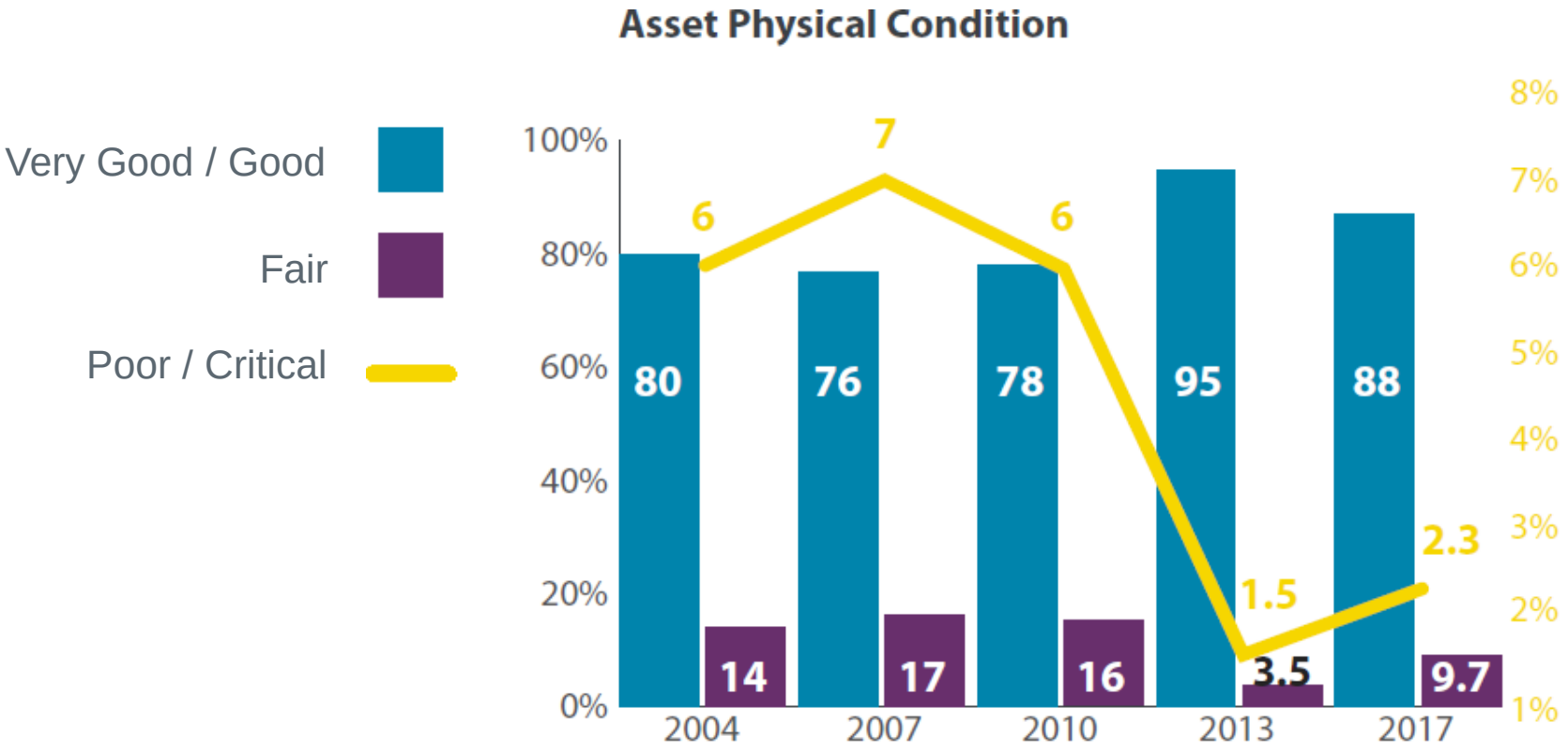
1%
Poor

1%
Critical



* Percentages have been rounded.

What Is The Physical Condition Trend



* Very Good, Good and Fair percentage reflected on the left axis and Poor and Critical on the right axis.

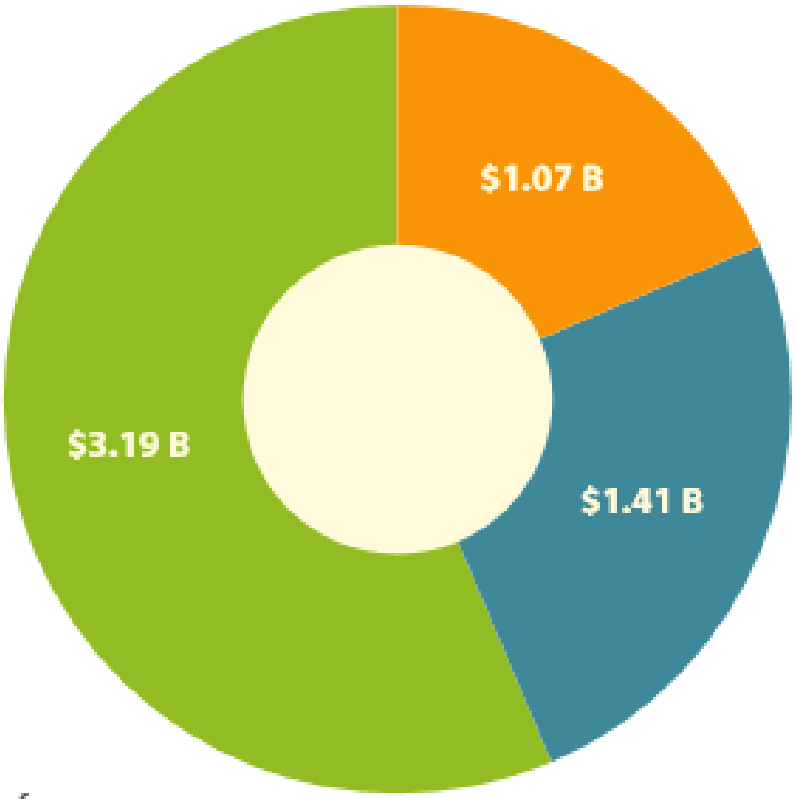
What Is The Infrastructure Gap?

Infrastructure Gap $5.67
($ Billions)

$1.07 B
Total Operating Gap

$1.41 B
Total Maintenance Gap

$3.19 B
Total Growth Gap



* Does not include Transit projects from RouteAhead including Green Line, as well as projects beyond the 10-year horizon.

Administration's Recommendations

That the Standing Policy Committee on Utilities and Corporate Services recommend that Council receive the 2017 Infrastructure Status Report for information.

Questions?