

WASTE & RECYCLING SERVICES





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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.