Variable Set-Out: Analysis of Costs, Risks and Benefits

Introduction and Background

Pay-As-You-Throw is a user-pay program that charges households for the amount of waste they generate and put out for collection, meaning that households that generate less waste pay less than those that generate more. This is similar to the consumption-based model that is used for the billing of electricity, water, and natural gas. For waste, this can be implemented in several ways, including charging customers based on the size of their garbage cart (variable cart size), the number of bags they put out for collection, or the number of times they set out their cart for collection in a period (variable set-out).

Key benefits of a Pay-As-You-Throw program include:

- Fairness and customer choice - Not all households produce the same amount of waste. Pay-As-You-Throw is intended to increase fairness so customers who waste less, pay less. Pay-As-You-Throw also gives customers some control over their waste disposal costs and to choose the level of service that is right for them.
- Collection efficiency and safety – Customers may put out less garbage when they pay according to how frequently they set out their carts. Fewer carts to collect translates into more efficient service delivery and lower costs.
- Waste diversion and reduction – Pay-As-You-Throw can incentivize customers to think about what really needs to go in the garbage and take care to sort their recyclables and food and yard waste, so that less garbage goes to the landfill.

In 2018, The City conducted a jurisdictional scan of Pay-As-You-Throw programs in select North American municipalities. Based on findings from the 2018 jurisdictional scan, Administration conducted a detailed analysis of three-cart sizes (variable cart) and a tag-a-bag program (UCS2019-0364) in 2019. This detailed analysis found that introducing variable cart sizes is an expensive option for Calgary, due to the costs of purchasing and storage of new carts and the additional costs associated with managing black carts currently in use. As a result of the findings, Council directed Administration to implement the tag-a-bag program. The tag-a-bag program was implemented in 2020.

As the three-cart size and tag-a-bag programs were being reviewed, the Ecofiscal Commission, recommended in their report that Calgary could benefit from the use of the Radio Frequency Identification tags, in The City's black carts, to implement a pay-per-tip system. Administration recommended that Council consider developing a plan to pilot the pay-per-tip system (a Variable Set-Out program). In alignment with this recommendation, Council directed Administration to explore customer behaviour regarding cart set-out and to develop a detailed pilot plan that will include cost of the pilot, rate impacts. Results of the customer behaviour exploration is detailed in Attachment 3.

This attachment includes the analysis of the costs for variable set-out pilot program, its impact on Black Cart Program charges and on other non-financial factors that may impact the performance of the Black Cart Program and Waste and Recycling Services' strategic goals.

Factors Considered

The table below summarizes factors considered in assessing the viability of a variable set-out pilot and program.

Factors	
Financial	Cost of pilot, program implementation and sustainment
	Monthly Black Cart Program charges
Non-Financial	Technology availability and capability
	Waste diversion and reduction
	Customer choice and behaviour
	Operational Efficiency

FINANCIAL FACTORS

Assumptions

The following assumptions were used in evaluating the financial impact of a variable set-out program on the black cart program costs:

- Three black cart set-out scenarios were considered in estimating potential program cost, savings, and rate impacts.
  - 89 per cent set-out each collection period: based on the current set-out rate and assumes little to no change in customer set-out behavior.
  - 75 per cent set-out each collection period: based on the survey results highlighting that 28 per cent of customers felt they could **very** realistically set out their carts less than every 2 weeks. The number was adjusted slightly downwards to reflect potential optimistic biases in survey responses.
  - 69 per cent set-out each collection period: based on the assumption that 35 per cent of customers indicated it is realistic (**somewhat/very**) for them to set-out their carts less than they currently do. The results were also adjusted to reflect potential optimistic biases in the survey responses.
- Four (4) communities covering up to 15,000 households over a two-year period were used for the pilot estimate.

ESTIMATED PROGRAM COSTS AND SAVINGS[1]

Notes on Program Costs and Savings

- Most of the cost of implementing the customer database and billing system changes are one-time costs and would be incurred during the pilot.
- The additional costs that will be incurred because of variable set-out are fixed costs, which will be incurred whether households set-out their black carts each week or not. These costs include cart management and maintenance, customer care and billing management.
- The savings from collection efficiencies and a reduction in black cart tonnage costs, will depend on the average household set-out rate.
- Expected savings will not be realized during program implementation and the subsequent first few years because it will take time for the average household set-out rate from variable set-out to be established. Households that set out less often during this period will expect to see reduced Monthly Black Cart charges. The expected savings during the pilot program and implementation phase and at least the first two years of sustainment would need to be absorbed by The City.
- There is a risk that additional waste may be diverted to blue and green carts, which will increase contamination of the blue and green carts. Increased contamination results in higher processing costs for the blue and green carts.
- No program savings will occur if the set-out rate is higher than 75 per cent.

Pilot

It is estimated that the variable set-out pilot may cost up to $4 million, while the maximum expected savings is projected to be $2 million. Most of costs will be incurred during the pilot and include the cost of developing a customer database system, cart data management and validation, and changing the billing system.

City-wide Implementation

City-wide implementation of a variable set-out program may cost up to $5.5 million, while the maximum expected savings is $3 million. Costs to implement the program include: cart management, cart maintenance, customer care and billing, and the communication and education required for program rollout.

Sustainment

It is estimated that sustaining a variable set-out program will cost up to $1.7 million annually. Most of these costs, like the implementation costs, are related to ongoing validation and maintenance of cart data. There is also an additional investment required to manage cart and customer issues related to billing.

The sustainment costs would be offset by potential savings of up to $1 million dollars annually.

[1] All estimates are class 4; therefore, the expected variance is -30 per cent to +50 per cent.

The table below summarizes these costs against potential benefits:

	Set-Out Rate		
	69%	**75%**	**89%**
Pilot			
Costs	$3.986,000	$3,825,000	$3,336,000
Expected savings	$1,985,000	$1,050,000	$0
City-wide implementation			
Costs	$5,544,000	$5,360,000	$4,802,000
Expected savings	$3,000,000	$1,580,000	$0
Annual sustainment			
Cost	$1,674,000	$1,608,000	$1,409,000
Expected Savings	$1,036,000	$546,000	$0

Analysis of the program costs against the benefits concludes that the cost of piloting, implementing, and sustaining the program outweighs any potential savings.

IMPACT ON RATES

The monthly Black Cart Program charges are calculated using the cost of providing service to Calgary households. Details on the rate impacts due to variable set-out over the 2023 to 2026 business cycle are highlighted below.

- Changes to the monthly Black Cart Program charges will depend on the average set-out rate for all single-family households.
- Based on these estimates, the average monthly Black Cart Program charge for households that set out based on current schedule (bi-weekly collection) will increase by approximately $0.50 to $1.00 monthly, depending on the overall set-out rate by all households.
- The average monthly Black Cart Program charge for households that reduce their set-out to once a month will increase by approximately $0.50 to $0.80 monthly.
- For households that set out less than once a month, their rates will increase by approximately $0.50 monthly.

The table below summarizes the projected impact of variable set-out on monthly Black Cart Program charge in the 2023-2026 business cycle[2]:

Average Monthly Black Cart Program Charge without Variable Set-Out	Average Monthly Black Cart Program Charge with Variable Set-Out			
	Average Monthly Set-Out Rate	Bi-weekly set-out	Once every 4 weeks set-out	0 every 4 weeks set-out
$7.20	**69%**	$8.20	$8.00	$7.70
	75%	$8.10	$7.90	$7.70
	89%	$7.70	$7.70	$7.70

From the analysis above, every household, whether they set their black cart out bi-weekly or less frequently will pay a higher monthly Black Cart Program charge. Most of the additional program costs are fixed and will be charged to all households whether they set-out their carts for collection or not.

The monthly Black Cart Program charge is higher when more households set out less because some portion of costs will be split between fewer households each month.

NON-FINANCIAL FACTORS

TECHNOLOGY AVAILABILITY AND CAPABILITY

Variable set-out is designed to rely on using the Radio Frequency Identification (RFID) tags in the black carts and technology in trucks that captures customer and collection information that would be used to determine how much to bill each customer monthly. The RFID tags on each cart will contain cart and customer information, while the technology installed in the trucks will be used to read the RFID tags every time the cart is tipped. The information collected at the time of collection is then used to bill customers monthly.

Recent testing of this technology indicates data accuracy of 95 per cent, which is lower than the required threshold for customer billing and could result in more than 30,000 customer billing errors each month.

Also, black carts are portable, making it easy to move them between locations and customers, making cart tracking complex and the system prone to errors.

To ensure billing and data accuracy, a significant investment will be required to maintain cart data and reconcile billing errors. The City may need to manually reconcile tens of thousands of

[2] Average charge over the 2023 to 2026 business cycle. These numbers are estimates.

billing records monthly, and additional resources will be required to physically audit cart locations for accuracy.

The high probability of errors will result in increased customer calls and complaints to both City of Calgary and ENMAX call centers. This will result in reduced customer satisfaction and reputational damage to The City.

WASTE DIVERSION AND REDUCTION

Some sources estimate that with Pay-As-You-Throw (PAYT), recycling rates will increase by five to six per cent and yard waste diversion will increase by four to five per cent, with source reduction estimated at five per cent.

However, the maturity of existing diversion programs is a major factor in the amount of benefit that might be achieved. Research indicates that implementing PAYT at the same time as introducing cart-based collection service tended to achieve the highest amount of diversion. Given the maturity of The City's existing black cart program, The City may not achieve any additional diversion. In addition, The City of Calgary's black cart program, through the introduction of bi-weekly collection and tag-a-bag program (a type of PAYT program), is already designed to encourage waste reduction and diversion. Given these factors, we expect limited increases in waste reduction and diversion would occur with variable cart set out.

An unintended consequence of PAYT is contamination, where households may decide to place garbage in the blue and green carts to avoid paying for garbage. Contamination results in increased processing costs for the blue and green carts.

IMPACT ON CUSTOMER CHOICE AND BEHAVIOR

In 2020, Administration conducted customer engagements in-person, online and by telephone. Results from the engagements revealed that there is moderate (59 per cent) support for a variable set-out program.

Almost 90 per cent of households always set out their carts for collection, with most stating that they set out their carts out of habit, because it is garbage collection day. About 28 per cent however indicated it is realistic for them to set out their carts less often.

Households indicated that they would set out less if offered a discount on their fees, and they also indicated that they would consider setting out their carts less often if The City asked them to set-out their carts only when needed, particularly if they knew the cost and environmental impacts of their set-out behaviours. About 69 per cent of customers indicated that they will likely set out less if they knew their behavior will result in reduced operational costs for The City. In comparison, a similar behaviour change will only be achieved with up to a $1 monthly financial incentive.

While a variable set-out program will provide the customer with the opportunity to set out their carts only when needed to reduce their monthly Black Cart Program charfe, the cost of managing the program will increase overall. Therefore, customers will not see reduced program fees. For example, if the overall set out across single-family households decreases to 75 per cent, customers who set out only once every four weeks would pay approximately $0.20 less

per month than those who continue to set out every two weeks, but their monthly charges would be approximately $0.70 higher than before the implementation of variable set-out.

Given this finding, it is likely that initial support for the program would be low, and customer behavior may not change with this program.

Details of findings from customer engagement activities are provided in **Attachment 3**.

OPERATIONAL EFFIENCY

Variable set-out will result in increased collection route efficiency through a reduction in the number of stops that each truck will make per route. Reducing the number of stops may result in savings on fuel costs and reduced environmental impacts from idling. The number of trucks required for collecting garbage may also be reduced by up six trucks if the set-out rate is low enough.

Our analysis revealed that at least a 25 per cent reduction from the current set-out rate will be required for any collection efficiencies to be realized, but those savings do not exceed the additional cost of operating the variable set out system. There is also likely to be an increase in the number of customer calls due to billing errors which will further reduce efficiencies as additional time will be spent by City and ENMAX staff to resolve billing issues.

Risk Summary

The table below highlights potential risks of implementing the variable set-out program.

Risk Category	Description	Likelihood	Impact	Mitigation
Social Impact	• Contamination of the blue and green cart because of customers trying to avoid paying for garbage. • Illegal dumping by customers who want to avoid paying for garbage.	Possible	Medium	• Educating households on the impact of contamination and illegal dumping on the cost of service and the environment.
Reputational	• Billing errors may result in customer frustration and reputational damage to The City. • Missed collection may result in a drop in customer satisfaction levels and satisfaction with City waste collection services. • Unhappy customers due to higher fees being charged even when they set out their carts less.	High	High	• Deploy resources to periodically track and confirm cart location and associated data. • Manually validate customer billing prior to invoicing monthly.
Economic	• Higher operating costs may result in higher monthly charges to households, making garbage fees less affordable.	High	High	• Consider implementing an awareness campaign encouraging customers to set out their carts only when they need to, taking advantage of the potential efficiencies from reduced set-out, further reducing current operating costs.

Conclusion

Administration proposed implementing a variable set-out pilot program, including a detailed cost estimate with the objective of providing customers who generate less waste and who could set out their black carts less frequently with an opportunity to reduce their monthly black cart charge. While such a program could further encourage waste reduction and diversion and increase operational efficiency, our evaluation found that the costs to set up and run the pilot would require all residents to pay more for the Black Cart Program.

In addition, the technology currently available is not able to track collection data to the level of accuracy required for billing purposes. To use the technology in its current state, significant resources will need to be added to manually manage billing errors and track carts, further increasing program costs.

A key finding from the customer behaviour exploration phase is that variable billing is not required for customers to set-out their carts less often as households indicated they would consider setting out less if The City asked them to and they understood how their set-out behaviour may impact future program costs.

Given the information provided, the risks of implementing this program outweigh the benefits and we no longer recommend proceeding with a variable set-out program. We will continue to explore different opportunities that will achieve greater fairness and operational effectiveness but not result in higher overall program costs.