Pay-As-You-Throw and Radio Frequency Identification (RFID)

The use of radio-frequency identification (RFID) technology to track how often residents put out their cart for collection is emerging as an option for a Pay-as-you-throw (PAYT) program. RFID tags can be embedded in carts and scanned by hand readers or readers on trucks to track the location and maintenance of carts, and gain information on program usage by customers. The RFID chips in Calgary's black carts could be used to track how often a cart is emptied. With this technology there is the potential to have billing based on how often carts are put out for collection. This is known as a variable set-out program.

A variable set-out program is considered more fair than a variable cart-size program because customers' bills are directly related to how much waste they generate. For this reason, it is also considered to provide a more direct incentive to customers to reduce waste. Variable set-out programs are rare in North America. RFID technology is more commonly used to track carts and customer program participation.

However, as the technology to integrate the systems that track cart data with billing systems improves, the use of RFID technology for both tracking and billing may start to be used more frequently. Currently, due to the level of accuracy required and the complexities associated with the residential billing system, the application of RFID technology to residential billing is not common.

Some communities have implemented both variable cart-sizes and variable set-out in one program (examples are included on the next page), this creates a complex program for customers and service providers. Cities that have already introduced variable cart sizes are less likely to introduce variable set-out because they already have a PAYT mechanism in place. However, cities that have not already invested in multiple sizes of carts may find that an RFID-based program is a more affordable way to introduce PAYT.

In October 2018, Canada's Ecofiscal Commission released a report that recommends municipalities implement PAYT programs, and specifically recommends an RFID-based PAYT program for Calgary[1]. This is because a variable set-out program creates a stronger incentive to reduce garbage, as it is more closely tied to how much garbage a household generates than a variable cart-size program.

Additional reasons why RFID technology may be a good fit for a PAYT program in Calgary include:

- Calgary black carts already have RFID tags. It would not require the purchase of any new carts.
- WRS has successfully piloted collecting cart specific data using RFID technology on trucks.

[1] Canada's Ecofiscal Commission: "Cutting the Waste: How to save money while imporving our solid waste systems", Octiber 2018.

WRS is continuing to assess how an RFID technology system may be deployed for Calgary and is planning to:

- Include discussions on RFID and PAYT as part of planned customer engagement in 2019.
- Continue to research and liaise with jurisdictions that have implemented this technology to understand lessons learned.
- Review data collected from trucks using RFID to determine its reliability.
- Explore compatibility of RFID technology with the current billing system and identify changes that would be required to billing systems to facilitate RFID PAYT.
- Examine revenue forecasting and pricing options to manage potential financial risks associated with adopting RFID for PAYT.

RFID Technology in Other Jurisdictions

WRS conducted a scan of jurisdictions that have adopted RFID for PAYT. There is no known jurisdiction the size of Calgary in North America that has adopted RFID for PAYT. Findings on two jurisdictions that have adopted RFID are provided below:

CITY OF GRAND RAPIDS, MICHIGAN

The City of Grand Rapids, population of 200,000, introduced a variable set-out program for garbage collection in 2012. This allows customers to be charged only when they set out their garbage cart on collection day. There is no fixed fee.

Customers have the option to choose from three cart sizes and pay for service only when their cart is tipped. A prepaid account is required for service to be provided to the customer,and price per tip is based on the size of the customer's cart. The carts are tracked using RFID, which links customer cart information to their account.

While Grand Rapids has had success with garbage reduction and waste diversion with this program, it has also had some challenges with setting costs and forecasting revenue.

CITY OF BEACONSFIELD, QUEBEC

In 2016, The City of Beaconsfield, a mostly residential municipality, population of 20,000, became the first community in Canada to introduce a PAYT program using RFID technology.

Prior to 2016, garbage was collected manually and households paid a fixed fee for garbage. Households now have the option to choose from three cart sizes, and are charged both a fixed annual fee and an additional tipping fee each time they put their cart out for collection. Both the annual and tipping fees are based on the size of the customer's cart. A program to encourage backyard composting was introduced concurrently to address the large amount of yard waste generated by the community.

Beaconsfield successfully reduced garbage to landfill by 51 per cent per capita since introducing the program. Prior to implementing RFID, the community was the largest waste generator per capital on the island of Montreal, and afterwards they were the lowest. There was also a drop in

the rate of garbage set-out for collection from 86 per cent to 55 percent in the first year of implementation.

If rolling out this program again, Beaconsfield has indicated they would reconsider offering the small cart. Savings are primarily from reducing the number of carts that are set out for collection each week, and the small carts result in households putting their carts out more frequently.