Radio-Frequency Identification Tags

FACT SHEET

N.C. Division of Environmental Assistance and Outreach

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Background

Radio-Frequency Identification tags (RFID) similar to those used by retail stores and public libraries for inventory control and theft prevention can help local governments gather information about curbside solid waste and recycling collections. RFID technology uses communications via electromagnetic waves to exchange data between a reader and an object such as a cart or dumpster for identification and tracking purposes.

How can RFID tags be used in solid waste collection systems?

RFID tags used in solid waste and recycling are attached to receptacles (carts/dumpsters) in a manner that protects tags from environmental conditions. For data collection purposes, a reader and a passive RFID tag work together as each receptacle is emptied. The reader embedded into the truck captures the tag's ID and electronically records data such as location and the time of service. When coupled with Global Positioning System (GPS) technology, truck-based scales, routing software and data provided by the local government, the RFID system creates a powerful tool that can be used for customer service, collection of program data, measurement of collection system efficiency and tracking inventories of carts and front-loading containers.

- RFID systems can be used to automate the gathering of data such as participation and time of service, and can potentially provide the collector with real-time information about the customer being served such as name, address and account status. The RFID system can be used to improve customer service by providing office staff with real-time information indicating whether individual bins/stops have been collected and providing verification of service time.
- The information collected with RFID systems can be used to record data about truck usage and service routes, and can even be integrated with routing software to maximize collection system productivity and efficiency.
- **Incentive-Based Recycling:** RFID systems can be used to create collection systems that encourage and reward recycling program participation. This type of system uses RFID tags to indentify each household's cart, track participation and even weigh the amount of recyclables generated to provide a reward. For weight-based incentive systems, trucks must be outfitted with a scale and RFID reader. One example of an incentive-based recycling system that is catching on in municipalities across the U.S. is RecycleBank. This system tracks how many pounds of recyclables each household produces per month, and the households can then receive rewards points or dollars that can be redeemed at local partnering retailers.
- **Pay-as-You-Throw:** When used with variable rate collection systems, also known as bill-by-volume or pay-by-weight, RFID tags can be used to improve the accuracy and efficiency of billing. Carts with RFID tags can be read as they are serviced. The data gathered can be processed into an individual customer invoice. Trucks may also be fitted with scales to include weight data if customer billing is adjusted by the weight or volume of material collected.

What are the different types of RFID tags?

- Passive RFID tags have no power source and require an external electromagnetic field created by the tag reader to initiate a signal transmission. Passive RFID tags are the type most commonly used in solid waste applications.

- Active RFID tags contain a battery and can transmit signals once an external source, called an "Interrogator," has been successfully identified.
- Battery Assisted Passive (BAP) RFID tags require an external source to "wake up" but have significantly higher forward-link capability providing greater range.

What are the costs?

Costs to embed RFID tags on carts at production have been provided from several vendors to help guide budget decisions. The use of vendor's pricing is for comparative shopping only, not an endorsement of a vendor by DEAO. RFID tags range from 75 cents to $1.50 per unit depending on the quantity of carts purchased.

Cart vendors

Otto
Sam Smith
Office: (919) 414-2453
Email: sam.smith@otto-usa.com
Web: www.otto-usa.com/en/products_rc.php
Costs: $.075 - $1.50

Rehrig Pacific Company
Eric Voss
Phone: (770) 312-6675
Email: EVoss@rehrigpacific.com
Web: www.rehrigpacific.com
Costs: $0.75 - $1.50

Toter
Rikki Shoemaker
Office: (800) 424-0422
Cell: (704) 905-1765
Email: rshoemaker@toter.com
Web: www.toter.com
Cost: $0.80 - $1.00

Schaefer Systems
Larry Wiegman
Office: (704) 876-4988
Cell: (704) 904-7925
Email: larry.wiegman@ssi-schaefer.us
Web: www.ssi-schaefer.us/waste_recycling.php
Costs: $0.75 or lower

Cascade
Shannon Homer
Office: (336) 226-8187
Web: www.cascadecartsolutions.com/prod/res.htm
Costs: $0.75 - $1.50

For more information from the Division of Environmental Assistance and Outreach:
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References:
RFID Journal, http://www.rfidjournal.com/faq#17
Association for Automatic Identification and Mobility, http://www.aimglobal.org/technologies/rfid/what_is_rfid.asp
Texas Instruments, http://www.ti.com/rfid/shtml/apps-waste-management.shtml

The N.C. Division of Environmental Assistance and Outreach provides free, non-regulatory technical assistance and training on methods to eliminate, reduce or recycle wastes before they become pollutants or require disposal. Telephone DEAO at (919) 733-1398 or toll free at (877) 623-6748, or e-mail nowaste@p2pays.org for assistance with issues in this fact sheet or any of your waste reduction concerns.