

# Communities Turn to RFID to Boost Recycling

Three U.S. municipalities are using passive UHF tags to monitor whether their residents place recyclable bottles, cans and paper out at the curb.

By Claire Swedberg

Aug. 14, 2008—For many years, Howard County's Bureau Of Environmental Services, in Maryland, had no idea which households were placing recyclable bottles, cans and paper out at the curb for pickup, and which were not. But in September 2007, the county launched a pilot program that includes EPC Gen 2 RFID tags attached to the recycling containers, with interrogators installed on trucks. As a result, the county can now track who is recycling, and who is not.

Once it fully deploys the system in September, the county intends to use RFID-generated data to send postcards to those who fail to recycle. The missives will educate the recipients about the importance of recycling, says Alan Wilcom, chief of the county's recycling division, and explain how it is done. The current pilot involves one truck route and 5,000 households, each of which received a tagged recycling container, known as a cart. After Labor Day, Howard County plans to expand the program countywide, to all 72,000 households and 15 trucks. The RFID system is being provided by Concept2 Solution.

In early 2007, Pennsylvania's Cranberry Township began using a similar Concept2 system to track recycling rates throughout its community. Since then, Pleasant Prairie, Wis., has also begun utilizing the system. Like Howard County, Pleasant Prairie attaches Alien Technology EPC Gen 2 Squiggle tags to its recycling containers, and uses a computer on its truck to store data about recycling "tips" (each time the truck dumps a container's contents into its hopper) and downloads that information when the truck returns to its depot.

The RFID technology company is presently in discussion with three other communities to use the system, says Joe Franz, Concept 2's director of business development. All three existing deployments are currently in pilot stages, each involving one or two trucks, with plans to expand the systems once the pilots are completed.

In Cranberry, two of the township's trucks are equipped with Motorola RFID interrogators. The township's recycling containers are each fitted with an Alien EPC Gen 1 RFID tag deployed by another systems integrator for a pilot that never took place. Because Alien's EPC Gen 2 tag offers a higher read rate than its Gen 1 predecessor, Concept2 has attached a Gen 2 tag to each truck's lift as a backup for instances in which a container's Gen 1 tag cannot be read.

Each tag has a unique ID number linked to the name and address of the container's user in the township's back-end system. When the truck picks up a particular container, the reader on the lift captures its tag ID number and transmits that data via a Wi-Fi connection to a handheld PC onboard the truck. Simultaneously, the interrogator captures the ID number on the lift itself, indicating a container has been emptied. In that way, if a container tag is not read, the township still has information indicating that container was emptied at that specific location.

The handheld PC can then use its built-in GPS system to determine the longitude and latitude of the truck as

the read data is captured. The PC employs a GPRS communication link to transmit that information to the Cranberry Township's back-end system, where Concept2 software interprets the location data. The back-end system then links to a [Google Earth](#) service, which provides the address closest to where that container was emptied.

In addition, the handheld PC can be removed from the truck and used to read a container's tag by hand, if necessary—for instance, if the truck's interrogator failed to read a container's tag—then utilize the GPS system once again to determine the truck's longitude and latitude, and send the location data, as well as the tag's ID number, to the township's back-end system.

Cranberry derives two primary benefits from the system: better tracking where recyclable materials were picked up, and identifying neighborhoods where recycling rates are low. If a customer complains that a particular container was not emptied, Franz says, the township can check its database to verify if and when emptying actually took place. It can also locate the truck's position in near-real time.

The township is using the data to determine the areas where recycling rates are lowest—for example, where residents repeatedly fail to put a recycling bin to the curb—then targeting those areas to provide additional education regarding the importance of recycling. The township currently has 25,000 bins fitted with EPC Gen 1 tags, Franz adds, and eventually plans to switch to EPC Gen 2 tags.

In Howard County, Wilcom says, general participation in the recycling program has increased since the county began providing tagged carts. He declines, however, to comment on whether the RFID tags played a role in that increase, or whether it was simply the convenience of the new carts. "People love the carts," he states.

Howard County typically places an Alien Squiggle EPC Gen 2 RFID label on the inside lip at the top of the cart, where it is less likely to be damaged by wear and tear, as well as weather. At the beginning of the day, the recycling truck driver first turns on the reader, located in the vehicle's hopper, then begins his route. Upon stopping at a pickup location, an employee gets out of the truck and attaches the cart to a mechanical arm that lifts the container above the hopper, where the interrogator reads the container's RFID tag and transmits that data to the truck's computer. There is no GPS or GPRS system in use, however. When the truck returns to its depot at the end of its route, county employees utilize a USB memory stick to download data into the county's back-end system.

"The biggest thing we've learned is the need for full automation [of the RFID system]," Wilcom says. With full automation, the reader would awaken and begin receiving RFID transmissions as soon as the truck ignition was started. Currently, he notes, if drivers forget to turn on the system, that day's data is never captured. "They've been pretty good about remembering, but there is that potential for human error," Wilcom states. In all other ways, he adds, the system has worked effectively. Now that the county is assured the system functions well, it plans to begin mailing reminder cards in September to those residents identified as not recycling.

RELATED\_ARTICLES "We wanted to use RFID to track participation rates," Wilcom says. "Since the carts are assigned to specific addresses, we can then send a postcard if we find someone is not recycling."

[RecycleBank](#) offers an RFID-based solution that is similar to Concept2's but also tracks the weight of recycling from each pickup. In that way, users can receive coupons or other incentives if they recycle a specific quantity (see [RFID Helps Reward Consumers for Recycling](#)). The county is more interested in tracking the bulk rate of recycling by measuring the weight of the truck's contents when it returns from its route, Wilcom says, rather than by weighing the contents of each individual household's recycling bin.

