

Switching to single-stream recycling collection might get the headlines, but moving from small, open bins to rollcarts can do even more to increase program participation and bring in more quality recyclables. Read on to find out how North Carolina has been able to make the transition in more than 80 percent of its communities.

By Scott Mouw, Rob Taylor and Joe Fitzpatrick



Over the last six years, North Carolina has seen an almost wholesale adoption of cart-based curbside recycling collection. In fact, a complete statewide transition from bins to carts is on the near horizon. As a result, 1.32 million households served by curbside now have access to a more convenient, efficient and flexible collection format, encouraged, in part, by a state program of grants and technical assistance. The transition has not been without its drawbacks, nor does it represent any kind of “perfecting” of the curbside collection system, but it is delivering results in the form of new tons, new programs and expanded material collection.

Laying the groundwork

In 2006, the state recycling program received funding from the U.S. Environmental Protection Agency Region 4 to conduct training and individualized assistance to medium-sized municipalities to improve their curbside programs. One of the major techniques employed in this effort was a transition from the ubiquitous 18 gallon bins to 65 or 95 gallon carts, made increasingly possible by the development of single-stream materials recovery facilities (MRFs).

The opportunities

The transition to carts in North Carolina began in earnest in 2008, helped by a number of factors that allowed the state to swim with the tide, rather than against it. The factors included:

- **Early adopters** – Although the City of Greensboro adopted carts as early as 1993, it took wider access to single-stream processing to really get the cart transition underway. By 2008, large municipalities such as Cary and small towns like Archdale started to show the effectiveness of cart-based collection and provided peer examples for the next wave of adoption.
- **Legislative boost** – In 2005, the North Carolina General Assembly added plastic bottles to the list of materials banned from disposal. When that ban came into effect in 2009, it allowed recycling programs time to prepare for greater diversion of plastic bottles. Although largely unenforced, the ban sent strong signals to communities to step up their recycling efforts.
- **Funding** – In 2007, the General Assembly acted again with a comprehensive rewrite of the state’s landfill laws, partly in reaction to the prospect of new mega-landfills bringing in outside waste. In the same law, North Carolina enacted a \$2 tipping fee surcharge, the proceeds from which helped boost the state’s recycling grant program. This new money came along at the

right moment to help accelerate the transition to carts.

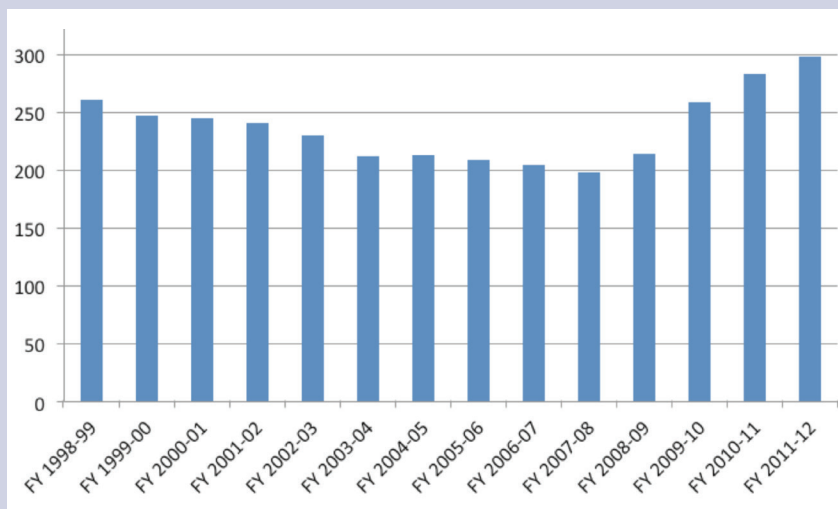
- **The MRF picture** – Soon after the recession, rebounding commodity values helped fuel investment in new, expanded and remodeled MRFs in North Carolina. The MRF investments responded to the inevitability of single-stream processing and connected to community interest in cart-based collection.
- **New materials** – Rising interest in single-stream corresponded to an expansion of materials considered recyclable. Many communities had also not paid attention to their curbside mix for years. Although there are still challenges with education, markets and effective processing, materials such as cartons and non-bottle plastics have become increasingly prevalent in the curbside mix. Single-stream has also helped expand collection of more traditional materials such as mixed paper and corrugated cardboard.
- **Demands for efficiency** – Interest in cart adoption coincided with municipal desires to reduce costs through automating collection, minimizing crew size and other measures. Carts offered a reasonable return-on-investment for both municipally operated programs and contracted haulers seeking to get more value for their recycling dollars.

Table 1 | Municipal curbside recycling in North Carolina

	Number	Households Covered/Not Covered
Municipalities with curbside	299	1,556,303
Municipalities without curbside	254	179,646
Total	553	1,735,949

Source: NC Department of Environment and Natural Resources, 2013.

Chart 1 | Curbside program growth in North Carolina



Source: NC Department of Environment and Natural Resources, 2013.

The state decision to invest

With all of these factors in play, North Carolina's recycling program began to push cart investment with a dedicated cart grant program in 2008. The state offered first-come, first-served grants paying \$25 per cart, with an initial funding cap of \$100,000 (and later \$75,000) per grant. With carts costing \$50 each, this funding level effectively halved the cost of cart investment for towns of 3,000 households or less. Municipal grantees with more than 3,000 households have spent more of their own dollars relative to the state share. The cart program request-for-proposals (RFPs) was also designed to help communities address their collection mix and their outreach plans. As a result, many cart grantees expanded their range of collected materials and re-invigorated their recycling education efforts. Through June 30, 2013, the state cart grant program had delivered \$2,762,315 in grants to 48 different municipalities, leveraging \$9,843,755 in

local investment and helping initiate 15 new curbside programs. State cart grantees are now adding about 15,000 new curbside tons into the material stream annually. Details on the current RFP can be found at www.recyclenc.org.

Cart transition by the numbers

The state cart grant program has been part of a larger story of cart adoption in North Carolina, driven by many of the factors identified above. A growing majority of North Carolina municipal households already receive curbside recycling services, as demonstrated in Table 1. Although there are still more than 250 municipalities without curbside programs, those are mostly small towns that represent a very minor portion of the municipal population. As more municipalities have offered service, North Carolina has decidedly reversed last decade's decline in curbside programs, as seen in Chart 1.

Among existing and new municipal curbside programs, a remarkable wave of cart adoption has occurred in a very short time, peaking in the 2010-11 timeframe with transition to carts by many of the state's largest cities. Chart 2 (on page 17) shows this history of cart deployment in terms of the number of program transitions. Chart 3 (on page 18) shows household reception of carts, resembling in many ways a standard marketing adoption curve, but with an uptick in 2013 as a few late-adopting larger towns like Wilmington and Burlington finished cart deployment.

The momentum displayed in the graphs has pushed North Carolina close to completing comprehensive cart adoption. Through June 2013, the state had achieved a cart penetration rate of almost 85 percent for municipally served households. There are signs that fiscal year 2013-14 will bring a slew of new transitions. For example, when the last remaining major non-single-stream MRF in the state converts to single-stream in spring 2014, it will allow cart adoption

by as many as 25,000 households in the surrounding region.

Results

Moving to carts has appealed to local officials as a way to improve service, achieve efficiencies, and reduce the many direct and indirect expenses of curbside sorting. As a general rule, cart-based collection results in a lower cost of providing curbside service while also increasing participation and collected tonnage.

In North Carolina, cart adoption has been the leading factor in a steady growth of curbside collected tonnage statewide. As shown in Chart 4 (on page 18), the state saw an increase of more than 100,000 tons of curbside material between FY 2005-06 and FY 2011-12, a rise of 49.7 percent.

As a side note, this rise in curbside tonnage has occurred parallel to the precipitous decline of newsprint. Using combined AF&PA and EPA Waste Characterization data, newsprint generation fell by a calculated 34 percent between 2006 and 2011. If newsprint generation had remained steady, North Carolina's curbside recycling increase would have been substantially steeper.

Table 3 shows examples of some of the state's cart grantees and the before-and-after effect of cart transition. The table also shows the substantial investment entailed with carts and the leveraging of state grant funds toward the overall investment. Overall, grantees are averaging a 73 percent increase in collected tonnage.

Trade-offs

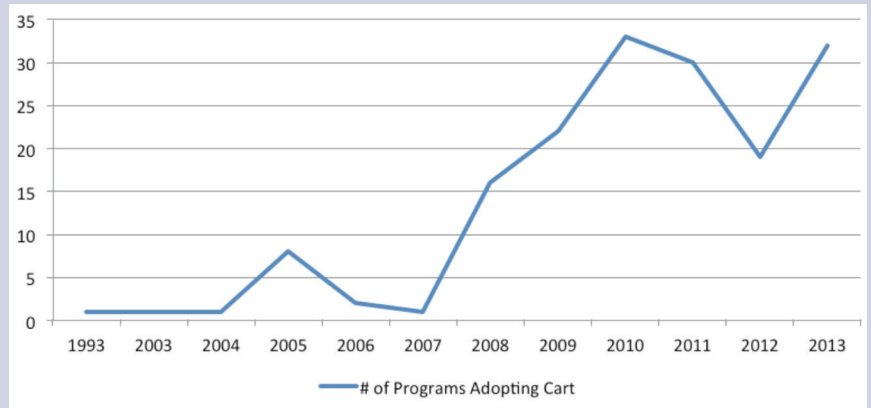
Investment in carts is a huge capital commitment for municipalities, and many have afforded that investment by moving from weekly to every-other-week collection. In losing the behavior "prompt" of same-day-as-garbage, municipalities have tried to ramp up calendar-based education. However, not all municipalities have had the wherewithal to conduct heavy or consistent outreach, which

Table 2 | North Carolina municipal curbside cart penetration

	Number	Percentage
Municipal curbside households in carts	1,321,708	84.9 percent
Municipal curbside households not in carts	234,595	15.1 percent

Source: NC Department of Environment and Natural Resources, 2013.

Chart 2 | Number of North Carolina municipalities adopting carts



Source: NC Department of Environment and Natural Resources, 2013.

Table 3 | Examples of cart grantees: tonnage before and after

Municipality (cart transition year)	Households served	State grant investment	Local investment	Annual collected tonnage before carts	Annual collected tonnage after carts (percent increase)
Asheville (2011)	29,150	\$75,000	\$1,477,000	4,632	7,706 (66%)
Burlington (2012)	16,610	\$75,000	\$794,225	1,940	2,642 (35%)
Kannapolis (2011)	18,000	\$75,000	\$830,940	0	2,909 (N/A – new program)
Monroe (2012)	9,398	\$75,000	\$407,000	650	1,499 (130%)
Mooresville (2012)	10,500	\$100,000	\$100,000	113	1,346 (1096%)
Mt. Holly (2010)	4,586	\$100,000	\$100,000	356	757 (112%)
Sanford (2012)	8,840	\$75,000	\$402,000	782	1,193 (53%)
Stedman (2010)	449	\$20,000	\$20,000	19	74 (288%)
Wingate (2011)	810	\$21,250	\$21,750	51	149 (190%)

Source: NC Department of Environment and Natural Resources, 2013.

has blunted the potential benefits of cart deployment.

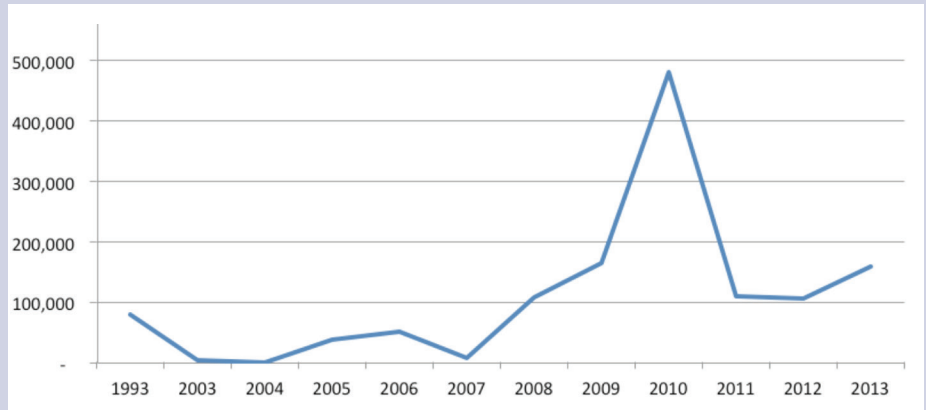
Over time, the use of RFID technology in cart collection systems could help communities measure and address participation issues. The state has worked to spread RFID use by first recommending and then

requiring all cart grant recipients to buy carts embedded with the tags. Now, the state is helping to fund more truck readers and is fostering peer-to-peer learning about RFID through technical assistance and recycling conference sessions.

There are also indications that single-

stream collection, such as in carts, has increased material cross-contamination and brought other challenges to material processing. North Carolina has not traditionally tracked contamination at the state's MRFs, but a recent survey showed a slight trend toward more out-throws. Although the average residue rate from reporting facilities was only 6 percent, the state is mindful that downstream markets are also seeing more contamination. Fine-tuning education programs, MRF operations, and reclamation and beneficiation processes will be critical to addressing these issues. Nevertheless, there has been an overwhelming net gain in material recovery from single-stream cart adoption.

Chart 3 | Number of North Carolina municipal households receiving carts



Source: NC Department of Environment and Natural Resources, 2013.

The takeaway

North Carolina has learned a number of lessons from its cart adoption experience that may apply to other states and to other cart initiatives:

Conversion to carts is very effective in revitalizing participation, increasing tonnage collection, expanding the material mix, kick-starting new programs, and delivering more materials into the recycling marketplace.

Cart-based collection drives down collection costs through automation, compacted collection and increased route efficiency.

An intervention of funding can encourage and accelerate the transition to carts; in many cases a relatively small intervention can leverage a much larger municipal investment.

Policies such as disposal bans, combined with new sources of funding, can be potent in mobilizing cart investment.

Cart conversion can be a critical opportunity to deploy new performance management technologies such as RFID.

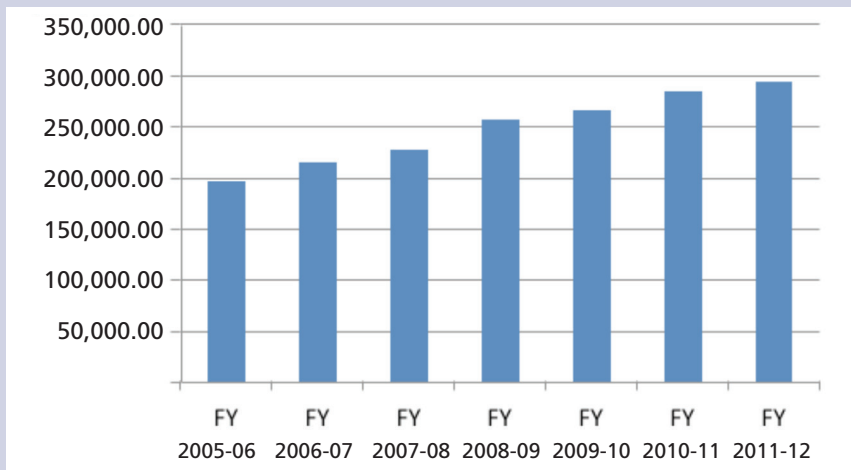
Communities can take advantage of “piggybacking” on peer municipal contracts to get the best deal on carts.

Conversion to carts by itself does not guarantee collection optimization. Effective education and outreach is still necessary, especially when cart conversion entails reduction in collection frequency.

Work still needs to be done to help MRFs address contamination and material marketing issues, especially with glass and non-bottle plastics.

Cart conversion is not a panacea that

Chart 4 | North Carolina curbside tonnage



Source: NC Department of Environment and Natural Resources, 2013.

solves all the challenges of effective curbside collection. But North Carolina has found that carts are an essential path to an efficient and modernized curbside recycling infrastructure, an improvement that has a very strong and lasting effect. The lessons from this transition will be critical as the state now turns to its next challenge: using the single-stream MRF infrastructure and a “hub-and-spoke” strategy to transform North Carolina’s rural drop-off system.



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