

**Recycling Technical Assistance Project**

**#584**

**Allegheny County Curbside Recycling Pilot Evaluation**

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Sponsored by the Pennsylvania Department of Environmental Protection through  
the Pennsylvania State Association of Township Supervisors.

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## **1.0 Problem Statement**

The Northside Bin Initiative is a pilot project that distributed approximately 1,040 recycling containers to residents served by a single existing residential recycling collection route on the Northside of the City of Pittsburgh (Collection Route 431). This project replaced the existing bag based recycling collection system with a container based system. PRC staff was tasked with gathering data and analyzing any impacts of this new system on the City related to staff time, routing, and finances. Recycling collection is conducted by the City's Environmental Services (ES) staff. Other data collected and analyzed included changes to recycling participation rates, changes in weight of material collected, collected material quality, contamination levels, and resident feedback. The findings of that data gathering and analysis are presented in this report.

## **2.0 Work Completed**

### **2.1 Baseline Data Collection - Overview**

This section outlines the data collected prior to bin distribution. The scope of the initiative was confined to only those residents served by Collection Route 431. Project staff determined baseline measurements for set out rate, average weight collected, and time on route. Interviews with route collection staff were conducted to address concerns and discuss possible impacts. The project outreach team recorded resident feedback during the door to door outreach phase.

### **2.2 Housing Units Served**

The City provided project staff with a route summary generated by their routing software, Route Smart, which documented just over 1,300 discreet households receiving collection service on Route 431. Project staff validated this count by visually confirming the status of each listed service address and found that approximately 300 of the addresses were vacant/abandoned or non-existent. The confirmed service count of Route 431 includes 1,129 housing units of which 781 are single family homes. The balance of 348 are individual units in multi-family dwellings. Project staff confined this analysis to only those households serviced by the residential collection program and did not include multi-family housing properties with 5 or more units.

### **2.3 Establish Baseline Set Out Rate**

To determine a baseline recycling program participation rate (prior to bin distribution) the team shadowed Route 431's truck on the pilot route's collection day. Observations taken during a preliminary survey led project staff to ascertain that a distinct relationship could be made between an individual pile of blue bags set out for collection and a single household. The majority of households set their recycling either directly in front or in back of their residence, distinctly apart, and not combined with other households (see photo "a." in the Appendix).

Based on these observations a system was developed to track the set out rate using this clear correlation between one pile and one household. One distinct pile (staff determined that at least one bag of recycling set out counted as a "pile") was counted as one household's participation. This system also counted a resident-provided recycling bin as one household's participation. Staff deduced that bags

placed up against or very near the base of a resident provided recycling container was simply excess material from the same household that did not fit into their container, and took steps to avoid double counting. A drawback of this metric is that when multiple households did combine their recycling into large piles, it was impossible to say how many separate households participated, thus these large combined piles were not counted. Fortunately, this was the exception not the rule.

Using the system described, the team calculated a 52% baseline total participation rate. A total of 513 distinct piles and resident-provided recycling containers were counted. Owing to the limitations of the measurement system, the baseline participation rate the team determined (52%) is a low end estimate with a margin of error of approximately 3-5%. For comparison, project staff shadowed a route that serves an adjacent Central Northside neighborhood and found a participation rate of 45%.

## **2.4 Establish Baseline Weight Collected and Time on Route**

The City provided project staff with the completed forms that route staff use to report the weight tipped at the MRF after collection, as well as time spent on route. At the MRF (Recycle Source in Hazelwood) the truck is weighed on a scale before and after tipping the material and the difference in weight determines the weight of material collected. The City provided forms dating back to January 5, 2015, the first collection of the year.

The average weight per collection for Route 431 January 5 through July 20, 2015 was 5.44 tons. A total of 5.12 tons were collected on July 20, the last collection day prior to bin distribution. For the same period of time, project staff determined the average time on route to be 5.88 hours, per collection.

## **2.5 Determine User/Operator Response**

Project staff's interaction with residents during the door to door outreach portion of the project indicated that the overwhelming majority of residents were enthusiastic and supportive of the project. However a small number of residents did express concerns. The concerns fell into three categories:

- the elderly who worried about moving the weight of the full bin,
- residents of row houses or buildings without a backyard or alley access who were concerned about bin storage, and
- residents that did not want to recycle.

Prior to bin distribution project staff interviewed the ES Route 431 staff to determine any possible impacts to their operation. ES staff indicated that they anticipated the bin would streamline collection, but expressed concerns about weight or water filling the containers (bins have holes in the bottom to prevent water from collecting). Route staff remarked that material that would otherwise be placed in piles of bags too numerous to pick up in one pass would probably be consolidated and be able to be collected all at once, reducing the number of trips back and forth needed to pick up the entire pile.

### 3.0 Analysis

#### 3.1 Measuring Impacts of Bin Pilot - Overview

After baseline measurements were collected, project staff distributed the 1040 bins from July 20 - July 24. Following bin distribution, staff continued to monitor participation, time on route and collected weight. Project staff analyzed and compared data from before and after bin distribution. An analysis of the findings are presented in this section.

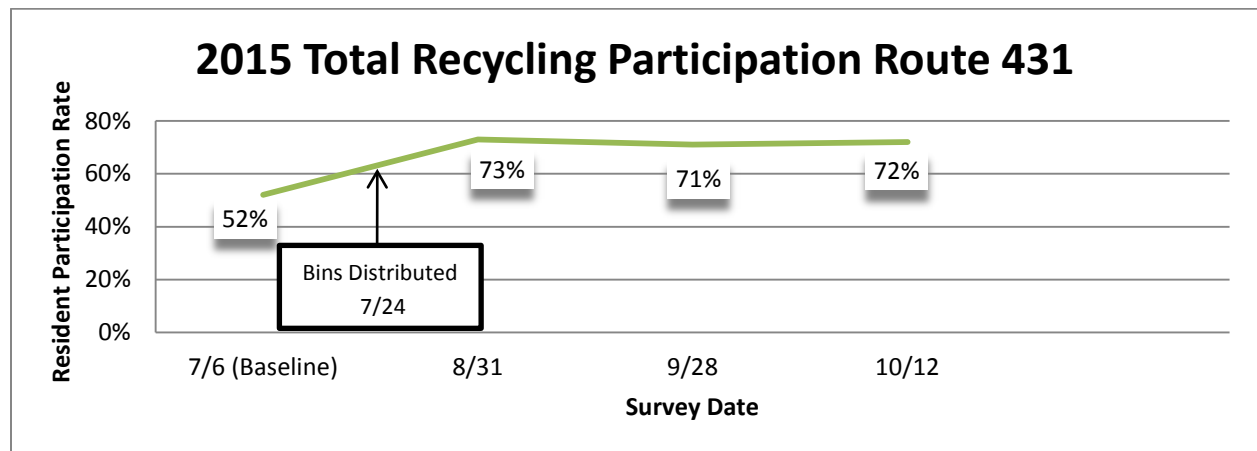
#### 3.2 Changes to Set Out Rate

Despite the challenges of measuring participation presented by the blue bag program, the team developed an effective, consistent, and accurate system for tracking resident recycling participation. The process was made much easier after the distribution of bins, owing to the fact that each household only received one bin and thus one bin set out equaled one household's participation.

The first survey after bin distribution (conducted August 31) counted overall participation with both the new blue bins and blue bags. Again one distinct pile (at least one bag) counted as one residence's participation, as did one provisioned bin. This survey saw remarkable increases in total participation: staff calculated a total participation rate of 73% (up 21% from the baseline of 52% participation- an increase of 208 households). Of that total participation rate, 77% were participating through usage of the new bins and the remaining 23% were still using blue bags. Subsequent participation surveys continued to count blue bag piles in addition to blue bins for a total participation rate.

Again for comparison, project staff shadowed a recycling route on October 16 in the adjacent Central Northside neighborhood and found a participation rate of 45%, using the same system for measuring participation.

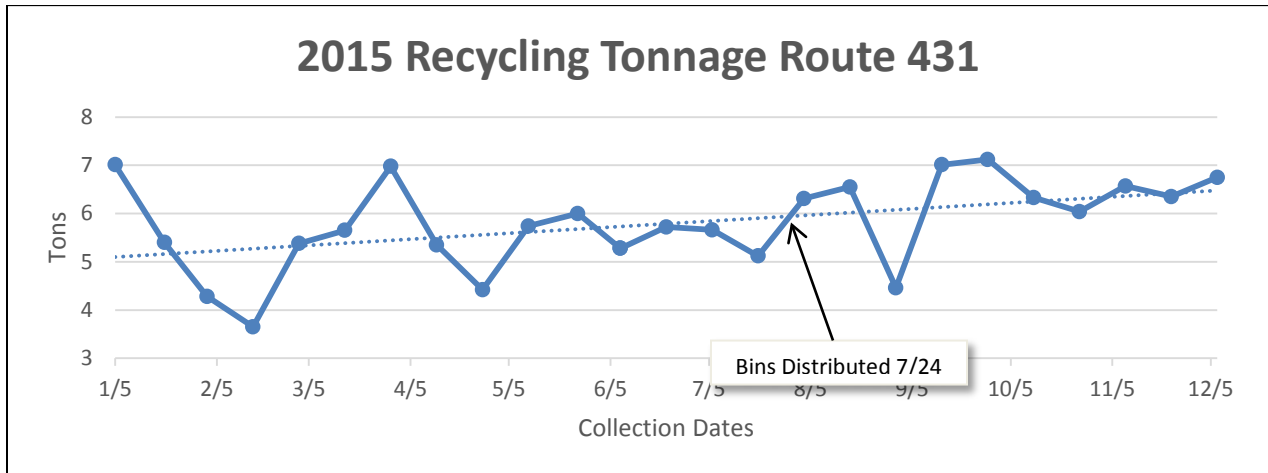
Three months after bin distribution, the overall participation rate sustained the initial increase and never dropped below 71%. Of this overall participation rate, an average of 75% of the residents continued to participate through use of the bins while 25% still set out recycling in blue bags. The following graph shows these changes over time.



### 3.3 Changes in Weight Collected

As outlined in section 2.4, the average weight per collection for Route 431 January 5 through July 20 2015 was 5.44 tons. On July 20, the last collection day prior to bin distribution, 5.12 tons were collected.

On the first collection day after bins were distributed (August 3), the truck collected 6.31 tons, well above the average and the third highest weight recorded during the year 2015. From the actual weight collected just prior to residents receiving bins, a weight increase of 23%, equal to an additional 2,380 pounds of recyclable material, was realized only one collection later.



The average weight collected after bin distribution, from August 3 to December 5 increased to 6.35 tons per collection, up from the average 5.44 tons prior to residents receiving bins.

The average weight per set out prior to bin distribution was approximately 10.5 pounds per household. After bin distribution the average weight per set out from August 3 until December 5 was 12.2 pounds per household.

### 3.4 Effects on Quality of Collected Material

Despite the focus in the outreach efforts on putting material into the bin unbagged, random contamination checks and qualitative observations determined that a large number of residents were still blue-bagging their recyclables before putting them into the blue bin. If usage of blue bags continues PRC has developed a *warning* door hanger to serve to residents of the pilot route not in compliance with proper usage of the bin.

It should be noted here that despite many residents still bagging their recycling before placing it in the bin, project staff observed considerably more unbagged, loose material in loads dropped off at the MRF from the pilot route compared to very little loose material from other route's loads. In other words, almost all the material delivered to the MRF from other routes was in blue bags, whereas the pilot route's load had a visibly higher content of unbagged material (See photo "b." in the Appendix). Less bagged material means less contamination (from the bags themselves) and higher quality material for

the MRF. Higher quality material fetches a higher price on the commodities market, which then translates to a better rate for the City for material being delivered to the MRF.

### **3.5 User Impacts**

After bin distribution project staff received a small number of calls from residents who were adamant about not wanting to have received the bin. About 15 residents called in to request that their bins be removed. Project staff coordinated with the residents to pick up the bins. On the scheduled bin reclamation day only 5 of the residents actually put the bin out to be picked up.

Again, the number of residents who expressed disdain at the project was negligible. The overwhelming majority of residents were very enthusiastic about the bins, and many called in or emailed to express their enthusiasm. Many calls came in from residents not on the pilot route, who inquired about how to receive one.

### **3.6 Impacts on Route Operations**

Route impacts analyzed include time on route, vehicle capacity and operator experience.

Based on PRC staff observations of operator experience and feedback, it actually seems that the bins streamline the operation for route staff. Instead of requiring multiple trips to collect large piles, the piles are now consolidated into bins. This time savings was however, eroded to some degree as route staff is now required to return the collection container to the curb.

Environmental Services reported that staff time on the pilot route increased after bin distribution. Using the forms the City provided, project staff found that the average time on route after bin distribution was 6.68 hours per collection. For comparison, average time on route per collection prior to bin distribution was 5.88 hours. It is difficult to attribute any effects to time on route solely to the bins. Time on route can fluctuate due to many different factors such as having a fill-in staff member unfamiliar with the route, weather, and quantity of material collected. It should be noted that current practice is for route staff to be paid for the full day even if the route is completed early, which is almost always the case. This personnel policy affords significant capacity in terms of route time and, regardless of the cause, the increased time does not incur additional costs. If the bins do necessitate more time on route this will of course affect route staff sentiment towards a bin program and should be taken into consideration if the City chooses to expand the program.

With regards to vehicle capacity, the additional volume and weight of material collected after bin distribution (due to increased participation) was within the capacity of the collection truck to collect in one pass as usual.

### **3.7 Fiscal Impacts**

Many cities comparable to Pittsburgh have experienced similar significant increases in participation and tonnage after rolling out recycling container programs<sup>1</sup>. Increased participation in recycling universally equates to cost savings for the municipality: More participation equates to higher tonnages of recyclable

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<sup>1</sup> Rehrig Pacific Reference Sheet 2015



material collected which means less recyclable material are landfilled. On a cost per ton basis this savings is well documented by the City's internal audit of Environmental Services operations.

In fact, in 2013 alone Pittsburgh avoided \$406,356 in landfill costs through recycling efforts. From August 2014 - July 2015, the City saved as much as \$311,493.86 in avoided disposal costs by diverting materials away from the landfill through recycling. Current City landfill contracts set the average price per ton for disposal at about \$25.00. The recycling processing and marketing contract with a regional MRF has resulted in a maximum per ton cost of \$7.86. This latter contract is indexed to commodities markets and can be expected at times to actually return a positive net revenue to the City. At present waste diverted from the landfill to the MRF results in a direct cash savings of \$17.00 per ton.

To put it in perspective, in 2014 the City sent nearly 88,940 tons to landfill and recycled around 15,459 tons (with 12% residue included). Based on the current valuation of the MRF contract the City avoided, or saved, over \$260,000 in 2014. Additionally, increases to the volume of materials diverted from landfill can also result in higher state sponsored program performance grants. It makes financial sense for the City to maximize recycling rates, in light of the discrepancy of landfill and MRF related costs.

The premise of avoided landfill disposal costs is that any increase in materials diverted to recycling should equate to a decrease in material going to landfill. In other words, the 21% increase in recycling participation should have the effect of lessening what was collected as garbage, and thus lessening the amount of material being disposed of at the landfill. Project staff analyzed data to determine if the additional material collected on the recycling route would correlate to a reduction in material being collected by the garbage trucks that service a nearly identical footprint.

The residences serviced by Route 431's Monday Recycling Collection Route are serviced by two garbage trucks routes on Monday as well: Route 401A and 402A. Route 401 services the entire eastern area of the pilot route, essentially overlapping that section of the pilot route exactly. Route 402 services the entirety of residents in the western half of the pilot route, but also services a few additional blocks south of Pennsylvania Avenue in the Manchester neighborhood. Regardless of this slight discrepancy, any reduction in weight would still be observed since the majority of the residences serviced by both routes are those within the pilot area.

Project staff analyzed the combined route's landfill weights collected before and after bin distribution and observed that the average combined weight did drop slightly, from 8.64 tons to 8.58 tons per collection. It is notable that both recycling and landfill tonnages fluctuate seasonally due to a host of factors. That being said, this data should be tracked over the long term to determine a more accurate assessment.

Of interest to the City is also the potential for fuel cost savings. A round trip to the landfill in Imperial, Pennsylvania, where the Northern Division's garbage is disposed, is 48.6 miles. That's roughly twice the distance to the MRF in Hazelwood (from the Northside). City records indicate that fuel usage for each ES packer truck is 2.8 miles per gallon. In 2013 alone, ES used 243,809 gallons of diesel fuel at a cost of \$780,189.

Ultimately a reduction in the amount of material transported to the landfill presents an opportunity for a considerable reduction in fuel use. An added benefit of reduction in landfilling is that it supports the City's Climate Action Plan; fewer trips to the landfill will equate to a reduction in fleet emissions.

## **4.0 Recommendations**

The project produced data that may serve as preliminary evidence of the feasibility of adopting a similar program citywide. Based on the outcomes of the project, there are several recommendations for the City:

- Continue to conduct participation surveys and record recycling and landfill tonnages– 6 months at minimum; however, a full year of data collection will take into account seasonal changes
- Continue to monitor for contamination in bins- City distributes warning notices for non-compliance as part of regular compliance checks if problem persists
- Conduct additional follow up outreach to correct any improper usage of bins – focus on putting material into bins UNBAGGED, get resident feedback
- Continue to monitor potential costs benefits on Environmental Services staff including time on route and weights collected on both recycling and garbage routes in pilot area

Project staff recommends that the City of Pittsburgh utilizes the findings presented in this report to assess the viability of expanding recycling container programs to other areas of the City. Based on the findings of this report project staff feel confident that a City wide bin rollout would be a success in terms of increasing residential recycling participation and diversion rates.

## Appendix

- a. Pile placement – clear relationship between an individual household and distinct pile.



