Improving Local Program Efficiency Insights into Participation and Recycling Economics

FACT SHEET

Why is participation so important?

Participation is the driving force behind the economic efficiency of every program. The more individuals use a service, the more efficiently time and resources are used. To better understand how exactly participation relates to program economics first requires an understanding of basic recycling economics concepts.

Fixed cost and variable cost

The overall cost of operating a solid waste management or recycling program can generally be broken into two types of costs: fixed costs and variable costs. Although the actual definition of each is more technical than one would think, we can simplify the terms by identifying the main cost components of a program and identifying whether the costs are generally fixed or variable:

- Program Administration – Fixed
- Collection (curbside or drop-off) – Fixed
- Hauling/Transportation – Variable
- Tipping Fees (disposal or recycling) – Variable

The term "fixed" does not mean there is no change, and the term "variable" does not mean always changing. An easier way to think of these costs is:

Fixed Cost - unlikely to be affected by daily changes in tonnage handled
Variable Cost – likely to be affected by daily changes in tonnage handled

Recycling programs tend to have high fixed costs and low variable costs. Solid waste collection and disposal programs also have high fixed costs, but these programs are much more influenced by variable costs than recycling programs. Drop-off recycling programs tend to be more affected by variable costs than curbside recycling programs.

Performance measures

Although there are many methods to analyze recycling program cost and efficiency, the most common is cost per ton. Cost per ton can be used to compare recycling programs from different communities or to compare a solid waste program to a recycling program. It should be noted that in any comparison, the same methodology must be used to develop the performance measure. For example you cannot use a cost per ton developed through a full-cost analysis and compare it to the budgetary cost per ton of another program.

The goal of all program coordinators should be to seek the lowest cost per ton possible. This can be achieved by adding materials, increasing participation, implementing award/incentive systems, mandating recycling, increasing user friendliness (e.g., from switching from bins to carts) or any combination of these. As the cost per ton decreases, a budgetary balance will occur between solid waste and recycling programs. When both programs are equally efficient, the overall budget should be balanced (not including yard waste). At this point, a community with a 20 percent recycling rate should be spending 20 percent of the solid waste and recycling budget on recycling and 80 percent on solid waste collection and disposal. The cost per ton for each program should be equal.

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Example: Town of Banksville

Banksville collects solid waste and recycling curbside once per week. In an effort to improve efficiency, the town will add mixed paper to the recycling program. As part of promoting the addition of mixed paper, the town will make an effort to boost participation at the same time, maximizing the effectiveness of education dollars spent. The town will spend $2,500 on program-change education.

Town Statistics:

Households	15,000
Cost per ton solid waste:	$125
Cost per ton recycling:	$165
Recycling participation rate:	55 percent
Solid waste:	10,800 tons
Recycling:	1,500 tons
Total managed:	12,300
Recycling rate:	12.2 percent
Recycling budget:	15.5 percent
Lbs. per participating household:	363 lbs.
SW tipping fee:	$32
Recycling processing fee:	$0
Solid waste collection cost:	$1,004,400
Solid waste disposal cost:	$345,600
Recycling cost:	$247,000
Total budget:	$1,597,500

The program is implemented successfully and participation jumps from 55 percent to 65 percent. The town also achieves the state average of 41 pounds of mixed paper per participating household.

The town experiences a one-half percent decrease in solid waste collection costs and a two percent increase in recycling collection costs.

Here is the new scenario:
The number of participating households has increased from 8,250 to 9,750. Due to the addition of mixed paper, the pounds per household per year have increased from 363 lbs. to 404 lbs.
Total recycling has increased to 1,969.5 tons (up 469.5 tons).
Total solid waste has decreased to 10,330.5 tons.
New budget and performance measures:

Solid waste collection: $1,004,400 - $5022 (one-half percent decrease in cost) = $999,378
Solid waste disposal: $345,600 - $15,024 (avoided disposal cost) = $330,576
Recycling cost: $247,000 + $2,500 (education) + $4,940 (increased collection cost) = $254,000

New Budget:
Collection: $999,378
Disposal: $330,576
Recycling: $254,000
Total cost: $1,584,394 ($13,106 decrease in overall cost)

Cost per ton solid waste: $1,329,954 / 10,330.5 tons = $128.75 per ton
Cost per ton recycling: $254,000 / 1,969.5 tons = 128.96 per ton

Budgetary Balance:

Solid waste disposal: 84 percent	Solid waste cost: 84 percent
Recycling rate: 16 percent	Recycling cost: 16 percent

Where is the Efficiency?

Since the majority of the costs associated with curbside recycling programs are fixed, the more material collected, the lower the cost per ton. The program is using the same amount of financial resources to collect more material. This is where the philosophy of running efficient programs is slightly different between curbside and drop-off programs, and between solid waste and recycling programs. Each is highlighted briefly.

Curbside Solid Waste

Over the course of a few collection cycles solid waste programs experience a 100 percent participation rate; therefore, efficiency gains are best made by reducing fixed costs through improved routing, collection frequency changes, equipment upgrades and reducing variable costs through improved waste reduction.

Curbside Recycling

Most curbside recycling programs experience only a 50 to 60 percent participation rate over a few collection cycles. Efficiency gains can be made in recycling programs not only by seeking to reduce fixed costs with the techniques outlined above, but also by increasing participation. As participation increases, more material is shifted from solid waste to recycling. The recycling program is now more efficient, and although there may potentially be a slight decrease in solid waste collection efficiency, this decrease is more than offset by the "real dollar" reduction in variable costs associated with the solid waste program.

Drop-off Solid Waste and Recycling

The fixed costs associated with drop-off based programs are usually shared between the two programs. There are a few ways to decrease fixed costs at convenience sites, but program managers can see the biggest efficiency gains through reducing variable costs. These can include introducing compaction, increasing container size, reducing hauling times and commingling (may also reduce fixed costs).

Participation v. Revenues Received

Many program managers spend significant amounts of time worrying about the price paid for recyclable materials. While it is important to be cognizant of current market trends if you are being paid for material, in many cases efficiency improvements can have just as large an impact on the program. The following simplified example outlines how efficiency improvements can affect a program.

Simple Example - Town of Harrison:

# Households	6,000
# Participating	3,300
Participation rate:	55 percent
Collection method:	curbside or drop-off
Price paid for recycling:	$25 per ton
Solid waste tip fee:	$30 per ton
Avg. collection per participant:	375 lbs/hh
Total recycling:	618.75 tons

Question:

Would it be better to try to get 10 percent more for material or increase the number of participants by 10 percent? Assume that changes in recycling and solid waste collection costs will, for the most part, offset each other.

Ten percent more for material - New price paid $27.50 per ton.
Existing revenue: $15,468.75
New Revenue: $17,015.63
Improvement: $1,546.88

Ten percent more participants – New participation rate: 3630 households (60.5 percent). Note it is only a five percent increase in the actual participation rate.

Before: 618.75 tons @ $25 per ton = 15,468.75
At new rate: 3630 HHs @ 375 lbs = 680.63 tons (or 61.88 new tons)
680.63 tons @ $25 = $17,015.75
Avoided Disposal Cost: 61.88 tons @ $30 = $1,856.4

Old: $15,468.75
New: $17,015.75 (Rev) + $1,856.4 (Savings) = $18,872.15
Net Improvement: $3,403.37

or about $1,856 more than if price paid went up.

This example will also work for a community that is not receiving revenues or is paying a small processing fee. In such a scenario, the overall cost of recycling may go up, but should be offset by the avoided disposal cost. The point of this example is that managers need to focus on the overall performance of both the solid waste and recycling program. The power of any recycling program, once it is in place, is avoided cost.