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RESOURCE RECYCLING

The true price of reduction

Based on the experience of the nation's biggest recycling program, the first part of this two-part series addresses the institutional barriers to successful municipal recycling by de-mythologizing and de-mystifying the cost of municipal recycling versus municipal refuse disposal.

By Robert Lange

Two of the challenges remaining to the development of recycling on a municipal level are its cost and continued association, in practice and in mind, with the management of waste.

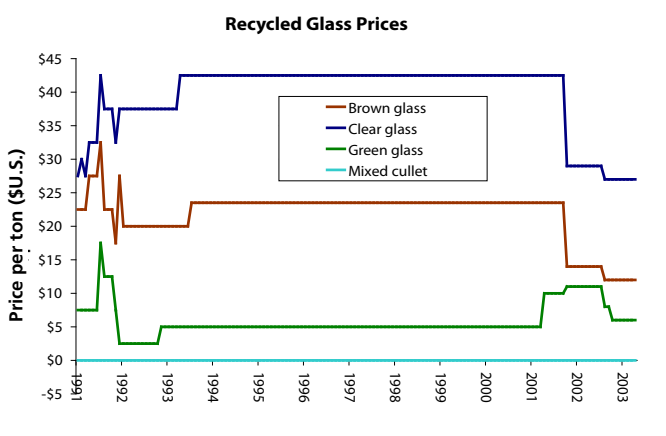
In the early 1980s, as disposal costs appeared to be increasing nationwide and disposal options were diminishing due to changes in federal regulations, the solid waste management community began to explore alternatives to landfill disposal. Almost two decades hence, recycling, now an integrated part of most municipal solid waste management plans, remains costly when compared with the cost of refuse collection and disposal. The major reason for this is that, based on a simple cost-per-ton analysis comparison, recycling is more expensive than refuse disposal operationally.

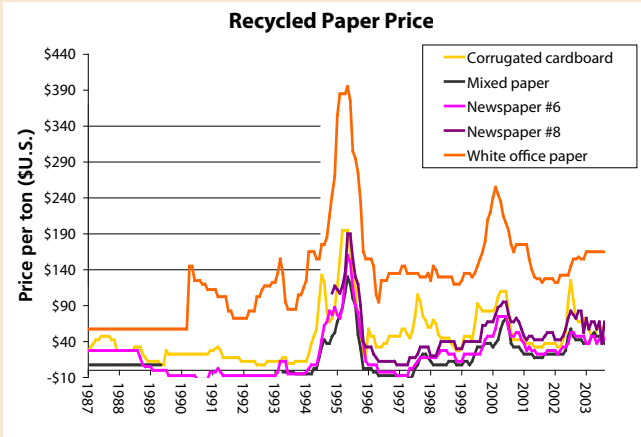
Before continuing further, it is important to address the persistent myth borne of idealistic advocacy: Recycling as a solid waste management practice will pay for itself. The thinking behind this faulty assumption is that, if commodities can be targeted and collected, instead of landfilled, then recycling will pay for itself through commodity revenue. This assumption can be maintained when the model involves voluntary drop-off centers manned by volunteers, and possibly further subsidized by government funding. However, the elements of a municipal program staffed by unionized employees providing weekly curbside service to all households, regardless of individual household set out, are both fundamentally different and exponentially higher in cost.

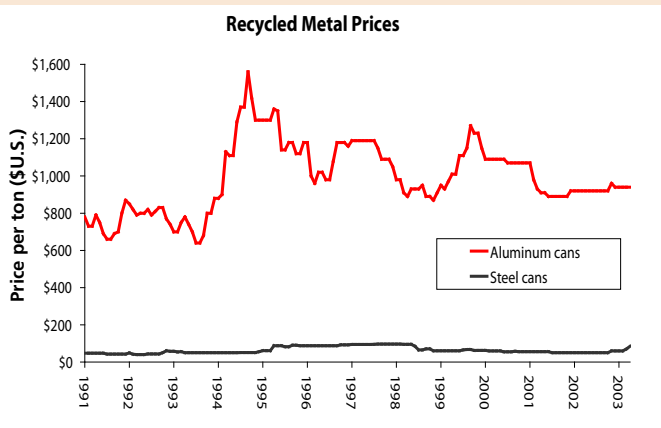
The reality is that, in the area of municipal waste management, cost is evaluated annually and funding is based simply on a program's operating cost per ton. This is both traditional and practical, since externalities associated with traditional solid waste management activities are more likely to be addressed as part of the political process rather than through an annual budget process. The responsibility for addressing externalities usually resides with other branches of the government.

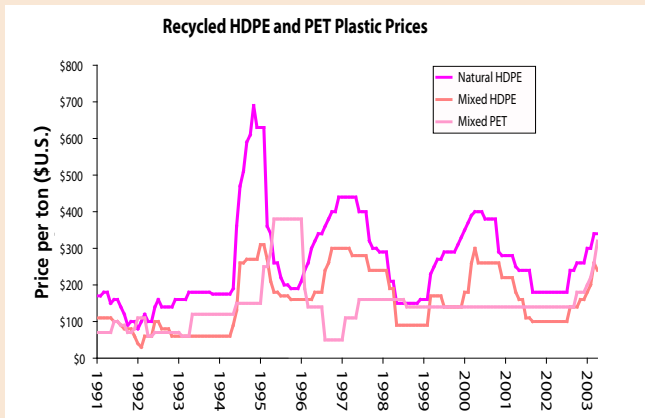
Given the institutional constraints placed upon municipal solid waste managers, there are still opportunities for lowering the cost of a recycling system's operation. Recycling has certain cost advantages over waste disposal, particularly its potential for producing revenue from the sale of the recyclables collected. However, getting to that point, and maximizing the value of the end-product for sale, is not as simple as it might first appear.

Figure 1 | Per-ton prices for recyclables collected in the New York Region









Source: New York City Department of Sanitation-Bureau of Waste Reduction, Reuse and Recycling, 2004

Why recycling costs more than refuse

Collection cost is the primary reason that recycling costs more than refuse to manage. The reason for this is simple, though not always immediately apparent. In the very early 1980s, before recycling began to be instituted on a municipal scale, everything placed out by residents was picked-up and disposed of as refuse. The most residents had to think about was if their refuse was set out in a manner consistent with the rules of the community – bagged if allowed, or in the proper size waste container, and loose materials tied and bundled.

On the collector's side, the primary focus was on whether or not the residents had set items out on the correct day, and in the proscribed manner. However, with the institution of separate recycling collections, it became complex, both for residents who now took on a level of responsibility for their discards, and collectors who were now collecting materials that required some quality control effort on their part.

With the introduction of recycling on a municipal level, a portion of what was formerly just "garbage" had now been designated for voluntary source separation by the resident and separate collection by the municipality or its contractor or franchisee. However, whatever percentage a municipality targets from the waste stream for recycling will still only be a fraction of the former total. Given the character of municipal residential waste and the markets for post-consumer recyclables collected curbside, the portion targeted is often less than 50 percent of the waste stream. Therefore the crew and vehicle assigned to collect recyclables will be required, per shift, to service (at least double the stops) to achieve the previous cost-per-ton efficiency of refuse alone. Add to this the fact that each household must comply 100 percent with the new set-out requirements to achieve this compromised efficiency.

To the extent individual household compliance is not 100 percent, the efficiency of recycling collections is further compromised and, concomitantly, refuse collections retain a degree of their former efficiency through resident non-compliance with recycling ordinances. When it is further factored in that, nationwide, the capture rate for recyclables targeted by individual municipalities often doesn't exceed 50 percent, regardless of a particular program's age, it is easy to see why the cost-per-ton expenditure for recycling collection presently exceeds that of refuse. There are, of course, exceptions to this generalization, but the exceptions, by their fundamental differences from the norm, prove the rule rather than disprove it.

For example, let's say a municipality targets 50 percent of the waste stream for recycling and achieves a capture rate from

its residents of 50 percent. This means that, on the weekly recycling collection day, each household would be placing out for collection, on average, 25 percent of what was formerly "garbage" or refuse. The recycling collection vehicle assigned to this task will have to service four times as many stops as the former refuse collection vehicle, assuming that four times as many stops can be serviced in a single worker shift. If resident compliance is less than 50 percent, the number of stops required to achieve the same tons per truck load increases further.

There are a number of means that municipalities can attempt to reduce the overall cost of recycling collection, such as single-stream service, the use of dual-bin recycling collection vehicles, or other methods that directly encourage residents to increase compliance, and thereby tonnage, either through positive or negative reinforcement. Regardless of these efforts, on a simple cost-per-ton-collected basis, recycling remains more expensive, because it's targeting a subset of the total waste stream. Plus, when combined with its dependency upon participant compliance for achieving greater efficiency, recycling contributes to a degree of inherent collection inefficiency.

Add to these factors the limitations that time (shift hours) and distance (maximum route coverage) further place upon recycling efficiency and it is easy to see why these inherent operational inefficiencies are difficult to overcome. These challenges to control recycling program costs are no secret to most municipal managers. It is a reality that is frequently lost when recycling as a solid waste management activity is discussed in public forums, most typically in the mainstream media where the myth of recycling paying for itself still asserts itself.

The cost of public education further contributes to the overall cost of recycling versus disposal, as refuse collection service requires almost no public education effort to fully engage its residents in participation. Residents have a compelling interest in seeing their putrecible cast-offs removed from their home and their sight. Recycling, on the other hand, requires that both initial program participation guidelines and frequent reminders be provided. Recycling is fundamentally a matter of motivation on the part of the resident, as residents are solely responsible for the in-home source separating of their recyclables, as well as the curbside placement of that material for collection.

Waste disposal versus the recycling of commodities

While recyclables collected by municipalities have potential worth, most are not collected in a form ready for market, thus must be prepared for market post-collection. This added handling comes with an associated cost per ton that diminishes the end-value to the municipality. Nonetheless, there can be generation of a net revenue amount, depending upon the particular recyclables collected. Metal and plastics are primary examples of recyclable materials that consistently produce revenue. Glass, on the other hand, is a very low-value commodity. Contaminated material becomes waste, requiring separation for disposal, thus becomes a drain rather than a gain upon revenues per ton, depending on the proportion of contamination per ton of material delivered to a materials recovery facility (MRF).

Collection cost is the primary reason that recycling costs more than refuse to manage

Per-ton municipal refuse disposal costs are affected by numerous factors, such as access to landfill or incinerator capacity, per-ton transport costs and changes in law. These costs are perceived by municipal budget managers, when allocating annual budgetary resources, to be ones that can be tracked and predicted within reason and, therefore, should be relatively stable in nature.

Recyclables, on the other hand – as post-consumer commodities that are subject to global market forces – are perceived as being more difficult to predict with regard to their final net value, both month-to-month and annually. Therefore, the uncertainty that recyclable post-consumer commodities inject into the mass balance equation of a municipal recycling program's annual budget needs is something that must be resolved if a local recycling program is to assure its continued success and funding. The post-collection processing of residential recyclables is an area where municipal managers have an opportunity to stabilize the cost of handling recyclables, per ton, and the revenues produced from this effort. By doing this, it provides local budget management staff with the predictability and stability necessary to assure programmatic expense funds will be available year to year. Figure 1 displays four separate charts related to the pricing for recycled glass, metal, paper and plastics for the New York Region.

In the second article, I will provide suggestions to overcoming the institutional barriers to municipal recycling, including stabilizing processing cost as a means to stabilizing overall program costs; how to go about contracting for recyclables; determining the best solicitation mechanism for securing processing services; and, calculating the monthly value of tons delivered. RR

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