# **Increase** recyclonerticipation

## what, why show much?

#### Why increase participation in YOUP recycling PPOGPAM?

Your community has been running a recycling program for years – it seems to be working pretty well. You collect the basic stuff and about half the folks in your community use the service. It's time to ask yourself: is that really good enough?

What is at stake in a community's recycling program? What is the cost of a low public commitment to recycling, and what are the benefits of doing better? In short, why should communities care about getting more people to recycle more materials?

When widespread recycling efforts began 15 years ago, communities found it easy to explain the benefits to the public. Images of garbage barges, headlines about landfills filling up and the "not in my backyard" phenomena all combined to galvanize public attention. With the help of a growing environmental awareness, the "disposal crisis" sparked a dramatic social movement that resulted in a permanent behavior change for about half of North Carolina's households.

Now the reasons to recycle - and the reasons to cultivate high recycling participation - have only increased in importance. What new arguments can help improve the recycling performance of the public and the programs that serve them? Below are some ideas to help take the public recycling conscience to the next level:

Local government's return on investment

 In implementing recycling programs, local governments are making an investment on behalf of their citizens in a public service that has economic and environmental benefits for society. If only half of the served households participate, the local government's investment fails to deliver the highest possible "dividends."  Local governments that make a small "co-investment" in programs to motivate households to recycle are maximizing their return on investment. They are also making sure that citizens are getting what they pay for through their taxes and fees.

#### The economy

- Public recycling programs rely on "markets," which are essentially large networks of private companies that help collect, process and use recovered materials to make new products. Both the United States and the global economy have become increasingly dependent on recycled or "secondary" resources. Many industries rely heavily on secondary resources to make their products, including the paper and steel industries, and aluminum, glass and plastic manufacturers.
- Major industrial sectors would suffer severely if the supply of recycled materials suddenly disappeared. In fact, they are counting on those supplies to expand. Future world and U.S. domestic economic growth will increasingly rely on the recovery of secondary resources, especially as virgin materials become scarcer and as the cost of energy rises.
- As the dependence on recovered materials has grown, the network of recycling businesses has expanded dramatically. The effects can be seen right here in North Carolina. The state's 1994 edition of the *Directory of Markets for Recyclable Materials* listed 306 companies; in 2004 that number was up to 532, for a 74 percent rise in only 10 years.
- The advent of new recycling businesses and their continued growth has translated into major job creation for North Carolina. A 1994 study found that recycling employed more than 8,700 people across the state. A similar study in 2004 documented more than 14,000 employed in recycling, an increase of 60 percent in one decade. If we assume a low average wage of \$25,000/year for these workers, recycling creates a \$325 million payroll for North Carolina each year, which is plowed back into the economy through consumer purchasing, home-buying, savings in local banks and paying of property and income taxes.
- All over the state, people are employed, pay taxes, spend money and invest in their communities thanks to the recovery of materials from the waste stream. Low participation in community recycling programs directly affects the ability of North Carolina's recycling companies to survive and thrive. Using factors derived from the 1994 jobs study, a 20 percent increase in recycling would create as much as 500 new jobs. So not only is greater recycling participation good for local government efficiency, it's also good for the state's economy.

#### Disposal over the long term

 Sensible waste management requires an integrated approach that recognizes both the need to reduce and recycle, and the inescapable need for environmentally protective disposal options. North Carolina took a major step forward in raising the environmental standards of disposal in 1998 by converting all landfills to lined facilities. This transition, along with the



higher investment costs of disposal, precipitated the closure of most small local landfills and the opening of larger facilities, many owned by private companies. From 130 operational landfills in the 1990s, the number of landfills fell to 41 by 2004.

- As part of the N.C. Solid Waste Management Annual Report 2003-2004, the N.C. Division of Waste Management conducted its first-ever projection of statewide disposal capacity. The total estimate of only 16 years of remaining landfill space gave the state a new ability to look ahead to capacity needs. Landfills in North Carolina have become more difficult to site it is not uncommon for the entire process to take 10 years or more, and many proposed facilities have been stopped by local citizen opposition.
- The increasing difficulty of the siting process is complicated by urbanization of many parts of the state. Urban communities with landfills such as Wake and Mecklenburg counties, Winston-Salem, High Point and Fayetteville are likely operating the last facility in their jurisdiction. Within 30 years, they will be relying on landfills in rural areas (taking on the additional costs of transfer).
- This long-term landfill trend is happening at the same time the state's disposed waste stream is rising. At the rate of growth experienced in the past decade, North Carolina could be disposing of close to 14 million tons of waste per year by 2024. In the time it would take for a child born in 2004 to graduate from college, North Carolina will need as much as 425 million cubic yards of disposal space, an area about the size of Umstead State Park in central North Carolina 45 feet deep.
- Landfill technology has improved dramatically and promises greater protection of groundwater than ever before. Thus the immediate environmental effects of landfills are now better managed. Longer-term effects, however, are difficult to predict although newer landfill technologies have limited risks, possible environmental harm remains. Landfills also remove land from other productive uses such as growing trees or crops, or developing homes and businesses. Negative economic effects of landfills aren't usually counted in calculating the costs of disposal loss of land productivity and the related tax base.
- Diverting more recyclables from waste helps control the risk and lessen the overall need for disposal capacity. A 2003 estimate by DPPEA projected at least 368,000 tons of readily recoverable traditional recyclables were thrown away in the residential waste stream alone. Recycling these materials would reduce the need for landfill disposal space by almost 650,000 cubic yards per year. How do we capture these materials? In large part, by getting more people to recycle, enhancing the programs that are already available to them.
- North Carolina communities can help avoid the next disposal crisis, and control the long-term costs of disposal by investing in recycling education programs, and helping the public understand the long-term impacts of landfills.

Environmental consequences

- Recycling has always been "sold" on the basis of its environmental benefits. The well-documented and much-used "factoids" about these benefits still tell us that recycling is one of the most powerful everyday actions people can take to protect the environment. Some of the more well-recognized benefits include:
  - Energy savings, for example:
    - Recycling an aluminum can saves 95 percent of the energy required to make the same amount of aluminum from virgin materials.
    - Producing new plastic from recycled material uses only twothirds of the energy required to manufacture it from raw materials.
    - Producing glass from virgin materials requires 30 percent more energy than producing it from crushed, used glass.
    - Producing recycled paper requires about 60 percent of the energy used to make paper from virgin wood pulp.
    - Resource savings, for example:
      - One ton of uncoated virgin (non-recycled) printing and office paper uses 24 trees.
      - Every ton of steel recycled saves 2,500 pounds of iron ore, 1,400 pounds of coal and 120 pounds of limestone.
  - Prevention of emissions and pollution, for example:
    - Producing recycled paper causes 74 percent less air pollution and 35 percent less water pollution than producing virgin paper.
    - The pollutants created in producing one ton of aluminum include 3,290 pounds of red mud, 2,900 pounds of carbon dioxide (a greenhouse gas), 81 pounds of air pollutants and 789 pounds of solid wastes.
    - Recycling one ton of steel reduces air pollution by 86 percent and water pollution by 76 percent, and saves 74 percent of the energy and 40 percent of the water that would otherwise have been used.
- The old "standard" environmental reasons to recycle can be supplemented by "new" arguments that have specific relevance to the quality of North Carolina's environment. For example:
  - Climate change the term "global warming" makes us think of the health of the whole planet, but the prospect of a rising sea level and stronger hurricanes should make climate change an important issue for all North Carolinians. Through its energy and resource savings effects, waste reduction is a demonstrated method of slowing the accumulation of greenhouse gases.
  - Air quality North Carolina's major urban areas now regularly appear on the lists of the 20 metropolitan sites with the worst air quality in the country. As large areas of the state more frequently exceed air quality standards, there are growing concerns over health and economic impacts. In addition, visibility in the North

Carolina mountains has worsened steadily, with possible impacts on tourism and other activities. Among the many strategies to improve air quality, recycling has a strong role to play. By capturing the tremendous energy savings from the use of recovered materials, recycling helps lower emissions of smog-forming gases. Removing organic materials like paper from the waste stream also reduces the generation of landfill methane, some of which is used beneficially in North Carolina, but much of which is vented and/or burned, contributing to local and global air quality concerns. Also, using more discarded paper to make new paper allows the trees left standing to do their job cleaning the air.

Trees – Speaking of which, recycling paper has long been touted as a saver of trees. Even if you're not a tree hugger, you can see that the fewer we use for making paper leaves more for other, highervalue products, such as lumber. North Carolina has a direct stake in how many trees are used. According to a study conducted by Southern Center for Sustainable Forests www.env.duke.edu/scsf/), an increasing amount of trees are lost to urbanization and more pressure is placed on the remaining forest resources. Capturing more paper from the waste stream helps meet the rising overall need for wood fiber, and leaves trees for other uses in our state.

North Carolina's communities have more reasons than ever to increase the effectiveness of their recycling efforts. The three R's have a corollary in the three "E's" – efficiency, the economy and the environment. With recycling programs already in place, communities are well-poised to capture these benefits by increasing public participation.

## PGGYGING GGONDIGS Why is participation SO important?

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

## fixed costs and variable costs

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
- e 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., 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 and 80 percent on solid waste collection and disposal. The cost per ton for each program should be equal.



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.







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.



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 - \$5,022 (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) = \$254,440

#### New Budget:

Collection: \$999,378 Disposal: \$330,576 Recycling: \$254,440 Total cost: \$1,584,394 (\$13,106 decrease in overall cost)

Cost per ton solid waste: \$1,329,954 / 10,330.5 tons = \$128.74 per ton Cost per ton recycling: \$254,440 / 1,969.5 tons = 129.19 per ton

#### **Budgetary Balance:**

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

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### participation vs. 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.

# **A participation**



Town of Harrison

Households ► 6,000 Participating Households ► 3,300 Participation rate ► 55 % Collection method ► curbside or drop-off Price paid for recycling ► \$25 per ton Solid waste tip fee ► \$30 per ton Average 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: 3,630 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.

## **Carolinas' Loop** the success of PET recycling in our own backyard

How many times have you heard people say that they don't recycle because they think the recyclables are simply thrown into a landfill with the trash? Have you ever wanted a quick way to prove their theory wrong? Well, here is your answer...the Carolinas' Recycling Loop, a great resource that shows exactly what happens to the recycling from many households in North Carolina.

Employ media to help you keep your message fresh and address currently held perceptions about recycling. Using information like this recycling loop can help re-motivate your public by giving them new reasons to recycle. Use it in presentations, make it into a poster, have it printed in the newspaper or include it in your newsletter.

## chapter 2 resources

#### **DPPEA Full Cost Accounting**

www.p2pays.org/localgov/assistance/accounting.asp

**DPPEA Funding Sources** www.p2pays.org/localgov/assistance/financial.asp

#### Waste Reduction Partners

www.landofsky.org/wrp/

Markets Directory www.p2pays.org/DMRM/start.aspx a plastic bottle's experience through life, death and reincarnation all within the carolinas

he recyclables from a bin are taken to a Materials Recovery Facility, such as Recycle America in Raleigh, NC. There the products are sorted by type and then the plastic bottles are ground into little bits of plastic, called flake.

lake is sent to United Resource Recovery Corp. in Spartanburg, SC. It is washed by a patented process, called UnPET, in which the top layer of flake is removed. The clean flake is then used in place of pellets made from virgin materials. It takes only a fraction of the energy to produce plastic when using UnPET vs. virgin pellets.

outheastern Container Inc, in Enka, NC, receives flake which is then molded back into bottles. Some of these bottles are sent to Coca-Cola Bottling Co. Consolidated in Charlotte, NC. The filled Coca-Cola bottles are then distributed across the Carolinas, where they are put in stores to be bought and recycled again

manufactured

In 2003, nearly 10,000 tons of PET plastic bottles were recycled in North Carolina. That's only a fraction of the 57,000 tons of PET plastic bottles that are generated in North Carolina. The amount of discarded plastic bottles would fill a football field over three stories high.