PRACTICAL RECYCLING ECONOMICS

MAKING THE NUMBERS WORK FOR YOUR PROGRAM



New Jersey Department of Environmental Protection
Division of Solid and Hazardous Waste

THE STATE UNIVERSITY OF NEW JERSEY
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Practical Recycling Economics:
Making the Numbers Work for Your Program

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Some Important Context

The target audience

Coordinators of municipal and county recycling programs. The examples and discussion are heavily weighted towards collection and marketing issues because those are the areas where local coordinators have the greatest control. Processing receives far less attention because in New Jersey it's done primarily by a few counties or private processors.

The intent of the manual

This is written as a reference and instructional manual to provide specific information, tools and strategies to make recycling more cost-effective for individual recycling programs. It does not critique or study the economic and environmental returns of recycling. Instead, it suggests concrete, practical ways to make existing programs more cost-effective.

The tone of the manual

Let's be honest: this topic could be killer boring. The manual attempts to avoid that with an informal tone that is always and only meant to make the information more enjoyable. All the examples are intended to be honest, representative numbers that reflect costs and revenues in New Jersey.

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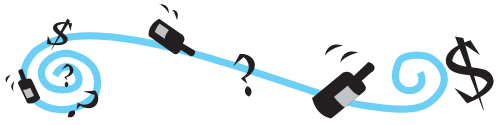
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Introduction



Changing times

For reasons perhaps only psychiatrists can understand, passions run deep about garbage. Professionals may call it solid waste, but customers still call it garbage. And, as many public works managers will attest, messing with people's garbage routines can invite trouble.

Passions run equally high about recycling. Since passage of mandatory recycling in New Jersey, an entire generation has grown up with recycling as a way of life – as a moral and legal responsibility of all citizens. It has enjoyed high popularity as the right and smart thing to do.

An increasing number of voices, however, have questioned both the practice of recycling and the premise upon which it was created. The criticisms initially came from free-market advocates, including the Reason Foundation and the Cato Institute. They argued that recycling had needlessly increased the cost of solid waste management in return for little environmental benefit. When the *New York Times Magazine* came to the same conclusion in its cover article "Recycling is Garbage," this critique of recycling had migrated from the free-market libertarians to the mainstream media.

Recycling highs and lows



Amidst this nationwide questioning of recycling, the economic and regulatory foundation of our statewide solid waste management system was crumbling. From 1994 to 1997, a series of court decisions challenged core sections of New



Jersey's system of flow control. This regulatory system had dictated the destination and disposal price of all solid waste generated within New Jersey's borders.

Flow control is a powerful financial tool. For solid waste managers, it guarantees a reliable supply of waste at a price that can't be undercut by competition. With a guaranteed stream of waste and money, counties could confidently invest in their chosen tools of solid waste management, including incinerators, landfills, transfer stations, recycling processing centers and recycling education and collection programs.

Flow control helped make the financial case for recycling. Flow control, and the environmental program investments initiated during the flow control era, resulted in some of the highest garbage disposal rates in the country. Those solid waste system rates, which averaged $92 per ton statewide and topped $125 per ton in some counties, provided powerful economic incentives to recycle. The system essentially gave recycling a hefty head start in any cost competition with solid waste disposal. And when prices paid for recyclable commodities hit astronomic highs in 1994-95, the net costs of recycling never looked better.

The 1994-95 price peaks, however, were just that – peaks. And prices were already heading south when the *New York Times Magazine* article hit the newsstands in June 1996. After the U.S. Supreme Court chose not to hear a final appeal from New Jersey regarding regulatory flow control, garbage disposal prices began to plummet. Within months, rates in some counties had fallen almost 50%. Even though the reduced rates in some cases did not fully capture all operating and debt costs of the disposal facilities, the financial effect on recycling was immediate.

At once, two main economic benefits of recycling – sale of materials and avoided cost of garbage disposal – had plunged drastically.

The more things change…

So where does this leave the economics of recycling in New Jersey? Ironically – exactly where it has remained all along. Mandatory recycling remains the law throughout the state. New Jersey's solid waste policy does not require recycling to be more cost-effective than garbage disposal. In fact, state policy is built on and sustained by the premise that recycling provides environmental and economic benefits, from job creation to resource conservation, that may not be reflected in a simple accounting of today's costs and revenues.

> Mandatory recycling remains the law, and New Jersey still has some of the most promising cost-benefit numbers in the country.

Promoting recycling in New Jersey is an environmental policy; it is not a license to run inefficient recycling programs. Given the state mandate, the goal of all recycling coordinators has always been to design programs that minimize costs and maximize returns. The methods of analysis and decision-making have never changed – only the numbers we plug into the equations have. And New Jersey still has some of the most promising recycling cost-benefit numbers in the country. We may have to look harder for savings, but the opportunities are there.

How to Enjoy This Manual

Start Anywhere...

Read It Any Way You Want

The content is structured to flow from big-picture issues to small ones, but feel free to go against the flow. You should be able to read any chapter and any section of any chapter without reading other parts. Sometimes the manual will refer you to other sections for more detail, but go there only if you want.

Chapter 1

What You Can Skip Without Financial Penalty

You can skip all of Chapter 1 and still run the world's most cost-effective recycling program. Chapter 1 discusses the laws of supply and demand and their peculiar relationship to recycling in New Jersey. It can help you better analyze how economic news and government policies may affect your program, but many of these forces are beyond your control.

Chapter 2



How costs act

If You Just Want to Know How Much Recycling Costs

The "Weird World of Costs" in Chapter 2 introduces some bizarre cost behaviors, and "Cost Benchmarks" helps measure a program's success. To calculate cost of service, read "Full Cost Accounting" and use that section's worksheet.

Chapters 2 & 3



How to cut costs

For the Ruthless, or the Tentative, Cost Cutter

To get right down to business, read the "Cost Benchmarks" section in Chapter 2 and gather the "Route Audit" data at the end of the chapter. Chapter 3 on cost-benefit analysis will help you decide whether a given project is cost-effective. To make that call for an overall program, compare total solid waste management costs with and without recycling. Chapter 2 and Chapter 3 are most helpful with that.

Chapters 4 & 5



Buying and selling tips

If You Work with Contractors or Like to Sell Your Stuff

Chapter 5 is nothing but contracts. Elect not to read it at your cost peril. It contains the manual's highest proportion of legal words, but hey, that's life with contracts! It includes specific language to save you money and headaches. The markets chapter and the contracts chapter have some specific language and strategies you may want to consider.

1 Understanding Recycling Economics

Fundamentals of supply and demand

Predicting the unpredictable

Economics: What's the use?

It's hard to stand on a shaky price floor

Shifting the demand curve out

Increasing demand for recycled products

Economics in action: Mandatory recycling

Pushing supply and pulling demand

Fundamentals of supply and demand

Recycling markets are controlled by the same laws of supply and demand that control markets for everything from breakfast cereals to beauty products. That's good news and bad news. The good news is that you can expect markets to behave rationally in the long run. The bad news is that "in the long run, we all are dead," as the famous economist John Maynard Keynes noted. In the meantime, we all live and work in the short run where markets seem anything but rational. Fluctuations in supply and demand can cause prices to soar one day and plummet the next. And no one – no broker, no market analyst, no trade publication – can accurately predict where prices are going or when they will get there. No matter how confident "experts" may sound, they cannot accurately predict price movements in a free market.

Predicting the unpredictable

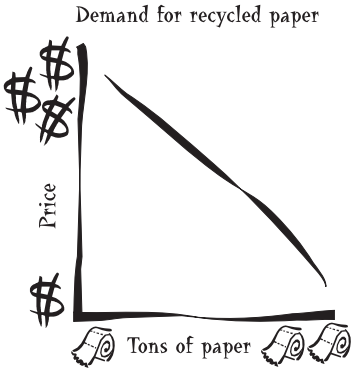
In free markets, prices are determined by a combination of the individual decisions of thousands, hundreds of thousands or millions of buyers. In competitive markets, these buyers don't coordinate their decisions with each other. They make decisions based on their own needs and budgets. To predict

prices, you need to know how each buyer will behave before he or she buys. And even that won't do it – you also need to know how each seller will behave at the same time. Anyone who can reliably predict market prices would never have to work. Life would be a perpetual and lucrative vacation while he or she buys low and sells high from a yacht in the Cayman Islands.

That leaves the working world to live with the unpredictable laws of supply and demand. Even if recycling coordinators cannot predict movements in markets, they still can understand them. And they are really simple to understand. The laws of supply and demand boil down to some simple lines that confirm what most buyers and sellers know instinctively.

1. Buyers like to buy more when prices are low and buy less when prices are high.

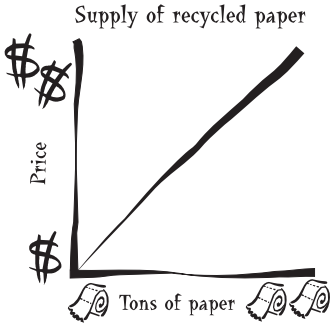
When the independent decisions of all buyers are added together, they might look like the graph *Demand for recycled paper*. **For any price on the graph, there is a corresponding quantity that represents the total demand of buyers at that price.**



this is a demand curve for recycled paper

2. Sellers like to sell more when prices are high and sell less when prices are low.

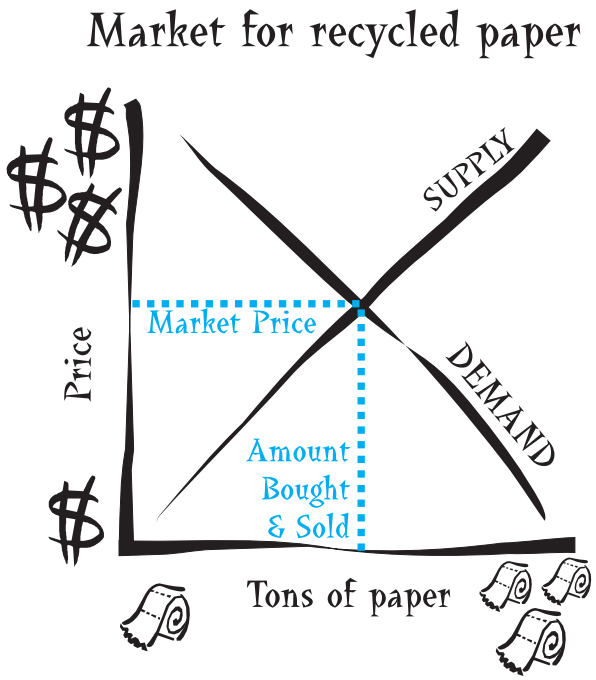
When the independent decisions of all sellers are added together, they might look like the graph *Supply of recycled paper*. **For any price on the graph, there is a corresponding quantity that represents the total supply offered by all sellers at that price.**



this is a supply curve for recycled paper

3. The price of any good and the total quantity sold will be set where the supply and demand are equal.

This statement corresponds to the graph *Market for recycled paper*. Notice that the lines intersect at only one point. At that price, the total amount supplied by sellers equals the total amount demanded by buyers. At a higher price, total supply exceeds total demand, creating a surplus. To move their products, suppliers will tend to drop prices until demand equals supply. At a lower price, total demand exceeds total supply, creating a shortage. **With more orders than they can fill, suppliers will tend to raise prices until demand equals supply.**



That's the heart of supply and demand. Understanding this basic relationship can help coordinators understand how and why recycling policies and economic trends can affect their programs.

Economics: What's the use?

Economists have a bad habit of oversimplifying the real world with convenient assumptions. For supply and demand to work in its purest form, economists "assume" several conditions are met in "perfect competition." Some of their assumptions may not apply neatly to recycling markets.

1. The market consists of many sellers and many buyers, and none is big enough by itself to affect prices in the market.

In many recyclable markets this assumption often is not true. For example, when one large paper mill closes, it often does affect prices throughout regional markets. Markets may exist in other cities or regions, but the added cost of transporting materials to those markets may effectively close them to local suppliers.

2. Each seller provides a product that is indistinguishable from all others like it.

For recycling markets, this condition is often met to a large degree. That is, an identical amount of clean, baled corrugated cardboard from one source is usually not preferred over the same quantity of clean, baled corrugated cardboard from another source. Markets can, and often do, penalize sellers who cannot meet contamination standards or who cannot supply minimum quantities. In both cases, however, those sellers are providing a less valuable commodity, so it is not indistinguishable from all others.

3. Buyers and sellers can easily enter or exit the marketplace.

Mandatory recycling establishes a legal requirement to remain as a seller in the market, almost regardless of price. This is discussed in *Economics in action: Mandatory recycling* later in this chapter.

If mastering the laws of supply and demand won't help you predict prices, and if perfect competition depends on assumptions that often ignore the reality of recycling markets, exactly what are these pillars of economics good for? Plenty. They can help guide statewide and nationwide recycling policies, and they are powerful tools to analyze everything from market upheavals to government regulations. Understanding those forces can help you make more educated guesses about future directions of markets, even if you can't predict exact price movements. Price floors and mandatory recycling laws provide useful examples.

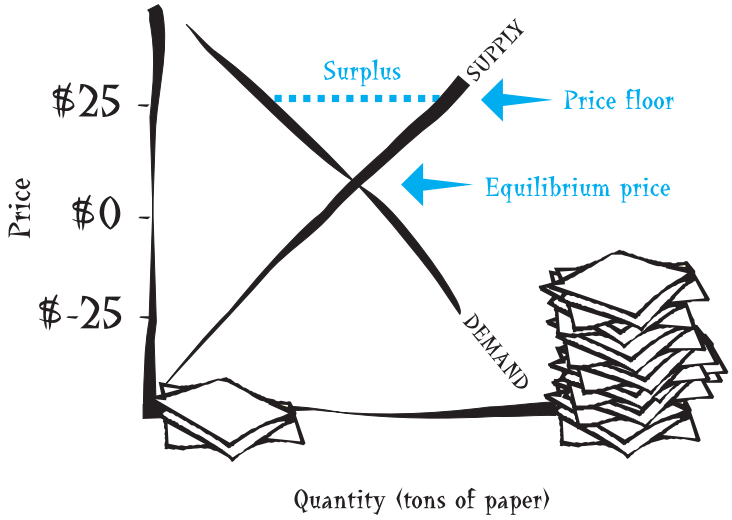


It's hard to stand on a shaky price floor

Low prices for recycled materials have been a long-term problem for recycling coordinators. If prices were higher, the incentive to recycle would be higher, and tonnage would rise. Good idea – so why can't governments simply set a minimum price, also called a "price floor," for recyclables?

For example, with garbage disposal costs near $50 per ton, the economics of recycling office paper in New Jersey looks more promising if organizations can receive at least $25 per ton for the paper they generate. What happens if the federal government declares a $25 minimum price when the paper market has been paying $5 per ton on average? The following graph illustrates an example of what supply and demand would predict.

A $25 price floor for recycled office paper



Price floors

As illustrated by the graph *A $25 price floor for recycled office paper*, at $25 per ton, suppliers want to recycle more paper than buyers are willing to purchase at that price. The result is a surplus. Normally, the price would fall to $5 per ton, where the total amount supplied by all sellers would equal the total demand by all buyers. But in this case, the price floor prevents a drop in price. This is exactly what happened with many agricultural commodities after the federal government set minimum prices above the open market equilibrium. This policy created huge surpluses of farm commodities, and the federal government had to buy, store and distribute the surplus at a cost that ultimately reached several hundred billion dollars before the price supports began to be phased out in 1996.

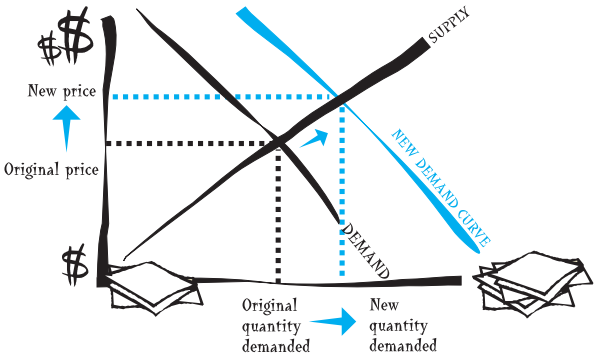
Shifting the demand curve out

If governments cannot simply decree higher prices without creating unwanted side effects, what can policy makers do to help increase prices for recyclables? The laws of supply and demand provide three basic options – increase the demand for recyclables, decrease the supply of recyclables, or both.

An increase in demand

As illustrated by the graph *An increase in the demand for recyclables,* increasing the demand does not mean lowering the price. It means that at any given price, buyers are willing and able to purchase more of a good. An increase in demand causes the original demand curve to shift to the right (because at every price on the demand curve, more goods are being demanded). The result is a recycling coordinator's dream – more tons of materials recycled and higher prices paid per ton.

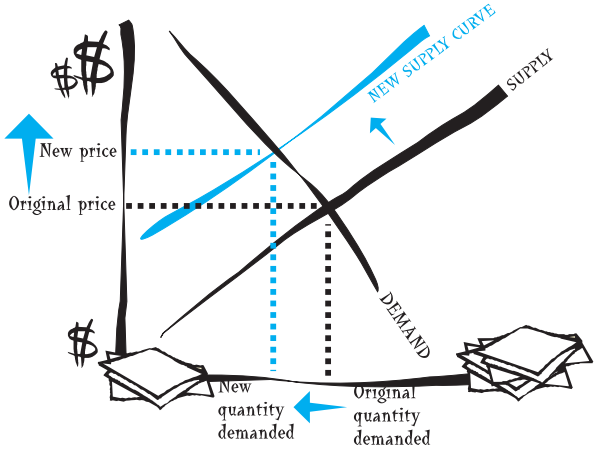
An increase in the demand for recyclables



A decrease in supply

As is demonstrated in the graph *A decrease in the supply of recyclables,* decreasing the supply means that at any given price, suppliers are willing to sell less than before. Remember, if you collect recyclables, you are a seller in these markets (even if you must pay to "sell" your materials). Ironically, this is the situation predicted by a drop in landfill and incinerator disposal prices. In this case, organizations that are collecting and selling recyclables suddenly find it less expensive to throw away recyclables as garbage because tipping fees have fallen. They may be bound by mandatory recycling, but they may not be as vigilant about collecting all available recyclables if they are only saving $50 per ton in disposal rather than $120 per ton. As each organization supplies fewer tons of recyclables, the total supply will fall at any given price paid for those recyclables. This causes the supply curve to shift to the left. That means that at any given price for recyclables, fewer tons are being supplied. The result would be fewer tons recycled, but an increase in price would be predicted.

A decrease in the supply of recyclables



Increasing demand for recycled products



The two graphs *Increase in demand for recyclables* and *Decrease in supply of recyclables* show why "demand side" policies like "Buy Recycled" campaigns are so attractive. They increase both the price and the quantity recycled. That's why they are so popular with recycling policy makers. However, increasing the demand for any product is easy to suggest, but difficult to accomplish because aggregate demand is the sum total of countless individual, uncoordinated decisions by buyers. The most creative marketing and advertising minds in the country are constantly experimenting with campaigns to increase demand for everything from cars to computers to corn chips.

Here are some ways that policy makers, recycling coordinators and all consumers can affect demand for recyclables.

Change consumer preferences

"Buy Recycled" campaigns and minimum-recycled-content legislation are all about increasing demand. These campaigns recruit or enlist buyers for all kinds of recycled products – from plumbing fixtures to parkas – so that at any given price, more recycled products will be bought in the marketplace. As a recycling coordinator, and as a consumer, you can help increase demand by choosing to buy recycled-content products. Economists tend to favor voluntary measures, such as "Buy Recycled" campaigns, over mandated purchasing regulations because voluntary campaigns expand rather than reduce consumer choice.

Change the prices of related goods

Pay-As-You-Throw (PAYT) solid waste pricing works on the premise that recycling is a substitute for garbage disposal. Demand for recycling service should increase when the cost of a substitute, garbage disposal, rises. In PAYT, consumers are charged for each can, bag or pound of garbage they generate. In traditional pricing systems, consumers pay a flat monthly fee (or the cost of this service may be hidden in their tax bill), so they pay no additional, or marginal, cost for setting out two cans a week rather than one. It costs consumers no more to put their mixed paper into the garbage can than into the recycling bin.



By charging consumers for each additional garbage can (or bag or pound), PAYT raises the cost of creating more garbage. That makes substitutes to garbage disposal – including waste prevention, composting, recycling, and unfortunately, illegal dumping – more financially attractive. Successful PAYT systems usually

combine convenient, comprehensive recycling programs with waste prevention education to encourage legal waste reduction. At the same time, they establish credible enforcement programs that include fines to raise the cost of illegal diversion. PAYT pricing complements mandatory recycling. It provides voluntary price incentives to encourage each household to maximize its participation in recycling and waste reduction programs, such as food and yard waste composting.

Promote changes in technology

Technological advances can make a big difference in recycling's bottom line. For example, plastics sorting equipment dramatically reduced the cost of processing post-consumer plastics. Cost-effective methods for turning plastic bottles collected at the curb into raw materials for manufacturers dramatically increased the demand for PETE and HDPE containers. This is a key reason the DEP has invested in research and technology development to spur demand for recycling.

Increase incomes of buyers and increase the number of buyers

When mandatory recycling was implemented in 1987, the New Jersey Department of Environmental Protection also created low-interest loans to increase both the number and capacity of processors and end-users of recycled products. These subsidized loans reduced costs (which in turn increased net income) and increased the buying power of these firms. They also lowered the cost barrier to enter the market, which helped cultivate new buyers.

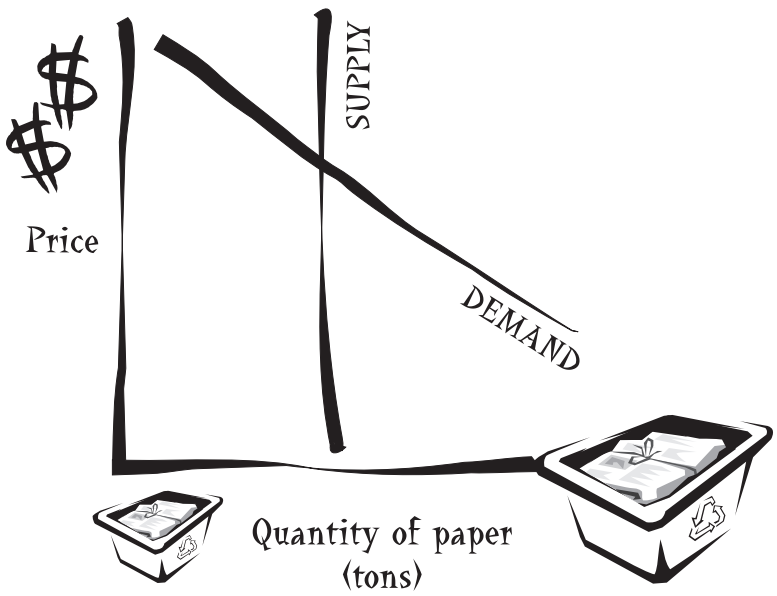
Economics in action: Mandatory recycling

How might markets react if states, counties and communities adopted mandatory recycling one after another in the Northeast as they did in the late 1980s and early 1990s? What does the supply "curve" look like with mandatory recycling?

In a simplification of an exceedingly complex issue, it looks something like the graph *Mandatory recycling—simplified*.

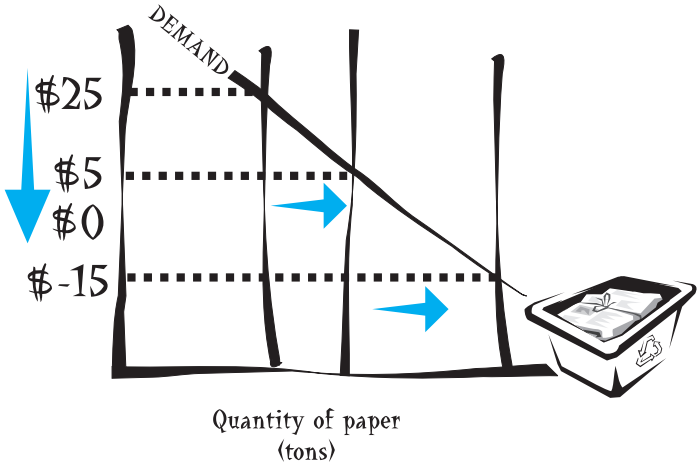
The graph tells the following story: Because recycling is mandated, suppliers (those who collect recyclables and attempt to sell them) must provide them at any price. If your town produces 100 tons of office paper per year, you provide them to the market whether you get paid $50 a ton or whether you have to pay $50 to get it off your loading dock. So, the normal rule of supply – "sellers provide more goods at high prices and provide fewer at low prices" – no longer applies. Normally, as prices fall, suppliers will reduce the amount they are willing to sell. Mandatory recycling means they have to provide that supply as long as markets exist for it.

Mandatory recycling—simplified



What happens when neighboring states, counties or municipalities also mandate recycling? The graph *Mandatory recycling—the '80s and '90s* illustrates the changes in the market.

Mandatory recycling—the '80s and '90s



As the graph demonstrates, every time another municipality, county or nearby state adopts mandatory recycling, the supply curve shifts to the right. That is, for any given price, there will be more recycled material supplied. As each mandatory program adds its supply to the market, the supply curve moves further to the right (more quantity supplied at each price). If demand does not change, then the laws of supply and demand would predict the following scenario: steady increases in recycling tonnage while prices continually decline. That is exactly what happened in many recycling markets in the late 1980s and early 1990s.

In reality, the supply curve is not a straight, vertical line as drawn in the two graphs *Mandatory recycling* and *Mandatory recycling—the '80s and '90s*. Tonnage collected during the price euphoria of 1994-95 showed how creative recycling coordinators (and thieves looking for easy money) could be in finding new sources of recyclables. And when recycling prices turn negative, many communities and organizations do the bare minimum to meet mandatory recycling requirements. So, the supply curve in the real, complex world in fact does slant upward because the quantity supplied will increase as prices increase.

Reality is more complicated in other ways. Mandatory recycling alone did not cause falling prices for recyclables in the early 1990s. A severe recession hit both the East and West Coasts, which depressed prices for virgin and recycled commodities alike. A recession causes incomes of both firms and consumers to fall, and falling incomes usually lead to decreases in demand. Shipping demands created by the Gulf War interfered with export markets. Desperate for cash, the republics of the former Soviet Union flooded the market with virgin materials, putting further pressure on prices for recycled materials.

However, all other things being equal (which is the only way economists like to think), as more jurisdictions adopt mandatory recycling, markets for recyclables should experience an increase in the amount of materials recycled and a decrease in prices paid for those materials.

Pushing supply and pulling demand

Fortunately for New Jersey recycling coordinators, our policy makers did not simply mandate recycling and call it a day. The "New Jersey Statewide Mandatory Source Separation and Recycling Act" also created incentives to increase demand for recyclables. These included low-interest loans to processors and end-users of recyclables as well as investment in research to identify new, more cost-effective technologies to process and upgrade the value of recyclables. Working with recycling advocacy groups, such as the New Jersey Buy Recycled Business Network, the state has also organized "Buy Recycled" campaigns to increase the demand for recyclables.

With these tools, the state is simultaneously pursuing both a "supply push" strategy that mandates collection of recyclables and a "demand pull" policy that increases both the number and purchasing power of consumers of recycled products.



Notes:

2 Fully Understanding Costs

The weird world of costs

- Direct and indirect costs
- Fixed and variable costs
- Marginal costs
- Controllable costs
- Operating, capital and overhead costs
- Sunk costs
- The time value of money
- Opportunity costs

Full cost accounting

- Costs versus outlays
- Full cost accounting for recycling crews
- Exactly how full is full cost accounting?

Cost benchmarks

1. Cost per household
2. Cost per ton
3. Tonnage per household
4. Recovery rates
5. Participation rates
6. Compliance rates
7. Stops per crew or stops per crew member

The real cost story: On the whole, I'd rather recycle in New Jersey

The route audit:The numbers you need to reduce costs



The weird world of costs

Why Bother?

Reduce cost of services

Answer recycling's critics

Generate more revenue

Costs seldom seem in short supply, and you may not have been looking to incur new ones. However, this chapter will introduce ways to analyze all kinds of costs, including some that are genuinely hard to identify, much less quantify. But why bother?

First, costs are notoriously devious. Understanding marginal costs, for example, can explain how a program that appears to reduce costs can actually increase them. Also, failing to understand capital and overhead costs has caused countless solid waste agencies around the country to underprice the full cost of landfill service.

Second, lots of other people are already doing the figuring, and you may not agree with their conclusions. When the Cato Institute called recycling in New Jersey an "inexcusable waste," it used many of the tools of cost analysis explained here. You need to understand the nature of costs to argue your point.

Third, you need to understand these costs if you ever consider sharing services with another department or organization or you want to recover money for work you have done. In shared service agreements, failing to understand your cost of service is a license to get soaked. Get your fair share by getting your numbers right. Ocean City does. This Cape May municipality prides itself on reimbursements it has received from insurance funds. When coastal storms hit this beachfront town, the public works department submits thoroughly and accurately documented bills for the emergency clean-up work it performs. The town would get less cash if its public works manager didn't understand costs so well.

Finally, privatization is a force to be reckoned with. Because they need not generate a profit, public agencies can compete dollar-for-dollar with private-sector service providers – if, and only if, they understand their cost of service.

Recycling coordinators may routinely encounter any of these kinds of costs, which are explained in this chapter:

- fixed
- direct
- operating
- controllable
- variable
- indirect
- overhead
- sunk
- semi-fixed
- capital
- marginal
- opportunity



With the right program design and a sharp eye on costs, many recycling programs can be reasonably competitive, if not more cost-effective, than simply carting everything to a landfill or incinerator. That remains true even after recent

declines in landfill and incinerator fees. Without these basic tools for cost-control, recycling programs can be – and should be – easy targets for anyone with a calculator and a dislike of mandatory recycling.

Cost control begins with understanding how and why costs change, and that can be best determined by asking a few basic questions about the nature of costs.

Question 1: Is the cost directly linked to the service provided?

If a cost is directly linked to the service provided, it's a **direct cost**. Direct costs can be identified with a specific activity, product or service. Direct materials, direct equipment and direct labor are three main categories of direct costs.

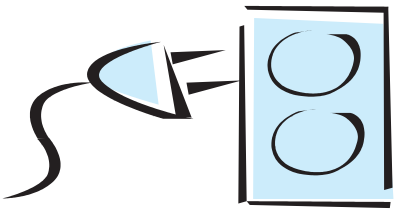
A composting site, for example, may have direct wages of employees who staff the site, direct equipment for the composting operation and direct materials, including educational brochures and utility expenses that are billed for the composting site only. Even the fringe benefits of compost site employees are considered direct costs – because those costs can be linked to employees who work directly on that project. If a salaried employee splits her time equally between recycling and public health, 50% of her total salary and benefits would be a direct cost to the recycling program. If a recycling program is managed by a supervisor who oversees a total of five programs, recycling might be assigned one-fifth, or 20%, of her salary and benefits as a direct cost. However, if recycling is one-third, or 33%, of the supervisor's budget, then 33% may be a better approximation of the direct cost of this supervision expense.

If you can't link the cost directly to a product or service, it probably qualifies as an **indirect cost** or **overhead cost.** When you're costing out a service like recycling, many indirect costs may seem neither obvious nor fair because the list of indirect expenses is long, and often expensive.

Overhead costs have one thing in common: They are either too tedious or too time-consuming to link them to any one activity. A receptionist, for example, could track each phone call received and try to assign it to a specific department, but recording and tracking that information may take more time than the data is worth. And how about the time the receptionist is not on the phone? He or she may be opening mail that applies to many or all departments. Instead of trying to bill the receptionist's time as a direct cost, most organizations throw the receptionist costs into a pool of indirect costs that is split among all departments. How to split those costs is discussed in the *Full cost accounting* section of this chapter.



A few overhead costs...





- facility costs, including rent, utilities, office equipment – not just for your department or operation, but for headquarters as well
- management and supervisory salaries, human resources, and their associated direct costs
- oversight or advisory boards, or governing bodies for your organization
- legal costs for issues that affect the entire organization
- maintenance staff and facilities, custodial, grounds maintenance, security and associated costs
- receptionists who handle inquiries for the entire organization
- the phone system, internal mail distribution and messaging systems
- financial services, including billing, collection, payroll, purchasing and accounting
- management information systems personnel, hardware, software and supporting costs
- loading dock operations
- carpeting, curtains, and supplies, ranging from bathroom tissue to computer disks

The list goes on.





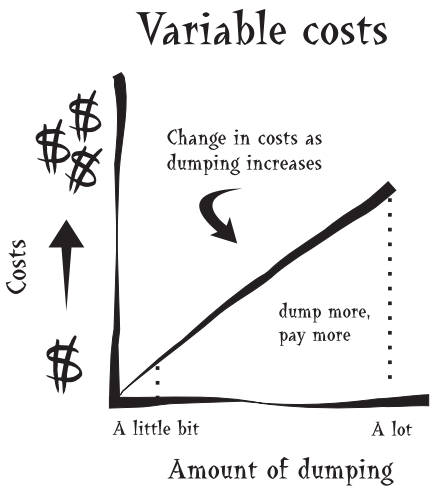
Question 2: How do my costs behave?

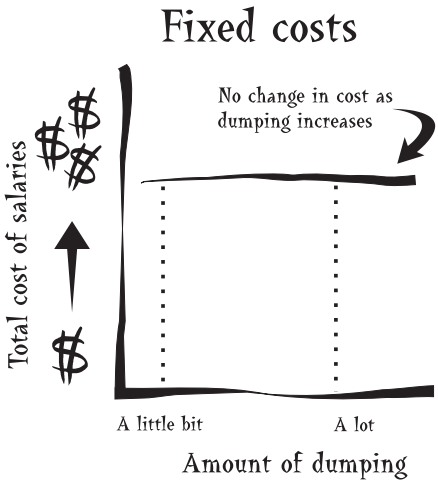
This is key because not all costs are created equal. You must understand when and how costs change – and when they don't change! – to make cost-benefit decisions.

Variable costs change as the volume or level of activity changes. Solid waste tipping fees are an example. You pay a fee for every ton dumped, so the more you dump, the more you pay. The same may be true for recyclables in down markets. If you pay a per-ton charge to "sell" recyclables, that becomes a variable cost. The more you collect, the higher your total costs.

Fixed costs remain constant regardless of the level of service or activity. Salaried employees who are not eligible for overtime are a good example. Their pay does not increase even if they work more hours in a week, nor does it increase if recycling tonnage increases. The depreciation expense of trucks and other equipment is another large fixed cost for many recycling programs; the cost of purchasing the equipment often does not change with the level of recycling.

Somewhere between fixed and variable costs lie **semi-variable costs.** These costs have both fixed and variable components. Telephone bills are often semi-variable: they have a flat monthly fee, plus per-minute charges. Some equipment rentals are similar: you pay a flat fee, plus a per-hour or per-mile charge for usage.





Fixed costs + variable costs = total costs

Costs and tonnage

Why does recycling cost more to collect per ton at the curb than garbage?

Weight is the difference. A household that recycles 1/3 of its waste is throwing out the other 2/3 as garbage, or twice as much by weight.

A household that recycles 1/4 of its waste is throwing out 3/4, or three times that amount, as garbage. It costs about the same to send a worker and truck to your house whether for recycling or garbage, so those collection costs are spread out over more pounds of garbage.

The result: recycling collection costs are usually substantially higher than garbage collection on a per pound, or per ton, basis.

Question 3: Which costs change when the program changes?

This is a big one for anyone interested in cost control. It is the question of **marginal costs**, and it's at the core of cost-benefit analysis. Which costs will change and which costs won't when you make changes to your solid waste management system? The question may seem obvious, but it is often anything but. It depends on the mix of direct, indirect, fixed and variable costs.

Consider a town that contracts with a hauler to collect five materials in its curbside program. Under this contract, the town is paying $90 per ton on average for collection – a reasonably good rate for New Jersey. Because markets for recyclables have been somewhat weak, the town must pay an average price of $5 per ton to "sell" its recyclables to a private processing facility. Its direct cost of recycling would be $95 per ton. Now, in this same town, solid waste collection costs an average of $40 per ton and disposal costs another $60, for a combined total of $100 per ton. These numbers show that recycling is more cost-effective than not recycling. Recycling wins the cost competition by $5 per ton.

Or does it?

Ask the **marginal cost** question. What would happen if recycling were discontinued? If recycling is more cost-effective than simply throwing garbage away, shouldn't total costs rise if the town stops recycling? That depends. We need to look more closely at which costs would change if recycling were disbanded.

Clearly, if the town pays the tipping fee, the solid waste disposal costs would change. Every ton that is currently recycled would now be disposed of at $60 per ton. We will simplify the case by assuming that all current recycling tonnage would be landfilled. Beyond that, the question gets complicated fast.



Marginal costs: the KEY to all cost decisionS

Marginal costs at the curb



The town's average cost of garbage collection is $40 per ton. But if recyclables suddenly get tossed into the garbage can, will garbage collection costs increase by $40 for each extra (or marginal) ton picked up? Not likely. That $40 figure includes plenty of fixed costs that won't change if garbage cans suddenly become more full of stuff that used to be in recycling bins. Yes, garbage trucks will take longer to complete their routes because more and heavier cans will be set out, and the trucks will fill up faster because each stop has more trash. But don't expect costs to increase anywhere near $40 per ton. In fact, some models predict that garbage collection costs would increase by less than 5%, or about $2 per ton, in a town with a 25% curbside recycling rate. Think about all the fixed costs that are not changing, such as:

- the cost of sending the truck to and from the route
- the time it takes driving between stops
- all overhead costs
- wages of salaried employees
- any other cost not affected by the amount of garbage collected

Think of this cost-benefit problem another way. The cost of bringing the garbage collection crew to your house has already been paid. So, in analyzing this decision, you may find only two additional, or **marginal costs,** for garbage collection:

- the extra time it takes to load more cans, bigger cans or heavier cans at each stop
- the time it takes to dump additional loads because trucks fill up faster

The final savings may depend on collection crew costs, truck size and configuration, travel time to and from the disposal facility, and additional wear on vehicles from increased tonnage. But as you can see, this is no simple equation.

Let's say that in this case, garbage collection costs would rise by $10 per ton if recycling were discontinued. We would also have to pay the $60 tipping fee for each ton we are currently recycling. That's a total additional, or marginal cost, of $70 per ton if recycling suddenly went away. But we would be saving the $95 per ton direct cost of recycling.

Recycling may indeed be cheaper per ton than solid waste ($95 vs. $100), but if recycling were discontinued, the town's total solid waste management costs would fall. Discontinuing the contract to collect recyclables would reduce costs by $95 per ton. That savings would be partially offset by a $60 per ton increase in disposal fees and a $10 per ton increase in garbage collection costs. Total solid waste management costs would be expected to fall by $25 per ton. Remember, this is all happening in a town where it costs less per ton to recycle a ton of material than to dump it. That is the paradox marginal costs can produce.



The numbers in this example are shown in "The paradox of marginal costs."

Marginal savings: Reducing frequency of garbage collection

Marginal costs and marginal savings work the other way as well. A school or office building might implement a new recycling program by directing custodial crews to empty garbage cans and recycling bins on alternate days rather than emptying garbage cans every night. In this case, the marginal labor cost of collection is zero, or very close to it.

This recycling program is simply displacing labor time spent collecting garbage with time spent collecting recyclables. Even though the company can calculate an average cost of collecting recyclables (hours spent on the task multiplied by the labor and benefits of the custodial staff), the marginal cost is zero because labor costs were reduced by an equal amount by reducing the frequency of emptying garbage cans.

A curbside recycling program plays the marginal cost game effectively, too. By reducing the frequency of garbage collection from twice per week to once per week and reassigning the crews and equipment to recycling, a recycling coordinator may be able to add curbside recycling at little or no marginal increase in total collection costs.

The obvious lessons of this cost story:

- you should identify the marginal costs and savings from your program options
- you should design a program that maximizes the savings you can capture

The paradox of marginal costs:

How recycling can be less expensive and more expensive than garbage disposal – at the same time!

Here are some average costs that a relatively low-cost New Jersey curbside recycling program might face during times of relatively weak markets for recyclables, when coordinators are paying an average of $5 per ton to "sell" their materials. The community contracts with a hauler that charges an average of $90 per ton to collect recyclables.

Average cost analysis:

Per ton recycling costs...



Collection	$90
Sales	$ 5
Total	$95

Per ton garbage costs...



Collection	$40
Disposal	$60
Total	$100

Note: This analysis assumes that recyclables are sold to a private materials recovery facility. Garbage disposal fees include any transfer station charges.

These average costs show recycling to be cheaper than garbage collection. So what might happen if recycling is discontinued? To answer that question, you need to determine how costs will change. Here is a possible scenario:

Marginal cost analysis:

Per ton savings from DISCONTINUING recycling...



Collection	$90
Sales	$ 5
Total	$95

Per ton additional costs of disposing of recyclables as garbage...



Collection	$10
Disposal	$60
Total	$70

Per-ton savings from discontinuing recycling: $25

The paradox: Is it cheaper to recycle than to throw everything away? Yes. And no! On an average cost basis, recycling is cheaper than garbage disposal. However, since trucks are already making house calls to collect garbage, the marginal, or additional, cost of picking up an extra 25% more garbage (the amount of household waste that is currently being recycled) is only $10 per ton. That means that total costs would drop in this scenario if recycling were discontinued, *even when recycling is less expensive on a per-ton basis.*

Question 4: Can I control these costs?

This is the question of **controllable costs** vs. **uncontrollable costs**. If you have authority to select the vehicles, routes, collection methods and staffing to collect curbside materials, collection can be considered a controllable cost. But, if your community has signed a multi-year agreement to contract for collection at a fixed yearly fee, that cost may be considered uncontrollable during the life of the contract.

When controlling costs, don't under-estimate the value of good management.



Most variable costs are considered controllable. Hourly labor, the largest cost component of most service operations, is usually a variable cost. You may not control the labor rate, but if labor rates rise, you can reduce staff time devoted to collection by changing collection vehicles, routes, methods, level of supervision, or some combination of all four. In fact, supervision is one of the largest factors explaining the difference between high-cost and low-cost solid waste collection programs, according to a nationwide study.[1]

Question 5: How long will these costs benefit my operation?

This is a key question that affects how you account for certain costs. This question and these costs are discussed in more detail in the *Full cost accounting* section of this chapter, but here's how the story turns out. Costs that are incurred on a regular basis during a short time period (usually less than a year) to support ongoing operations are classified as **operating costs** and are recorded in full as costs during that time period. Costs that are incurred for expensive items that are useful for long periods (usually more than one year) are classified as **capital costs.** Because their price tags substantially affect the cost of operation and because capital items are useful for more than a year, their costs are spread out over their useful life with an accounting method known as **depreciation,** which is explained with examples and more detail later in this chapter.



Question 6: Is the money already out the door?

Another way to ask this question is: When is a dollar not a dollar? *When you can't get it back!* If money has already been spent, it may be irrelevant to the financial decision you face today. Money that has been spent and can't be recovered is known as a **sunk cost**. And for the purpose of cost-benefit decision-making, sunk costs are valued at $0 because they will not change no matter which option you choose. No doubt the largest and most painful example of sunk costs are the hundreds of millions of dollars invested in siting and planning for New Jersey solid waste disposal facilities that have since been cancelled. The debate has raged over who should pay for those costs, but one economic fact is simple: Costs that cannot be recovered are irrelevant to cost-benefit decisions because no matter what option the state, county or municipality chooses to follow, the planning, engineering and legal costs already incurred, a.k.a the sunk costs, must still be paid.

Q When is a dollar not a dollar?

A When you can't get it back.

To examine sunk costs up close, let's look at some smaller numbers that don't stir the same passions as multi-million-dollar debts for cancelled incinerators. Let's say your county signs on as a sponsor of an Earth Day fundraising concert. Benefits will go to school recycling programs in the county. The fundraising committee spends $10,000 in advance to advertise the concert with flyers, newspaper ads, posters and radio spots. Its contract with the performer allows the committee to cancel with no penalty up to 90 days before the event. After that date, the committee must cough up the entire $20,000 performance fee. With the fundraiser 91 days away and ticket sales running below expectations, the committee meets to decide whether to risk it. In looking at the numbers, you realize that the $10,000 in advertising costs is irrelevant to making the go/no go decision. Why? Because no matter what you decide, that $10,000 is out the door. It is a sunk cost that will not change regardless of whether you run the concert or not. The relevant costs are the $20,000 performance fee and any **marginal** costs of deciding to present the concert, such as hiring security and staff for the event. Because the $10,000 in advertising is a sunk cost, your best move may be to run the concert even at a loss. When can choosing to lose money be the smart choice? When your only other option is to lose even more!

This fundraising example is intended to show on a small scale how large numbers may be costly, but irrelevant, to making the right cost-benefit decision. If tickets sell for $100, making the mistake of including the sunk costs in its cost-benefit calculation would cause the committee to overestimate by 100 ($10,000/100 = 100) the number of tickets needed to approve the contract with the performer.



Question 7: What's tomorrow's dollar worth today?

In finance, there is a time value of money, and that value is based on a simple rule: A dollar received tomorrow is worth less than a dollar in your pocket today.

It's easy to see why. Rather than using $1 to illustrate the point, let's raise the stakes and use $1 million instead. If you have $1 million today, you can earn some interest. At 5%, it earns $50,000 a year. That's $137 per day, every day. So, at a 5% interest rate, the **opportunity cost** of getting your $1 million tomorrow rather than today is $137. The higher the interest rate, the more you gain by grabbing your dollar today.

For any interest rate, you can calculate the value today of receiving a dollar in the future – whether that's tomorrow, next year, in three years, or in 30 years (the term of many public bonds). At 5%, $1 million received next year is worth only $952,380.95 today because at 5% interest you can put that $952,380.95 in the bank, and one year later it will be worth $1 million. At that interest rate, the value of receiving $1 million 30 years from now is worth only $231,000 today. When inflation was running around 10 to 12% in the late 1970s and early 1980s, 15% interest rates were common. At a 15% "cost of money," $1 million received in 30 years is worth only $15,000 today! So a dollar is only equal to a dollar if you can spend or invest it today. If you have to wait for your money, that dollar is worth less to you today.

Now think about the many cost-benefit decisions recycling coordinators are asked to consider. You decide to invest in something today – a truck, a baler, a tub grinder, computer software, an educational brochure or campaign – and the payoff flows in gradually over the next few years. If the up-front money comes out of your organization's budget (rather than borrowing it), you are paying out today's dollars and collecting payoffs in future dollars, which are worth less than today's dollars because of the time value of money. How much less they're worth depends on how far into the future you will receive them and how much interest you are forfeiting each year (the interest rate).

Question 8: What else could I do with this money?

This is the question of **opportunity costs**, and this answer, too, can get tricky. Opportunity costs are the things you can't do because your resources (money, staff, equipment, buildings, etc.) are committed to a given project.

Let's start with an easy one. You need to buy a $100,000 truck, and you are deciding whether to plunk the $100,000 up front or borrow the money. On paper, it might look cheaper to pay cash up front. If you borrow the money, you have to pay interest. At a 7% interest rate, it costs $7,000 a year to borrow $100,000. If you pay cash, there is no $7,000 payment. But you definitely lose something by spending the cash up front. As we saw with the time value of money, if you had the $100,000 in an account that pays interest, you would be earning money on that stash. That lost interest doesn't appear on any ledger, but it's an easy way to quantify an opportunity cost *even when there is no line item cost to your organization's budget*.

Many opportunity costs are harder to calculate. That $100,000 might have helped build a park or school. We elect representatives to make decisions about how public money should be spent, but a fundamental concept of economics is that all decisions involve trade-offs and recycling is no exception.

Opportunity costs in action: What's a warehouse worth?

The reality of opportunity costs helps explain why so few paper processors are willing to warehouse recycled paper until markets and prices for paper improve. If recycled commodity markets are volatile – and they are – why not simply wait out the down cycles and cash in when prices improve? The answer lies partly in opportunity costs. Warehouse space is valuable. In North Jersey, it can easily rent for $5 per square foot per year. For the owner of a 50,000-square-foot warehouse, that means forfeiting more than $20,000 every month waiting for prices to improve.

Then there's the risk factor in playing the markets. No one can guarantee when and where market prices will go, so renting the space may not only be more lucrative, but less risky as well.

Finally, there's the cash flow issue. Paper sitting in a warehouse does not pay the bills. Selling the paper today allows you to invest the proceeds and earn a return. Holding recycled paper, like holding any other asset, means forfeiting that return until you sell it. Inventory is expensive in many ways, and most of the expenses are related to opportunity costs.

Full cost accounting



Having identified all these different kinds of costs that behave in so many conflicting ways, how can you calculate the cost of a recycling program? Over the past decade, a rising number of voices have been answering that question with three words: full cost accounting, or FCA.

In truth, full cost accounting can really be reduced to one word – accounting. The principles and practices of FCA now being applied to solid waste management are essentially the tools accountants have used for decades to record and report costs. It's not the accounting that has changed – it's the people doing the accounting. The U.S. Environmental Protection Agency has been promoting a move to full cost accounting because many publicly-funded solid waste programs have been unintentionally underpricing their services. Their accounting systems did not reflect the full costs of providing solid waste management services. That means that recycling coordinators, solid waste planners, public works officials, custodians and even elected officials are being asked to learn the language and tools of accounting, so they can make more informed solid waste management decisions. In its succinct and useful guide, *Full Cost Accounting for Municipal Solid Waste Management: A Handbook* (cited in the reference section of this manual), the EPA defines FCA as a "systematic approach for identifying, summing and reporting the actual costs of solid waste management."[2]

FCA is based on some core principles that differ from the cash-based accounting systems that many public agencies use. A cash-based system is much like a checking account: revenues go in, costs come out, and what's left at the end of the month or year is a surplus or deficit. Pretty straightforward. It's also the way the world works. You can't pay bills without money in the account, so cash flow is the lifeblood of all organizations, and managing cash flow has to be a financial priority. It may not be the most accurate reflection of costs, however. Many big-ticket costs, such as buildings and equipment, may require a one-time payout, but are used over many years. In these cases, cash flow accounting poorly matches outlays of cash with actual costs.

FCA, on the other hand, does not focus on when money comes in or comes out. Instead, it tries to assign revenues when they are earned and costs when they are incurred – regardless of when the money actually changes hands. That simple change can translate to some substantial changes in reported costs. Rather than using cash-flow accounting, FCA relies on "accrual accounting," which assigns costs to the time period in which their benefits accumulate, or "accrue." Converting from cash-flow accounting to accrual accounting requires converting outlays (the money that comes out of your account) into costs.

Costs versus outlays

What is the difference between a cost and an outlay? It depends on the kind of cost. And for the purpose of full cost accounting, let's revisit a few costs: operating costs, capital costs and overhead costs – and introduce a new one, hidden costs.

Operating costs

Operating costs are regularly recurring costs that are consumed or used over a short period, usually less than one year, and are routinely incurred for ongoing operations. For most service operations, salaries, wages and benefits are usually the largest component of operating costs. Other operating costs include rent or lease payments, routine maintenance costs, utilities, fuel, supplies and interest payments. All these expenses have one thing in common: They are paid for (with an outlay) in the same period they are consumed. The monthly payroll outlay gives you the services of your staff for the month. The outlay for an annual lease payment provides access to that space for the year. The outlay for an interest payment each month allows you to "use" that principal for another 30 days. For full cost accounting purposes, therefore, outlays are the same as operating costs because the outlay and the cost occur in the same period.

Capital costs

That story changes with big-ticket items, such as equipment and buildings, that have an expected life span of several years, or even several decades. In these cases, you might spend $120,000 to buy a truck in one year, but you expect to "use up" that asset over seven years, or more. In this case, outlays no longer equal expenses. A cash accounting system will record that truck expense as $120,000 in the first year and $0 for each of the next six. FCA instead tries to match the cost with its actual use by employing **depreciation,** a method of allocating costs over the useful life of a long-term asset. Depreciation uses three variables – purchase price of the asset, expected useful life of the asset, and estimated salvage value at the end of its useful life – to calculate an annual depreciation cost. There are several different depreciation methods, but the most common and simple method is straight-line depreciation. The formula for straight-line depreciation is:

$$\frac{\text{Purchase price} - \text{salvage value}}{\text{Useful life}} = \text{Annual depreciation cost of asset}$$

For our truck, which has a projected useful life of seven years and an estimated salvage value of $15,000, the annual depreciation cost would be:

$$\frac{\$120{,}000 - \$15{,}000}{7 \text{ years}} = \$15{,}000 \text{ per year truck expense}$$

Capital costs include more than buildings and equipment. Up-front development and design costs, such as graphic arts and signs for recycling programs or the cost of purchasing recycling containers, can be depreciated as well. There are some notable exceptions to the depreciation rule. First, to be depreciated, an asset must have a "material" cost to the program it serves. This rule saves us from depreciating low-cost items like hammers and nails, which may have a useful life of more than one year, but are simply too small to make a "material" difference in our annual costs. Second, land is not depreciated because, unlike a truck or even a building, the value of land is not "used up," according to the principles of FCA.

Overhead costs

Overhead costs are indirect costs required to run any kind of organization, and they are quite often underestimated by the people who rely on them. They are costs that cannot be directly related to any one product or service, yet without the support of these indirect costs, most operations would break down immediately.

As demonstrated in *What's the big deal about overhead costs?*, working without overhead support is no way to do business. These services can and do

What's the big deal about overhead costs?

To understand how and why overhead costs need to be included in cost calculations, try starting your day this way.

Get rid of your phone. No one is paying for the monthly service anymore. You'll have to take all your messages – and complaints! – in person. Turn off the heat and lights in your building. In fact, leave the building and stand out in the street. If you have any mechanics, tell them to leave, too, because your organization no longer owns or rents any property. Don't worry, there won't be any maintenance department anymore. Lose the ability to write checks to anybody, including paychecks for you and your staff. And if you want cash to buy anything, raise it or collect it yourself because there won't be any billing or collection department anymore. Be sure to pick up after yourself and consider learning a martial art because the grounds, custodial and security staff are gone.

Now – do your job just as well as you do it now!

add to the cost of delivering services, and to ignore them is to seriously underestimate the full cost of service. And, as was demonstrated on page 20 with *A few overhead costs*, these can add up. In some service organizations, the indirect cost rate can run as high as 70% of the direct cost of service (which translates to about 40% of total costs), although several studies have estimated the rate near 20% for solid waste management organizations.

Slicing the overhead pie

Once all overhead costs have been identified, they must be allocated to the different departments or activities within an organization. These costs can be allocated many ways, but they all boil down to the same basic question: How big is your slice of the organizational pie? You can answer that question using many variables, but here are three common ones.

- People – how many in your department compared to the whole organization?
- Money – how big is your budget compared to the whole organization?
- Space – how many square feet do you occupy compared to the whole organization?



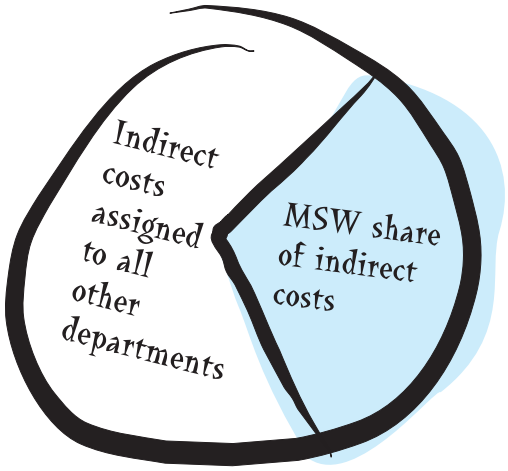
Using budget totals as the basis for allocation, the following formula can be used to calculate a recycling program's share of indirect costs:

$$\text{Percentage of indirect costs to be allocated to recycling program} = \frac{\text{Annual recycling budget}}{\text{Total budget} - \text{indirect costs}}$$

$$\text{Using personnel, the calculation would be} = \frac{\text{Number of recycling personnel}}{\text{Total personnel} - \text{staff from indirect costs units}}$$

$$\text{Using space allocation, the calculation would be} = \frac{\text{Space allocated to recycling program}}{\text{Total office space} - \text{space allocated to support units}}$$

All three methods start with the total organization costs and subtract the resources used by the support units. That leaves the direct costs, personnel or space used by all programs, and the percentage simply reflects the recycling program's share of those direct costs. That percentage is multiplied by the total indirect costs to arrive at the indirect cost dollars to be assigned to the solid waste management unit.



Calculating your share of overhead costs

This example uses numbers from a Union County municipality.

The recycling unit reported direct costs of $331,045. That was 4.94% of the town's direct program expenses of $6,696,145. The town's overhead costs were $1,538,769. (Overhead units were identified as Administrative & Executive, Building & Grounds, plus three financial units – Treasury, Tax Collection and Tax Assessor – that provide and collect the revenue for the entire organization.)

So, recycling's share of the town's indirect costs is 4.94% of $1,538,769 or $76,074.

The total recycling budget for this program was:

$76,074 = 4.94% of $1,538,769 = recycling's share of indirect costs

$331,045 = recycling department's direct expenses

$407,119 = total cost of recycling

Future costs

With recycling programs under scrutiny all over the country, it seems untimely, if not cruel, to begin asking them to include overhead costs in their cost of service. Untimely, perhaps, but accurate. Failing to include overhead costs understates the cost of any operation, not just recycling. In fact, the EPA drive towards full cost accounting was motivated in part because many communities were seriously underpricing their landfill space by focusing on the cash outlays during the operating life of the landfill. This pricing looks fine during the short-run while the landfill is accepting garbage, but ignores the substantial up-front costs of siting, designing and building the landfill, and the costly functions of capping, closure and post-closure maintenance and monitoring.

Because this manual is designed for recycling coordinators, it does not discuss the issue of allocated future costs associated with solid waste disposal facilities, such as post-closure costs. However, the EPA's *Full Cost Accounting for Solid Waste Management: A Handbook* addresses this issue.

Hidden costs

Full cost accounting includes one more cost category that many recycling managers are happy to leave uncovered: hidden costs. Hidden costs are rarely ever really hidden – they're just camping out in someone else's ledger. Grants, gifts, donations and subsidies are prime examples of hidden costs that may serve to understate the total cost of a program. For example, a recycling coordinator under pressure to demonstrate the cost-effectiveness of his or her program may be understandably reluctant to include equipment bought from grant funds or the difference between a low-interest loan and the market interest rate. The rationale for including these costs, however, is to accurately reflect the cost of service, and to avoid making future decisions based on numbers that are skewed by hidden costs.

Full cost accounting for recycling crews

Estimated cost for one-person recycling crew		Annual cost	
Operating costs			
Labor			
Direct labor @ $15/hour		$31,200	
Backup labor for 30 days (11.5% of work year)		$3,588	
Crew leader @ $20/hour — 10% of leader's time per crew		$4,160	
Mechanic @ $17/hour — 20% of mechanic's time per crew		$7,072	
Recycling coordinator @ $17/hour — 20% of time per crew		$7,072	
Labor Subtotal			*$53,092*
Fringe benefits @ 35% of labor subtotal		$18,582	
Fringe benefits subtotal			*$18,582*
Vehicle operation & maintenance			
Replacement parts		$5,000	
Fuel & fluids		$6,500	
Insurance		$5,000	
Licenses & taxes		$1,000	
O&M for backup vehicle		$1,750	
Vehicle operation & maintenance subtotal			*$19,250*
Other operating expenses			
Employee training		$1,000	
Direct supplies	$3,800		
Promotion/education @ $2.50 per household		$12,500	
Other operating expenses subtotal			*$17,300*
Operating expenses subtotal			*$108,224*

This cost breakdown can be replicated with the worksheet in Appendix E.

Full cost accounting for recycling crews, cont.

	Annual Cost
Capital costs	
Item: collection vehicle	
Purchase price — $120,000	
Useful life — 7	
Annual depreciation — collection	$17,143
Item: backup vehicle — 1 for every 10 crews	$1,714
Item: pick-up truck — 1 for every 10 crews	
Purchase price — $21,000	
Useful life — 3	
Annual depreciation — pick-up truck	$700
Item: containers — 1 per household	
Purchase price — $10	
Useful life — 10	
Annual depreciation — containers[1]	$5,000
Capital costs subtotal	*$24,557*
Direct costs subtotal	*$132,781*
Overhead costs	
Indirect & overhead costs @ 25% of direct expenses[2]	$33,195
Overhead costs subtotal	*$33,195*
Grand total	**$165,977**
Cost per day	**$638**
Cost per hour	**$80**

[1]Crew serves 5000 households (500 per day) with biweekly collection.

[2]Overhead costs are based on published estimates from the Solid Waste Association of North America and National Solid Wastes Management Association. Costs included are building, utility, furniture, management, financial and custodial.

Even honest attempts at quantifying externalities can produce

Exactly how full is full cost accounting?

It is not entirely clear just how full full cost accounting should be. Both this manual and the EPA guide for solid waste managers include the operating, capital, future, overhead and hidden costs already discussed. They do not include larger social and environmental costs.

The EPA's *Full Cost Accounting For Municipal Solid Waste Management: A Handbook* defines environmental costs as "the cost of environmental degradation that cannot be easily measured or remedied, are difficult to value, and are not subject to legal liability." Environmental costs include issues such as depletion of non-renewable resources, energy use, and upstream and downstream environmental impacts (for example, impacts incurred in the manufacturing and decommissioning of solid waste equipment, or in the potential for groundwater contamination 100 years from now).

In 1998, for example, the EPA published estimates for recycling's role in reducing greenhouse gas emissions. The study noted that recycling reduces greenhouse gas emissions by consuming less energy than manufacturing products from virgin materials, producing less methane than landfilling waste, and by permitting carbon to remain stored in trees for longer periods. Increased recycling and source reduction "can make a significant contribution to U.S. greenhouse gas emission reduction," the study found.[4]

Economists often refer to these issues as "externalities" because their costs are not included, or "internalized," in market prices. Accounting methodologies for these costs have not been standardized, and even honest attempts at quantifying them can produce widely different results. These costs may be hard to count, but New Jersey's solid waste policies do recognize that recycling provides larger economic and environmental benefits than landfilling or incineration.

Social costs produce similar quantification problems. For example, what price do you place on odors by disposal facilities? What is the dollar impact on property values, on community image or pride? How do those costs compare with increased investment and job opportunities generated by those facilities? And how do you account for costs of a solid waste management system that fall most heavily on certain groups, such as those immediately surrounding a facility (or at least within nose-shot of it), while its benefits are widely distributed around a region? Host-community taxes, in which a community is compensated for agreeing to site a solid waste facility, begin to address only a few of these questions.

Like some of the larger environmental costs, these social costs are challenging to identify and quantify. They are often included under the term True cost accounting, which seeks to place a dollar value on these externalities that are not reflected in market prices. However, unlike traditional accounting, which is governed by rule-making bodies, true cost accounting has no standard methodology for putting a price on these wider cost questions.

Finally, full cost accounting, as defined in this manual, does not examine the issue of economic impact or economic multipliers for recycling or other solid waste management options. Several studies have quantified the economic development benefits of recycling.[5] Burying and burning garbage generally require fewer employees than processing and upgrading recyclables, so diverting each ton to a processing facility or end-user helps create jobs, according to a study of the economic impact of recyclables in the Northeast. However, if recycling also increases the cost of solid waste management, this cost – and its multipliers – must be weighed against the benefit of increased employment.

The only sure way to capture the full extent of these larger benefits is to design a system that reduces the total cost of solid waste management. That is why this manual focuses on reducing the cost of delivering those services.



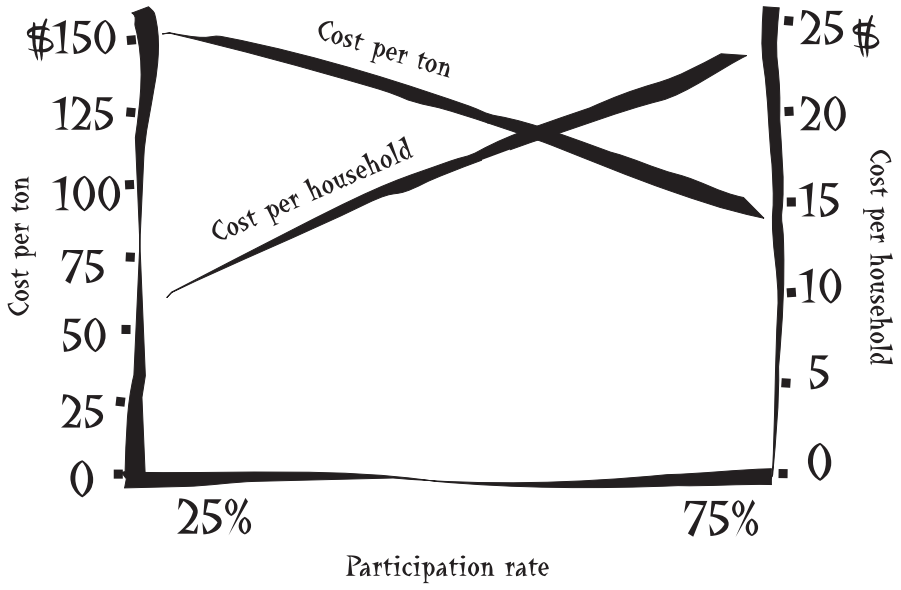
The way you measure costs can tell seemingly different stories about program performance.

Cost benchmarks

Debates over the cost-effectiveness of recycling often escalate into philosophical questions about free markets versus government intervention. In reality, the economics of recycling can boil down to some pretty mundane issues, such as how long an employee takes to load a recycling bin or how many extra stops a garbage crew can squeeze into a work day. In New Jersey, recycling can be, but is not guaranteed to be, more cost-effective than landfilling or incineration. It requires an integrated solid waste management that captures savings in garbage collection and disposal wherever they are created by increased recycling.

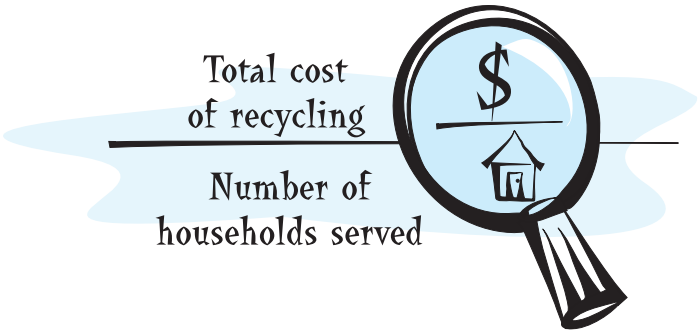
Residential recycling programs also face a frustrating cost paradox: The way you measure costs can tell seemingly different stories about program performance. For example, increasing the amount of material collected from each household is a proven strategy to reduce the per-ton cost of recycling. That makes sense: Spreading fixed costs over more tons reduces your cost per ton. However, adding new materials to increase tonnage per household also tends to increase the per-household cost of recycling. As more households set out more material, collection crews may require more loading time at each stop and additional trips to the processing facility as trucks fill up more quickly. That means more labor time is required for each household on the route – and labor is usually the largest cost category in service operations like recycling. So the same strategy that drives down a program's cost per ton may increase total costs and cost per household.

Costs and participation



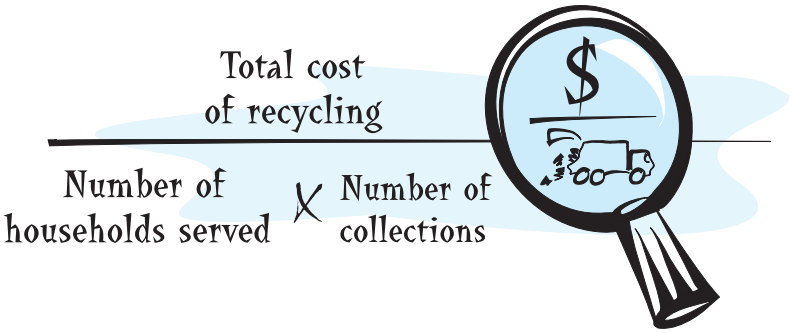
Source: NSWMA

This is just one example of the behavior of recycling and solid waste costs. That's why it's useful to gauge recycling program performance with more than one benchmark. The following seven cost benchmarks reveal important information about the efficiency of a recycling program.



1. Cost per household

Public sector recycling coordinators like this benchmark for two reasons. First, it gives taxpayers a rough measure of how much it costs to be served. Knowing the cost per ton, in contrast, has little meaning to the average consumer. Second, cost per household for recycling collection is often cheaper than cost per household for garbage collection. It should be, because recycling collection is often less frequent than garbage collection, and recycling programs almost certainly collect fewer tons. When the frequency of collection is different for recycling and garbage collection, a more accurate measure might be cost per household per collection. This number essentially is the cost of a house call made by a collection crew and truck. It is calculated as follows:



Cost per household has its drawbacks. Costs can appear to be lowest when a program is operating at horrendous levels of inefficiency. The *Costs and participation* graph, based upon a national recycling cost study, showed that cost per household increased from $11 at a 25% participation rate to more than $23 at a 75% participation rate. Taken to its ridiculous extreme, this means a recycling program would achieve its lowest cost per household if no one participated! Crews would never have to leave the truck; they would simply drive by each household. Successful programs may show steadily increasing per household costs precisely because they are attracting more households to

recycling and recovering more material from each household. For most operations, rising per-unit costs are a sign of concern. In the case of recycling, however, rising per-household costs could mean your program is more cost-effective than ever.

2. Cost per ton

The cost-per-ton benchmark is often cited in reports on recycling costs, particularly in comparison with garbage collection and disposal. Although the math is straightforward, you do have options in calculating the figure. The basic formula is:



Total cost of recycling could be reported with or without revenue from recyclables. Your best move is probably to calculate both numbers. Because recycling markets are notoriously volatile, wild price swings can hide the basic costs of collection and processing. For comparison with garbage collection and disposal, the more accurate number should include revenues (or costs paid to "market" recyclables). However, to compare year-to-year progress of your own program, cost per ton without revenues is a better yardstick for cost efficiency.

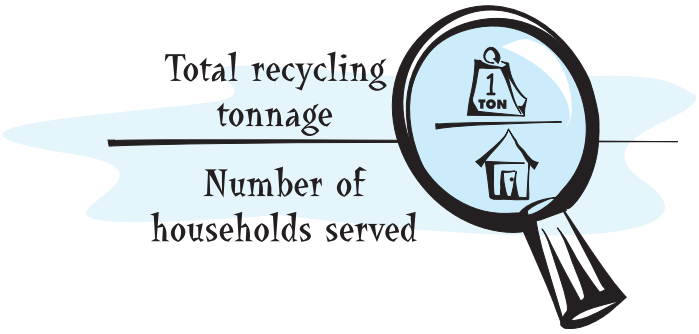
Because garbage tipping fees are usually based on tonnage, cost per ton provides a rough measure to compare the costs of yard waste or recycling with garbage collection and disposal. Slavishly following cost per ton, however, has serious drawbacks.

First, cost per ton is a weight-based measure in a volume-based solid waste world. Landfill space, truck capacity, dumpster sizes, and household garbage and recycling bins are measured in cubic yards or gallons, both measures of volume. Because cost per ton is a measure of weight, it can be difficult to compare to these volume-based standards.

Second, cost per ton is an average cost, so it tells you little about the nature of your costs. Analyzing program options requires information about marginal costs, the costs that will change as your operation changes – they are buried in average cost calculations, such as cost per ton. In fact, making decisions based on average cost per ton numbers could cause you to cut programs that are cost-effective (see *The paradox of marginal costs* in the first part of this chapter).

3. Tonnage per household

This is one of the core measures of how much you're really recovering with your recycling program. It is calculated by:



The math on this one is easy. The hard part is ensuring that the recycling tonnage in the top of the fraction (the numerator) is matched correctly with the people in the bottom of the fraction (the denominator). Including tonnage not generated by the people served by your program distorts the number, making it meaningless for any useful analysis. One example is including tonnage from a road construction project in calculating tonnage per household. How much road asphalt does the average resident generate? Including recyclables that are not generated by households served by a recycling program can produce impressive, but absurdly inaccurate, numbers.

To avoid this problem, do some simple, and not particularly scientific, sampling of your recycling and garbage trucks. You should weigh trucks or dumpsters only after they have served a homogenous customer group. For example, if your curbside collection program also collects from local restaurants and bars, their tonnage may badly skew your average for glass. Instead, periodically have your crew count the number of households (both the total on route and the number with set outs) and stop to weigh their loads before collecting from businesses.

Measuring multi-family recycling costs

The U.S. Conference of Mayors conducted an extensive survey of multi-family housing recycling, and its 1998 report found the same relationship between costs and diversion that most curbside programs experience. As diversion rates rise, a program's cost per ton falls and its cost per household increases.

The average per ton cost of collection was $251 in communities with diversion rates of less than 10%. That figure dropped to $113, or more than 55%, in communities with recycling programs that diverted more than 20% of the waste stream.

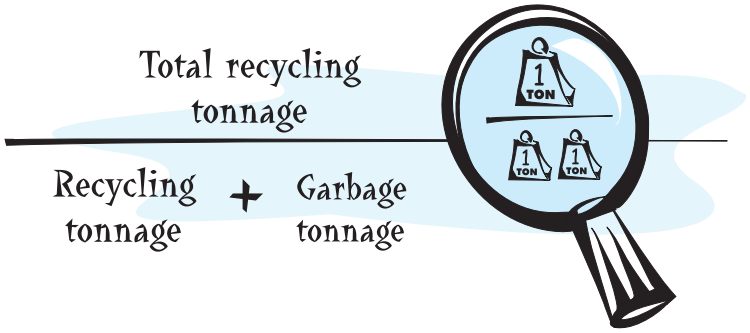
Per household recycling collection costs, meanwhile, were more than 31% higher in communities with recycling programs diverting more than 20% of waste compared to those diverting less than 10%.

Tonnage per household can help compare a program to itself. On average, are you recovering more material from each household compared to prior years? Did adding a new material to your program or introducing a new educational campaign have a marked impact on how much was recovered from each household? Did your total tonnage increase simply because your program served more people or because you recovered more material per customer served?

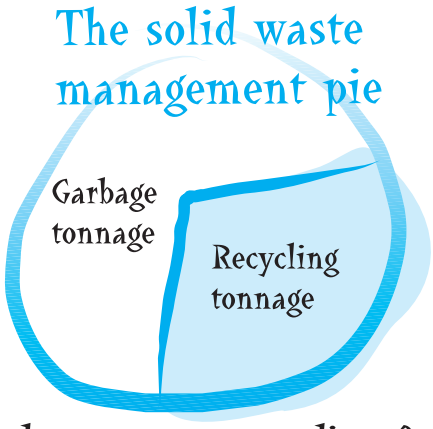
4. Recovery rates, also known as diversion rates

This calculation is probably the most accurate measure of your recycling rate. It answers the question: how big a slice is my recycling program cutting out of the whole solid waste management pie? It is calculated as follows:

The critical question here is: exactly which pie is being sliced? The easiest way to report high recycling rates is to include heavy materials, such as construction and demolition waste, or scrapped autos or exceptional items, such as soil recovered from a site remediation project. Some of the heavy materials may never have been headed to a landfill in the first place.



From a cost perspective, the more important number, however, measures how much waste your recycling program is actually diverting from a disposal facility. For most curbside programs, diverting 35% of a household's weight without including yard waste, or 45% including yard waste, is a truly impressive feat simply because of the composition of waste produced by the average household.



How much does your program divert?

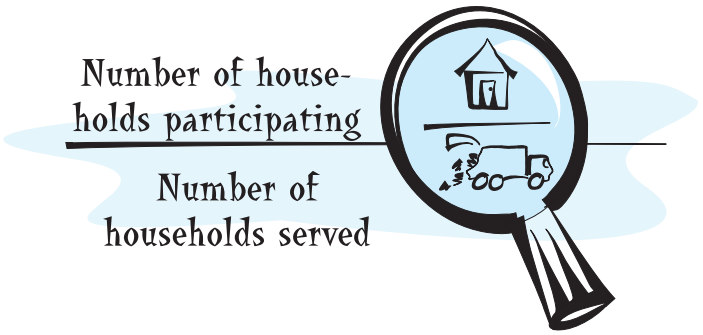
In contrast, an office building recycling program might routinely reach rates above 70% simply because paper and cardboard account for two-thirds to three-fourths of the waste produced by the average office worker. New Jersey has set a goal of recycling 50% of the municipal solid waste stream and 65% of the total solid waste stream by 2001.

For a residential program, the recovery rate may be the most accurate estimate of the percentage of total solid waste being recycled. For large, multi-family buildings, it may be the only reliable way to estimate a recycling rate.

5. Participation rates

This could be the most widely quoted and least accurate statistic on the market. It is almost impossible to measure reliably.

The math, of course, is easy. For a community program, divide the number of households participating in a recycling program by the number of households served. No problem there.



To calculate this rate, you'll need to count households. As crews run through their collection routes, someone must record the number of households with set-outs. That number, however, tells nothing about *how much* these people are participating. For instance, a curbside program might collect six materials that combined should equal about 35% of household solid waste by weight. Yet, a household would be counted as participating even if it only set out bottles and cans totaling less than 10% of its weekly garbage generation.

Estimating participation rates for large multi-family units, or for depot sites, is even more sketchy, unless you maintain a reliable log of users, which is difficult for unstaffed sites. Because the participation rate reveals no information about the level of participation, you need tonnage per household as well to generate meaningful information.

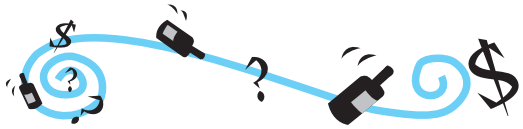
6. Compliance rates

Compliance rates are the flip side of participation rates. If participation rates ask "Who is playing by the recycling rules?," compliance rates tell who isn't. That answer is best found in the garbage can. Compliance rates estimate what percentage of customers are throwing recyclables away as trash. And like participation rates, this number requires you to define "compliance." If a spot check reveals junk mail throughout a household's garbage, is that "non-compliance" even though no other recyclables are found in that garbage can? Here's a larger question: "Why bother to compile this statistic?" Perhaps it is useful only if recycling tonnage is consistently running below projections or estimated rates. This might help you identify neighborhoods that are out of compliance, but spot checking garbage is a relatively labor-intensive process. Comparing tonnage per household rates for the under-performing areas might instead be the path of least resistance.

7. Stops per crew or stops per crew member

A "route audit" is the only reliable way to calculate this key measure of productivity. Here's why: As your recycling program collects more and more material, you are gradually creating opportunities to reduce garbage collection costs. As households divert more tonnage from the garbage can to the recycling bin, garbage collection crews should be spending less time at the curb (as they pick up fewer and lighter garbage cans) and less time driving to and from disposal facilities (because trucks are filling up more slowly). The flip side, of course, is that recycling crews may be taking more time at the curb and more trips to the processing facility because residents are setting out more material.

As solid waste disposal fees have dropped drastically (in some counties by more than 50%), recycling programs need to capture savings in garbage collection costs to make recycling cost-effective. Capturing those savings means serving more households per crew and per crew member on each garbage route. If you have not audited your routes by having an observer on each route as it is collected, how and where can you find those savings? The steps and information needed to perform a route audit are described in *The route audit* section at the end of this chapter.



The real cost story: On the whole, I'd rather recycle in New Jersey

So each of these seven numbers tells you something about your costs, but what's the bottom line? Is your recycling program cost-effective? Does recycling truly pay in today's markets with today's dollars? The answer is a definitive…maybe. Or put more optimistically, it can be. But it's crucial to ask the right question to arrive at the correct answer. And the right question is: Does recycling raise or lower the total cost of solid waste management? It's a simple question, but it's easy to forget. You are comparing the cost of solid waste management with and without recycling. If you can design and operate a recycling program that honestly reduces the total cost of solid waste management, you win. At that point, recycling is cost-effective in today's dollars and today's markets, and you can argue that recycling is not only the better environmental and social option, it's cheaper than landfilling or incinerating everything we discard.

And it is still plenty possible in New Jersey. Reduced landfill and incinerator prices definitely make it harder to work the numbers in recycling's favor. Disposal fees in New Jersey have fallen from highs in the range of $120 to $130 per ton to $50 to $60 per ton. But New Jersey still has some of the nation's most favorable economics for recycling, including the following factors.

The most densely populated state in the nation



That means high land costs, which drive up disposal costs. Our garbage disposal costs are still among the highest in the country, even after the declines of the late 1990s. Our population density also means lots of buyers and sellers right in our backyards, so we have a large supply of recyclables and some of the best access to recycling markets in the country.

Well-developed recycling infrastructure

Since implementing mandatory recycling, the NJDEP has cultivated the growth of recycling processors and end-users with a mix of grants, loans and directed research. As a result, recycling is a powerful industry in the state, ranking 13th in total employment when all recycling-related jobs are counted. That translates to more buyers vying for the recyclables collected by New Jersey coordinators.

A business and residential population that supports recycling

New Jersey's recycling rates are already among the highest in the nation. That's great news for the cost-effectiveness of recycling. Maximizing the amount of recyclable material collected per person is a proven strategy for reducing the per-ton cost of recycling, and it creates opportunities for reducing both garbage collection and disposal costs.

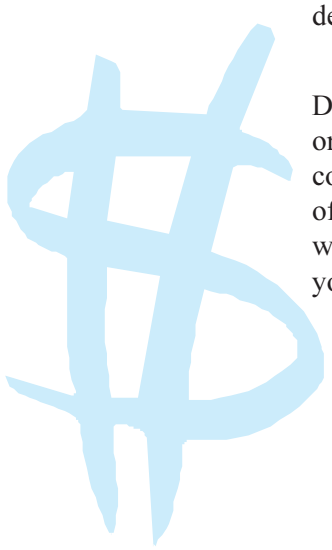
High labor costs

That sounds like a disadvantage, but high labor costs provide a greater opportunity for savings gained by reducing garbage collection costs. Those savings might come from reducing the frequency of garbage collection, or by redesigning garbage collection routes because recycling has reduced the amount of garbage set out each week. For example, a program that replaces twice-a-week garbage collection with once-a-week garbage collection and biweekly recycling collection reduces the number of monthly collection visits from eight to six. Where labor costs are high, that reduction saves more money.

The route audit: The numbers you need to reduce costs

What separates a high-cost collection program from a low-cost one? Lots of things – some you can control and many you can't. Some communities simply cost more to serve. In a rural area, where drive time between stops may be measured in minutes rather than seconds, drivers spend a lot of time just to reach the house. In a compact suburb that's long on small multi-family housing units, your crews may be able to scoop up recyclables from 10 families without moving the truck. Wage rates, too, are a major cost factor over which you may have no control. So given the hand you're dealt – local wage rates, community demographics, the materials you're required to collect – how do you measure whether your collection routes and crews are operating efficiently?

A route audit is the answer. It reveals where and how your crew's time is being spent – and where they might be able to spend less of it. Start by asking your crew; they are the experts on their routes. Where do they see the greatest delays and inefficiencies? What do they recommend to overcome them?



Next, send an observer to ride with collection crews on each route. Depending on your program, those observations should be made at two, three or four different times of the year. Obviously, New Jersey winters can affect collection times, but so can the purchasing, driving, school and vacation patterns of your residents. Just ask any recycling coordinator from a shore community, where summer populations can dwarf the number of year-round residents. Use your judgment as to how often your program needs an audit.

Data to collect in a route audit lists information to collect for each route.

Data to collect in a route audit

Truck and route information

Model and year of truck: _____

Truck ID or license number: _____

Capacity: _____

Number of compartments: _____

Material collected and capacity per compartment:

1 _____

2 _____

3 _____

4 _____

5 _____

6 _____

Contents of vehicle at start of shift: _____

Crew size: _____

Frequency of collection: _____

Total length of route: _____

Odometer at first stop: _____

Odometer at last stop of first load, if one load: _____

Odometer at MRF: _____

Odometer at return to route (for second load): _____

Odometer at last stop of second load: _____

Odometer at return to route: _____

Odometer at return to garage: _____

Observed route statistics

Total number of stops on route: _____

Single family: _____

Multi-family: _____

Commercial/non-profit: _____

Total number of stops with set outs: _____

Single family: _____

Multi-family: _____

Commercial/non-profit: _____

Total number of items collected: _____

Single family: _____

Multi-family: _____

Commercial/non-profit: _____



Number of stops served first load:

Single family:

Multi-family:

Commercial/non-profit:

Number of stops served second load, if more than one:

Single family:

Multi-family:

Commercial/non-profit:

Tonnage for first load:

Tonnage for second load:

Key time statistics (in minutes)

Length of work day:

From start of work day to leaving for route:

Drive time to first stop on route:

Drive time to marketing facility:

First load:

Second load:

Total unloading, weighing and turnaround time at market facility:

First load:

Second load:

Lunch and break time:

Compaction or compartment adjustment:

Refueling:

Breakdowns or unscheduled delays:

Other (clean up of spillage or breakage, customer interaction, etc.):

At garage at end of work day:

Time available for collection:

Calculations

Average collection seconds per stop:

Single family:

Multi-family:

Commercial/non-profit:

Average number of items per set out:

Single family:

Multi-family:

Commercial/non-profit:

How to analyze and use route audit information

Armed with the results of your audit, how do you identify cost savings? The audit tells a minute-by-minute story of how your crew spends its day. Turning spare minutes into saved dollars is the goal.

Maximize a crew's collection time

This requires minimizing time spent on all other uses of a crew's time. Start with the beginning of the work day. How quickly is the crew out of the yard and on the route? How much time is spent on travel to the MRF? At the MRF? How many times does the truck fill up and which compartments are filling up first? Can extra truck capacity reduce a second or third load, and how much time will that save? How much time is spent traveling between stops? Can it be reduced with new routes that better match local traffic and street patterns? How much time is spent at your facility at the end of the work day?

Alone, each of these items may not account for much time, but taken together, these lost minutes quickly can add up to unproductive hours in a work week. But they are hard to find without the specific, accurate information a route audit provides. The payoff can be huge: one county recycling program identified more than $240,000 in annual labor savings by getting crews out more quickly to their routes.

Maximize the number of households collected per crew member

In high-wage areas, low-cost programs tend to maximize labor productivity by minimizing the amount of time each crew member spends collecting from each customer. At the curb, the economics of recycling is all about seconds per stop. For example, one New Jersey county estimated it could save more than $30,000 per year simply by reducing average collection time by 1.6 seconds per stop.

Improving crew productivity has been the primary driver for improvements in vehicle design and capacity. Productivity is not all about trucks, however. Management can be a more important factor. In fact, a comparison of high and low-cost solid waste collection programs around the country found that organizational structure and management "accounted for the majority of the differences between highest and lowest cost service providers."[7] The same study found that low-cost programs invested the time and money required to keep collection crews well-trained.

Increase participation and amount of material collected per stop

You have already invested equipment, staff and organizational support to collect recyclables. One way to increase the return on that investment is to collect more recycled materials. That happens as your fixed costs are spread out over more tons of recyclables. As noted in the *Cost benchmarks* section of this chapter, increasing the amount of recyclables collected should reduce the cost per ton of recycling, but it also has the nagging tendency to increase the cost per household. Remember too – and this is key – that as you collect more recyclables from each household, you should be collecting less garbage. And if you're collecting less garbage, you should be looking for ways to reduce garbage collection costs (by serving more customers with the same crew, for example.)

As you can see, the strategies for reducing recycling collection costs are hardly earth shattering. They are:

- minimize unproductive time
- collect materials as quickly as possible
- if you're going to the trouble to make house calls, increase the amount you collect at each stop

Notes:

3 Putting the numbers together:

Tools of cost-benefit analysis

Recycling's head start to a better bottom line

- Prices may not measure all the right costs
- Three ways to make the numbers work

Doing the math

- Break-even levels
- Payback periods
- Comparing the total cost of solid waste management with and without recycling

Designing a system for financial success

Strategies for recovering avoided costs

Recycling's head start to a better bottom line

Is recycling cost-effective? That core question has been asked and answered by both the pro-recycling and anti-recycling camps. Not surprisingly, they find widely different answers. The Cato Institute, for example, singled out New Jersey's statewide recycling efforts in 1994 as "an inexcusable waste of resources." The Environmental Defense Fund, on the other hand, offers a 14-point analysis documenting recycling's financial benefits.[1] This manual, and this chapter in particular, are not the latest entries into the crowded field of recycling critiques. They will not prove or disprove recycling's cost-effectiveness. Instead, this chapter will discuss useful tools and methods of cost-benefit analysis that can be applied to your program.

Recycling's cost-effectiveness depends on how recyclables, yard waste and garbage are collected and processed, and at what prices they are sold or disposed. It also depends on who is paying which bills in the solid waste management system. In fact, the cost-effectiveness of recycling depends on so many variables that it almost by definition needs to be analyzed individually for each program.

Prices may not measure all the right costs

In New Jersey, the law does not require recycling to be less expensive than garbage collection and disposal. Operating a recycling program that reduces the total cost of solid waste management is a goal to shoot for, but the New Jersey recycling law stands on the premise that recycling provides wider, longer-term environmental and economic benefits (externalities, as economists call them) than burning or burying garbage. And those added benefits may not be accurately reflected in today's costs and revenues.

At the core of this financial question, recycling usually starts with a hefty head start over garbage disposal. The head start is the tipping fee at the disposal site, plus any revenue received from selling the recyclables. You will always have to pay for disposal, and because New Jersey is the most densely populated state in the nation with high land and labor costs, New Jersey's fees will probably always be the highest in the nation. Even with a decline in garbage disposal fees and relatively weak prices for recyclables, that head start in New Jersey remains in the $50 per ton range, and more in some areas of the state.

Three ways to make the numbers work

The key to making the financial numbers work for recycling is three-fold.

1. Increase recycling's head start by finding additional savings created by the recycling program. The basic $50 per ton head start is based on disposal costs alone. Recycling programs should also reduce garbage collection costs, simply because there's less garbage to collect. Be prepared to answer this question: if the current recycling program were disbanded, how much would garbage *collection* costs increase? *Without that answer, it is hard to show that recycling can be cost-effective on disposal savings alone*.
2. Constantly look for ways to drive down recycling collection costs, so that the difference between garbage collection costs and recycling collection costs is in the $50 to $60 per ton range. That's challenging, but possible, especially if you are able to keep recycling collection costs under $100 per ton.
3. Make sure you are getting a fair price for recyclables. You may not be able to affect market prices, but you can definitely be a smart seller who achieves that delicate balance between assuring reliable markets in the long run and receiving competitive prices in the short run.

Doing the math

Why can't we just generalize about the cost-effectiveness of recycling? As a start, simply compare commercial sector recycling with a residential curbside program. Commercial programs often generate relatively large amounts of homogenous waste in a single spot (a factory, warehouse or office building, for instance), so they enjoy relatively low collection costs. On the other hand, most residential curbside programs face high collection costs because small amounts of diverse materials are collected from thousands of locations. Generalizing about the cost-effectiveness of these two programs is a challenge at best and meaningless at worst.

The managers of both programs, however, can use the same tools to find the specific answers for each situation. Those tools include break-even levels, payback periods and total cost comparisons. Managers can use these tools to analyze their overall programs, or specific program changes they are considering.

Break-even levels

This is defined as the point, or level of operation, where the total cost of a recycling project (or an entire recycling program) equals the money saved in total garbage collection, transfer and disposal costs. Mathematically, the break-even point for a project normally looks like this:

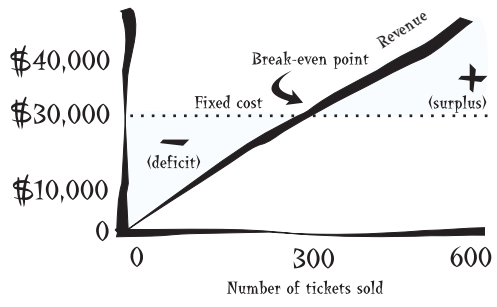
$$\text{Break even} = \frac{\text{Fixed costs}}{\text{Revenue per item} - \text{Variable cost per item}}$$

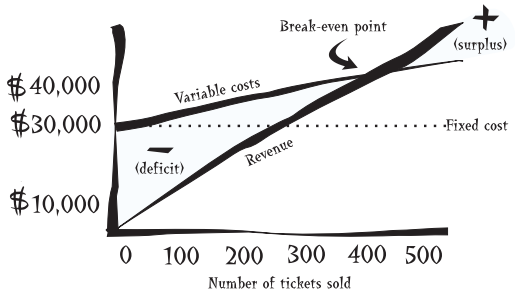
For example, in the fundraising example outlined on page 27 in *The weird world of costs* section of Chapter 2, a recycling committee embarked on a concert with fixed costs of $30,000. They were selling tickets at $100 each. If they had no other costs per person, the break-even level would be:

$$\text{Break even} = \frac{\$30{,}000}{\$100 \text{ per person} - \$0 \text{ cost per person}} = \frac{\$30{,}000}{\$100} = \text{sell } 300 \text{ to break even}$$

If, however, the $100 ticket includes a meal priced at $25 per person (the variable cost), the break-even level for the fundraiser rises to 400.

$$\text{Break even} = \frac{\$30{,}000}{\$100 \text{ per person} - \$25 \text{ cost per person}} = \frac{\$30{,}000}{\$75} = \text{sell } 400 \text{ to break even}$$





Avoided costs as "revenue"

Recycling programs put a unique spin on this classic management calculation. With recycling, the main "revenue" often is the per-ton tipping fee saved at garbage disposal facilities by diverting recyclables out of the garbage can. This break-even calculation works well for programs that contract out collection services at a fixed price. For example, consider a program with a fixed recycling collection contract of $120,000 per year. This program pays a $60-per-ton tipping fee and sells its materials to a private materials recovery facility (MRF) at an average of $5 per ton.

The combination of the $60 tipping fee and $5 in sales revenue is the per ton "head start" for recycling. If you are "saving" $65 for each ton of recyclables, at some number of tons $65 will equal the $120,000 you invested to collect them. That is the break-even point.

Here is how the break-even level translates for a recycling program with a fixed collection contract.

$$\text{Break even level of recycling} = \frac{\text{Fixed costs}}{\text{Revenue per item} - \text{Cost per item}}$$

Which becomes:

$$\text{BREAK EVEN} = \frac{\text{Cost of recycling}}{\text{Avoided cost per ton} \pm \text{Revenue per ton}} = \frac{\$120{,}000}{\$60 + \$5} = \frac{\$120{,}000}{\$65} = 1{,}846 \text{ tons}$$

In this case, the recycling program will reduce the total cost of solid waste management if more than 1,846 tons are collected, and it will increase the total cost of solid waste management if less than 1,846 tons are collected.

Of course, this number has some serious flaws.

- This scenario assumes that none of the recycling tonnage will be disposed of as residue. If the average market price of $5 includes that residue, the assumption is accurate. If the MRF penalizes the program for each ton of residue, the number to work with is the net recycling tonnage after processing. This example also assumes the MRF is privately run. If it is publicly owned and subsidized, the per-ton subsidy needs to be included to calculate a true break-even number.
- This scenario also assumes a fixed collection contract, so collection costs do not increase as recycling levels increase. Many communities operate programs with these kinds of contracts, but that collection price may be fixed in the short run only – until the contract comes up for renewal, for instance. In the long run, costs should be expected to rise as recycling tonnage increases, making the break-even level higher.

- The scenario ignores a third factor, and unlike the first two, this one understates an important advantage for recycling. This break-even problem assumes savings only from garbage disposal costs. Garbage collection costs remain unchanged in this scenario. This is true for many communities, especially where residents contract with haulers directly for garbage collection and disposal. In these communities, residents' garbage bills do not decline as recycling increases. However, as recycling increases, there should be some savings in garbage collection, simply because there is less garbage to collect. That's why an integrated solid waste management system should translate increased recycling into reduced garbage collection costs. If it does not, it's harder to make recycling reach break-even.

Payback periods

Break-even levels tell **how many** units (tons, tickets, households or whatever is being measured) are needed to recover an investment. A payback period tells you **how soon** you will recover it. It is particularly valuable for projects that require an up-front investment of fixed costs and a "stream" of revenue or benefits that will flow over several years.

Backyard composting often produces just that scenario. A program may require investment in promotion and education to attract converts and instruct them in composting. The payback comes over several years as residents divert food and yard waste from the garbage can to the compost pile.

Savings come in two ways: reduced garbage disposal costs and reduced garbage collection costs. The first is easy and obvious: disposal fees are reduced for every ton diverted to the compost pile. For each household each week, the disposal savings from composting food waste may look almost laughably small. An average household might produce three to five pounds per week of compostable food. Using the conservative figure of three pounds and a $60 per ton disposal fee, that translates to less than 10 cents per week in avoided disposal costs. Over the year, however, it totals almost $5 in savings per household. The savings don't end there, of course. Next year, another $5 is saved and then another. As long as that household composts, $5 is saved every year.

Let's say you partner with schools and civic organizations to present composting training sessions. Your partners advertise the class and provide the facilities. You provide the materials and instruction, and estimate it costs about $90 to present a two-hour composting training workshop for 24 people. Based on past workshop results, you can expect to convert about 30% of the class into active, reliable food waste composters. In a workshop with 24 participants,

that's seven new composters. What's the payback period on the composting education project? If each composting household saves $5 per year, that's $35 in the first year ($5 x 7) from one workshop.

$$\frac{\text{Up front investments}}{\text{Savings per year}} = \text{Payback period}$$

$$\frac{\$90}{35} = 2.5 \text{ years}$$

Including the cost of money

The composting education project example is simplified in two important ways. First, by partnering with a civic group or school to promote and host the workshops, the up-front cost is dramatically reduced. Piggybacking onto another organization's promotional efforts eliminates an important cost from the workshop budget. That's not unrealistic; it's simply one design for a low-cost educational program.

Second, this payback period example ignores the time value of money, which is discussed in the *Weird world of costs* section of Chapter 2. To be accurate, a payback period calculation should recognize that any dollar saved next year, or in any future year, is less valuable than a dollar spent today. Money spent today or money received in the future cannot earn interest for you now. When interest rates are relatively low and payback periods are short (say 6% interest over a three-year period), ignoring the time value of money may be inaccurate, but often not catastrophic. At 6% interest, the value **today** of receiving $5 per year for three years is $14.16. When interest rates hit 20% during the high inflation days of 1979-80, the "cost of money" was one of the most critical variables in any cost-benefit analysis.

The composting example has a payback period of less than three years. That's attractive by most financial yardsticks. Also note that this example ignores any cost savings from reduced garbage collection costs, expected to be small, but real. (They may be less than 1% if we're talking about only food waste and a 30% participation rate.) The numbers look even better when both yard waste and food waste are considered.

Comparing the total cost of solid waste management with and without recycling

This is the acid test. Comparing the total cost of solid waste management with and without recycling side-by-side provides a good estimate of the net cost or savings of a recycling program – measured in today's dollars only. It's critical to note again that this cost-benefit calculation is based solely on current costs and current markets. It does not include the wide range of potential social and environmental costs of landfilling or incineration, or the job-creating benefits of recycling compared to garbage disposal. In New Jersey, public policy explicitly prefers recycling for these reasons, even if it increases the total cost of solid waste management in today's markets. Even given that preference, however, we can still aim to design a recycling program that does reduce the total cost of solid waste management. This total cost comparison is a good place to start.

This calculation is relatively straightforward. Compile all the costs incurred and revenues generated by garbage and recycling programs. For a worksheet of costs to be included in the analysis, *Appendix E* can serve as a useful guide. Then compare those costs with the ones that would be incurred if recycling were discontinued and all solid waste were disposed of as garbage.

The cost of more garbage in the can

The numbers get tricky mainly in the collection costs. The core question becomes: how much will garbage collection costs increase if all households suddenly throw out 20% to 35% more garbage every week because they are no

Costs without a change in collection frequency

	SWM costs without recycling	SWM costs with recycling
Garbage collection	$357,000	$321,300
Garbage transfer & disposal @ $60/ton	$683,640	$566,400
Recycling collection	$185,250	
Sales of recyclables	$0	$0
Total cost of SWM	$1,040,640	$1,072,950
Net cost of recycling program		**$32,310**

Note: This SWM scenario with recycling assumes that 9,440 tons of waste are disposed of as garbage at $60 per ton and 1,950 tons are recycled at a private MRF, which accepts the recyclables at no fee. Under this scenario, the net cost of recycling would drop to zero if this program received an average of $16.56 per ton for its recyclables.

longer recycling? No doubt, costs will rise. Collection crews will be lifting more and heavier cans at each stop. Trucks will be making more round trips to the transfer station or disposal facility.

But how much will costs rise? This is a classic marginal cost question, and it's an important reason to understand the nature of marginal costs, which are discussed in *The weird world of costs* in Chapter 2. The answer depends on your collection system and its cost structure, and on the demographics of your community.

But here's a pretty safe prediction: a 25% increase in the amount of garbage set out will not cause a 25% increase in collection costs. Why not? Fixed costs. Fixed costs don't change with volume of collection. (This issue is discussed further in *The paradox of marginal costs* in Chapter 2.) For example, a supervisor's salary does not increase if a community's garbage cans suddenly contain more waste. Costs for administrative offices, maintenance facilities, billing and collection system, payroll department, computer support, telephones – these don't change easily with volume.

One analysis done by the consulting firm Ecodata Inc. using New Jersey labor costs, projects that a 25% increase in the weight of garbage set out per household will cause a 14% increase in garbage collection costs. In some scenarios, the increase might be almost imperceptible. Pick-up time at the curb may not change at all, particularly if an automated collection system is in place, where a mechanical arm can lift a 60-pound garbage can just as quickly as it lifts a 45-pound one. In this case, with no extra time expended at the curb, the

Costs with a change in collection frequency

	SWM costs without recycling	SWM costs with recycling	
Garbage collection	$357,000	$249,900	
Garbage transfer & disposal @ $60/ton	$683,640	$566,400	
Recycling collection	$185,250		
Sales of recyclables	$0	$0	
Total cost of SWM	$1,040,640	$1,001,550	
Net savings with recycling program			**$39,090**

Note: This SWM scenario with recycling assumes that 9,440 tons of waste are disposed of as garbage and 1,950 tons are recycled. A private MRF accepts the recyclables at no fee. In this case, reducing the frequency of garbage collection from twice per week to once per week reduced garbage collection costs by 30%. Under this scenario, recycling remains cost-effective even if the program must pay $20 per ton on average to "sell" its recyclables to the MRF.

only cost increase may come from filling up the garbage truck more quickly. These seemingly small issues can ultimately determine the net cost or savings of recycling.

The best way to compare solid waste management costs with and without recycling is to actually do it side-by-side, as shown in *Costs without a change in collection frequency* and *Costs with a change in collection frequency.*

When garbage disposal fees approach $100 per ton, many recycling programs can actually reduce the total cost of solid waste management, even if they receive no revenue for their recyclables. In these cases, the $100-per-ton disposal savings exceed the additional, or marginal, costs of recycling collection. With garbage disposal fees closer to $50, disposal savings alone are not usually big enough to cover the cost of recycling collection, which can easily exceed $100 per ton in New Jersey.

Garbage collection is the natural place to look for additional savings, and reducing the frequency of garbage collection is one strategy to capture those savings. Reducing the frequency of collection, even without reducing the amount set out, can save about 30% in collection costs for some programs.[2] And recycling's success creates the rationale for reducing the frequency of garbage collection. Garbage justifiably can be collected less frequently because strong recycling and waste reduction can reduce the weight of household garbage by as much as 25% to 35%. Unless recycling prices head far into the negative, a cost-efficient recycling program (collection costs near or under $100 per ton), combined with a reduction in garbage collection from twice per week to once per week, should reduce total solid waste management costs.

Financial sense may not mean political popularity

The system outlined above makes good financial sense. This recycling program has reduced both garbage collection and disposal costs, so it succeeds in reducing the total cost of solid waste management. It would still reduce costs if the community were forced to pay $20 per ton to "sell" its recyclables.



Don't confuse good financial sense with political popularity, however. This system may never make it from a spreadsheet to Main Street because residents, or their elected officials, may not accept reduced garbage service in the name of economic efficiency. That's fine. In fact, it's good. That's what democracies do; they let people choose. Recycling coordinators and solid waste managers have the responsibility of identifying the least cost options that meet New Jersey's environmental objectives. If residents, or their elected representatives, choose a higher-cost path because they want a higher level of service, that's their right. However, they can make better decisions with better information. They may never know a lesser-cost option exists unless you find it first. Designing a system that incorporates recycling and reduces overall costs is the kind of win-win scenario that may carry the day.

Designing a system for financial success

In the examples *Costs without a change in collection frequency* and *Costs with a change in collection frequency*, communities reduced their garbage disposal costs every time a ton of material was recycled. In New Jersey, that is no guarantee. In fact, New Jersey doesn't really have one solid waste management system. Solid waste collection methods often change once a municipal border is crossed, complicating an already confusing financial story.

Take the fairly common case of a community where the municipality or county operates the recycling program and residents contract directly with haulers for solid waste collection and disposal. Then try doing the simple side-by-side comparison of total solid waste management costs in these communities. Suppose that, for a decade, residents in these communities have watched their taxes pay for a publicly-funded recycling program, but most have seen no decrease in the fees they pay to their garbage haulers. In these communities, there is no direct mechanism for recovering garbage collection or disposal costs. To residents, recycling may simply appear as an additional cost to the system that generates no identifiable financial benefit. To the consumer, the side-by-side comparison of solid waste management costs may look something like *Residents contract directly with haulers*.

Residents contract directly with haulers

	SWM costs without recycling	SWM costs with recycling
Garbage collection and disposal cost per household @ $25/month	$300 per year	$300 per year
Per household recycling costs less sale of recyclables (paid through tax bill)	$0	$25 per year
Total cost of SWM	$300 per year	$325 per year
Net cost of recycling program per year		**$25 per household**

In a world of perfect competition, recycling should reduce residents' garbage bills in the long run. If a publicly-funded recycling program indeed does reduce a hauler's collection and disposal costs, and that hauler does not pass the savings on to the consumer, a competitor can easily underbid that firm. That's how competition is supposed to drive prices down.

However, there is no time limit on when the "long run" will actually kick in with savings for consumers. The next section of this chapter outlines strategies to consider.

Strategies for recovering avoided costs

The only sure way to recover avoided costs is to first know where to find them. That means fully understanding marginal costs and how they change for different program options. For example, will reduced garbage set-outs allow you to run fewer garbage collection routes? If so, will equipment sit idle after the changes, and what is the cost of allowing it to sit idle? Could dumpster sizes and collection routes be reduced more easily if you contract for garbage and recycling collection?

Identifying garbage collection savings is crucial to making recycling cost-effective, but those savings are frequently difficult to identify. It requires knowing which costs are fixed and variable, and which are controllable over the time period you are analyzing. That's why every important cost decision should be examined through the lens of marginal costs.

Here are some suggestions for recovering avoided costs.

1. Use collection-only contracts

Rather than contracting for garbage collection and disposal, contract for the collection portion only. If you are paying the tipping fee, you capture the savings each time you divert a ton away from disposal. If the hauler pays the tipping fee, how are you capturing the savings from your recycling investment?

Collection-only contracts also reduce bonding costs for your contract. Performance bonds (discussed in Chapter 5) are insurance policies. Contractors buy them to ensure services will be provided even if the contractor is unable to perform required duties. The cost of these insurance policies is tied to the total cost of the contract, so excluding disposal fees reduces the cost of the performance bond.

2. Evaluate contractor rebates

The garbage hauler pays a specified amount for each ton of material a community recycles, so the more a program recycles, the more it receives. The rebate reflects the fact that garbage haulers' collection costs should be reduced whenever a recycling program diverts material from the garbage can to the recycling bin. This is especially applicable in communities where tax dollars pay for recycling education and collection (a county program, for example) and a private hauler has a multi-year contract with a municipality to collect garbage. In these cases,

the success of the publicly funded recycling program (when a new material is added to the program, or through an extensive home-composting educational campaign, for example) helps reduce garbage collection costs. The rebate seeks to recover some of those savings.

Be careful with rebates, however. In reality, you should expect this provision to increase the base price of contractors' bids. Why? Contractors will add these rebates to the core cost of service, so the total price of their bids should rise. The net cost or savings of the rebates, then, truly will depend on the success of the recycling program.

3. Consider Pay-As-You-Throw pricing

The EPA reports that as many as 4,000 communities around the country use some form of Pay-As-You-Throw (PAYT). Residents pay a direct charge for each bag or can of garbage they set out. This system rewards the individual rather than the community as a whole for waste prevention and recycling. PAYT pricing has proven popular in many areas because it gives customers the power to reduce their garbage bill. It sends a direct dollar signal to the consumer: generating more garbage costs more money. Because the same dollar signal that encourages source reduction and recycling also can encourage illegal dumping, successful PAYT programs usually include a credible enforcement program.

PAYT may not work in all communities; it is especially difficult to implement in large multi-family units, for example. However, it has been an economic and environmental success story in rural, suburban and urban settings. New Jersey has more than 40 municipalities with some form of PAYT pricing. The USEPA maintains a toll-free hotline (1-888-EPA-PAYT) and website (www.epa.gov/payt) that provide a wealth of valuable technical assistance for anyone considering PAYT.[3]

4. Encourage competition, cooperation and negotiation

Unusually high profits should attract competition, which should increase the number of service providers and drive prices downward. But how competitive is the market, and can you encourage more competition? Contractors facing little or no competition may not work as hard to find savings for you.



If you are contracting for garbage or recycling collection, follow the recommendations in Chapter 5 to ensure your bid specifications are clear, complete and supported with the information contractors need to submit accurate bids, and give them at least a month to prepare. Overly complicated bid specifications will discourage new bidders, as will excessive insurance requirements and punitive damage provisions. Also, consider coordinating collection bids with neighboring towns to create a larger, contiguous service area that may be big enough to attract new, hungry bidders.

5. Work with your current vendors to identify cost savings

A vendor's front-line collection workers may know more about route inefficiencies than any consultant might find. Remember, lower prices need not mean lower profits for vendors if you provide an incentive for vendors to reduce costs.

6. Go for easy weight first

New Jersey has mandated recycling for more than a decade, and some of the state's mature programs are facing a new challenge. As manufacturers reduce the weight of packaging (called "light weighting") and plastic containers continue to replace glass and aluminum, some programs are starting to see recycling tonnages decline. With many fixed recycling costs in place, this translates to higher per-ton recycling collection and processing costs.

To reach the state's ambitious recycling goals and reduce average costs, the best counter strategy to light weighting may be to re-examine the waste each household produces. Where are the biggest opportunities today to reduce garbage tonnage and increase recycling? For most mature programs with high participation among the basic recycling commodities, that answer may be in yard waste, food waste and mixed paper. Although percentages will vary for different communities, paper, cardboard, yard waste and food can exceed 50% of the average household's weight. With the demographic shift toward home-based offices, mixed paper may grow as a percentage of the waste stream, adding material that will counter the trend toward light weighting.

Notes:

4 Marketing recyclables

It's all about marketing

- Requirements under the law

Forces that drive markets

- The rise and fall of paper prices
- The glass is greener on the other side of the border: A case of oversupply
- The Iron Curtain falls – and takes aluminum prices with it

Long-term vs. short-term markets

Market players

- Going direct: Selling to end users
- Brokers and intermediate markets

Cooperative marketing

Market indicators

- Translating book numbers to street prices
- Market standards

Talking to markets: A checklist

It's all about marketing

Regardless of how recyclables are collected, if you don't have a market for your materials, your recycling program is literally going nowhere. Recycling simply cannot and does not happen without markets. In fact, without willing buyers for recyclables, you're essentially still collecting garbage.

A willing buyer, however, may not translate to a positive sale price. Markets for recycled materials are notoriously volatile, and prices often turn negative. Paying to "sell" your materials does not mean recycling is no longer cost-effective. After all, the average New Jersey generator still pays more than $50 per ton to "sell" its garbage to a transfer station, landfill or incinerator. In both strong and weak markets, however, it always pays to be a smart seller. Therefore, the purpose of this chapter is to help recycling coordinators find the best price and the best terms for sale of their recycled materials.

Requirements under the law

Amendments in 1993 to the "New Jersey Statewide Mandatory Source Separation and Recycling Act" included important changes that directly affect the economics of recycling.

1. Recycling targets were increased from 25% to 50% of municipal solid waste, and to 60% of the total solid waste stream.

2. The amendment dropped a provision that required municipalities to recycle a designated material only if the cost of recycling it did not exceed the cost of disposing of it as garbage. That rule had helped protect recycling programs against drastic declines in market prices for recyclables. With that change, New Jersey's recycling policy acknowledges that sometimes recycling may indeed be more expensive than garbage disposal. The state adopted this policy change to acknowledge that the full economic and environmental benefits of recycling – and the corresponding full costs of landfilling or incineration – may not be factored into current market prices.

Marketing by the book

What exactly is a market? In New Jersey, the legal definition of a market, for recycling purposes, is "the disposition of designated recyclable materials." And disposition is legally defined as "the transportation, placement, re-use, sale, donation, transfer or temporary storage for a period not exceeding six months of designated recyclable materials for all possible uses except for disposal as solid waste." Both definitions are included in N.J.S.A. 13:1E-99.12, which governs mandatory recycling in New Jersey.

Forces that drive markets

Coordinators deal with recyclables at the same level a miner digs for ore; both the coordinator and the miner are generating raw materials for an end user. This end user might be a paper mill, a glass manufacturer, an aluminum maker or any other manufacturer who needs the materials you are collecting.

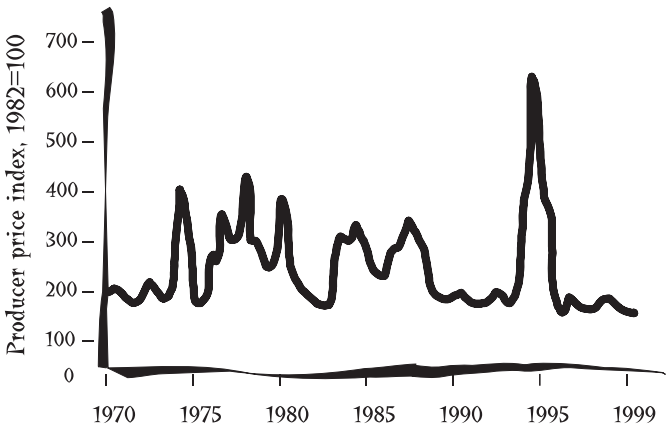
As noted in Chapter 1, recycling markets are driven by the law of supply and demand, and the paper, glass and metals markets provide useful illustrations of those laws at work.

The rise and fall of paper prices

In hindsight, most observers consider the peak paper prices of 1994-95 to be an anomaly. Yet, price cycles themselves are no aberration. Paper prices tend to fluctuate seasonally, and they tend to follow swings in the condition of the economy. Over the past 30 years, paper prices have bottomed out around recessions in 1974-76, 1981-82 and 1991-92.

In 1994 and 1995, several factors combined to cause unusually drastic price swings in market prices for paper. Weather was a big one. Winter hit the Northeast especially hard in the winter of 1994, causing two disruptions. First, during heavy snowfalls fewer residents put their materials at the curb on a regular basis. This reduced the supply of raw materials available to the "miners" of recyclables. Second, the weather made it more difficult to transport materials to the markets that needed them.

Price index for old newspaper



Source: Bureau of Labor Statistics

At the same time that the weather was restricting supply regionally, demand was growing globally as foreign economies enjoyed strong economic growth. And demand in South Korea can affect prices paid in South Brunswick. In fact, the U.S. is the largest recycled paper supplier to the Far East, according to recycling dealer Allan Zozzaro.[1]

Growing demand from overseas markets competed with growing demand from domestic markets. Demand in the U.S. was driven in part by new paper mill capacity that could handle a greater mix of paper. As the domestic economy expanded, demand also increased from mills that produced higher grades of paper.

As demand grew and supply decreased, buyers began to compete more fiercely to secure enough raw materials to meet current and future orders. This led to a "panic" among some buyers, according to Jerry Lobosco of Lobosco Recycling.[2] Buyers soon began accepting lower-quality paper while paying even higher prices. At the same time, buyers for overseas markets began to bid aggressively to secure paper for their current boom markets and projected increases in demand.

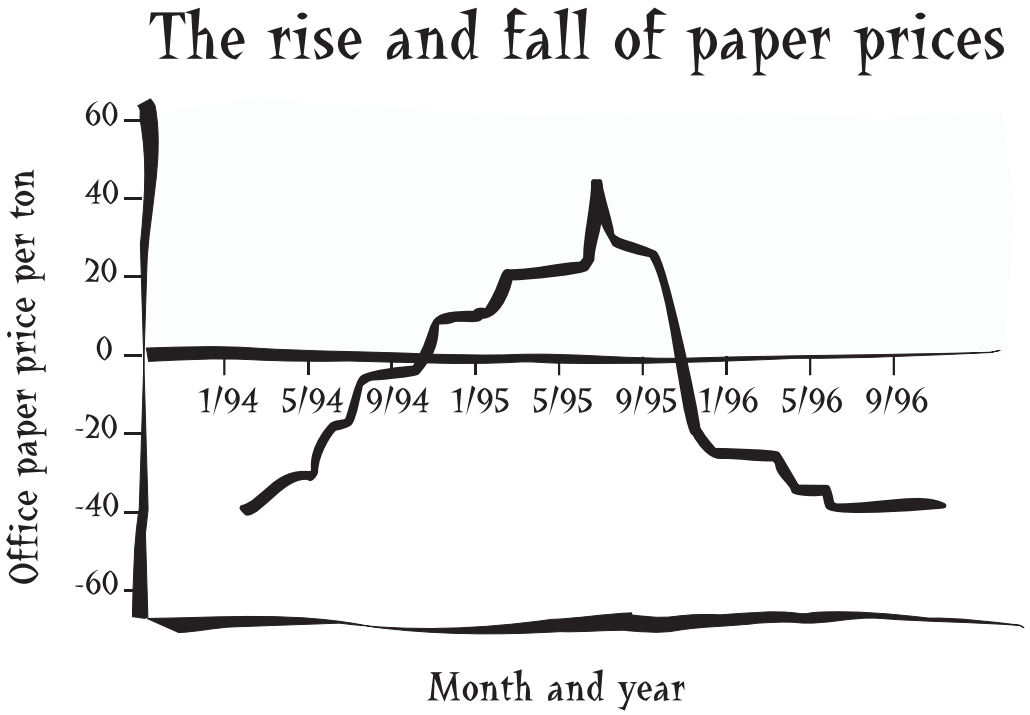
All these factors pushed prices higher. Rapidly increasing paper prices attracted many new players into the market, and some chose to attract business by offering higher prices than many sellers, both public and private, were being paid at the time. These new buyers further fueled the price frenzy.

The bubble bursts

As with most markets, when prices are spiraling out of control, the bubble bursts. When the weather improved, so did the available supply of paper. At the same time, some mills found they required higher-quality recycled paper to meet the quality standards required for their products.

Prices dropped as demand began to fall and supply increased. As prices fell, sellers who had been warehousing materials started to dump those materials into the market to cash in before prices dropped further. This increased supply even more. Finally, some buyers could no longer honor commitments they had made based on high prices. As a result, the sellers with whom they had contracts were forced to find new buyers – at lower prices.

The results were predictable and disastrous. Prices paid for paper continued on a downward spiral and eventually dropped to lows not seen since the early 1990s. The market saw a long overdue correction. Vendors who were unprepared for this downturn, or were unable to adapt, simply disappeared. Perhaps the best description of the 1995 market came from John Mulligan of Zozzaro Brothers: "The 1994-95 market was a Halley's Comet, its occurrence is rare and its length of stay is brief."[3]



Source: Giordano Recycling Corporation

The glass is greener on the other side of the border: A case of oversupply

Green glass provides an example of the supply curve at work. According to a 1993 study by the Northeast Recycling Council, the sale of green glass posed a large problem for many municipal and county programs. NERC, at the request of several of its member states, found that the cause was relatively simple, even though finding a solution has been a bit more complicated.

The problem stems from a "regional imbalance between the supply of green glass containers recovered from the waste stream and the demand for green cullet from domestic glass manufacturers," according to the NERC study.[4] Green glass is most heavily used in the production of beer and wine from Western Europe and Canada. Therefore, the U.S. imports more green bottles than domestic glass producers want to buy here. This historical oversupply keeps constant downward price pressure on that particular commodity.

The Iron Curtain falls – and takes aluminum prices with it

Metal recycling, too, has suffered from oversupply. For example, primary aluminum is made from alumina extracted from bauxite ore, and some of the largest concentrations of bauxite are found in the republics of the former Soviet Union. Since the early 1990s, some former Soviet republics, in dire need of hard currency to shore up their troubled economies, have sold large supplies of bauxite in international metals markets. As bauxite prices fell, it became cheaper to manufacture primary aluminum. And since primary aluminum competes with recycled aluminum, falling prices for primary materials caused falling prices for used beverage containers.



The paper, green glass and aluminum examples show the diverse forces that drive markets for recyclable materials. Those forces include the overall state of the national, regional and global economies, weather, number of buyers and sellers, technology, as well as some less tangible variables, such as current and future expectations of players in the market.

Long-term vs. short-term markets

The primary difference between a long-term and a short-term market is, not surprisingly, time. A long-term market agreement is generally one that lasts at least a year and involves the use of a single vendor or a single group of vendors. A short-term market is generally a market agreement that lasts less than a year, and it involves more frequent movement between vendors, according to Bruce Logan of Giordano Recycling Corporation.[5]

The advantages of "playing" the short-term market are not much different than they would be if you actively manage any of your personal investments. In a short-term market, you maintain the ability to move between multiple brokers or market outlets. If one buyer is unable to accept your material, you can switch to another buyer. (This is similar to having a diversified investment portfolio). In order to play the short-term market to its best advantage, you must be able to continually track the market forces and trends affecting your commodity. That is one of the crucial roles commodity brokers play in the marketplace.

Market players

Whether using a long or short-term market, remember that successful marketing means recyclables can be moved to the end user in both good times and bad.

In developing a market, you may be developing a relationship with one or more of these key players:

- end users (mill, foundry, glass or plastic plant, etc.)
- intermediate markets (companies that consolidate the material and "upgrade" or "improve" it for use by the end user)
- brokers (companies that usually act as liaisons and set up deals between the producers of the material and the end users)

With all three groups, you are attempting to develop a partnership that achieves three primary objectives:



- maximizing the price received for material, along with any value-added services the buyer might provide, such as report writing, training or storage equipment
- guaranteeing that the material can be moved to market in good and bad economic times
- moving material to market at the lowest possible cost

Going direct: Selling to end users

If you are dealing directly with an end user, such as a mill or foundry, you may be affected by facility shutdowns for routine maintenance or seasonal production schedules. In addition, your product may be held to a higher standard for purity. You may also be required to develop your own trucking arrangements because the mill may rely on you for transportation.

Providing transportation can be both time-consuming and troublesome, according to Brian Lefke, director of solid waste for the Atlantic County Utilities Authority, who markets a wide range of ACUA recyclables. Truckers often work for multiple mills, so they may have incentives to "spy" on your market arrangements, including the prices you receive and the terms of your deal.[6] That information is highly valuable to buyers in any market, so guard it closely. Before you decide to sell "mill direct," be sure to research the history of the firm, its financial stability and its reputation in the industry. (See the checklist on page 100 of Chapter 5 on how to research a company).

Should you go direct?

The advantages in dealing with an end-user directly generally include:

- receiving the highest price possible for the material
- avoiding the need for multiple contracts with multiple parties

The disadvantages include:

- typically having to arrange shipping on your own
- being subject to facility downtimes
- being tied to the fortunes of a single mill or company
- risk of industrial spying from transportation firms used by competing mills

Source: Brian Lefke

Brokers and intermediate markets

If you choose to sell to an intermediate market or a broker, you're going to rely on their research to buffer you from rapid changes in the markets. You will also rely on their relationships with various end users to help you maximize your product pricing and to move material in depressed markets.

Brokers and intermediate markets provide some similar functions. For example, both usually arrange for the transportation of your material, saving you from developing separate relationships with trucking companies.

But there are important differences. An intermediate market usually takes ownership of the material (a.k.a. "takes title") and often upgrades its quality to standards demanded by a broader range of end users. Because intermediate markets can combine recyclables with materials from other programs, they may be more flexible about the level of contamination they will permit. By providing more flexibility with quality standards, these markets give you the greatest level of protection in bad economic times.

Brokers typically do not take title to materials. Instead, they usually find buyers willing to take it in the form you provide.

Before considering the type of market to use, or whether to serve as your own broker, first identify how much material you can supply. A small community generating a limited amount of recyclables should expect to have less flexibility than a large generator.

Most municipalities don't generate enough material to have much impact on the markets. For example, according to the NJDEP, slightly more than 42% of the 7.85 million tons of municipal solid waste generated in the state each year is being recycled. This means that some 3.3 million tons of raw material are being returned to the market. A program that produces 5,000 tons of material annually accounts for only .15% of the material being returned for remanufacture.

Working with brokers or intermediate markets

Advantages to using an intermediate market or broker are:

- the ability to blend materials with others of higher quality, thus avoiding rejection of your load
- developing a series of outlets that helps to mitigate against downturns in the economy or mill shutdowns
- providing transportation

Disadvantages include:

- lower prices paid for your materials
- relying on the relationships of the broker with the end user rather than your own direct relationship with the ultimate buyer of your materials



Cooperative marketing

The issue of selling power in the market is a prime motivator for cooperative marketing. Similar to the concept of group purchasing agreements, cooperative marketing combines material collected in neighboring communities to create one larger supplier that commands the collective selling power of its member communities.

The best examples of cooperative marketing are in counties where marketing responsibility is borne at the same level. At the time of this publication, these counties included:

- Atlantic (for most municipalities)
- Cumberland (all)
- Mercer (some)
- Morris (some)
- Union (some)
- Burlington (all)
- Hunterdon (some)
- Middlesex (some)
- Somerset (all)
- Sussex (some)

To successfully implement a cooperative marketing program, municipalities need a high degree of coordination.

- **Collection programs and material quality**
  Members must agree on materials to be collected as well as quality standards and market specifications.
- **Storage**
  Where there is a need for temporary storage of material, members need to coordinate logistics to minimize transportation impacts to the final destination.
- **Transportation**
  A coordinated collection and transportation schedule needs to be developed.
- **Markets**
  A coordinated contract needs to be developed between the municipalities and the markets selected.
- **Revenue sharing**
  An equitable formula for revenue sharing (and cost sharing in negative markets) needs to be developed.
- **Coordinator**
  There should be a single party responsible for the administration of the terms of the coordinated agreement.

Market indicators

All smart sellers need to know the going price for their wares. For recycled materials, specific prices for various commodities and market specifications are listed in trade publications. The greatest number of indicators are published about paper, but many publications deal with the other commodities as well. The following are some of the most common resources:

The Yellow Sheet, Official Board Markets (paper only)

The Fibre Market News (paper only)

Waste News (all commodities)

The Paper Stock Report (paper only)

Recycling Markets (all commodities)

Translating book numbers to street prices

The primary problem with market indicators is just that: they are only indicators. Publications are not intended to provide an absolute price list for the commodity covered. Because of the varied nature of these publications, translating a market indicator price into a fair market price can be confusing.

To better understand how these pricing indicators work, examine the excerpt from *The Paper Stock Report*. The sheet lists the common grades of paper and the prices currently being paid for that grade. The two primary questions then are:

What do the grades of paper mean?

What price is being paid to whom?

The grade of paper is the most important factor used to determine price. The grades of paper are defined in excerpts from the PSI specifications in Appendix B.

Once you determine the grade of paper, volume becomes the next important variable affecting price. As a seller of recyclables, you are a supplier of raw materials. The more raw material any seller can provide, the fewer suppliers an end user or an intermediate market will require to meet its raw material needs. If you have enough material to provide directly to a mill, you are more likely to be paid at a rate closer to the full mill buying price.

Therefore, successful marketing starts by understanding exactly what you have to sell and then determining how much you can offer to buyers. Working with that information, sources like *The Paper Stock Report* can be useful pricing guides. They can reflect either the full retail price that a mill is willing to pay for each grade of paper or dealer prices, or both. To be considered "mill ready," the paper must meet the quality standards of the mill for the grade of paper in question. You can consider "mill ready" to mean that the mixtures of paper (the raw material) for sale can be added directly into the paper making process as it is received at the mill, without requiring further processing. Mill-ready paper

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must contain few contaminants, or prohibitives. Because mill-ready paper must meet tight quality standards, buyers usually are willing to pay the "highest" available price for this "pure" raw material.

Given these variables affecting the final selling price, market indicators are best used as a baseline for contracts to sell recyclables. The actual price you receive may be lower than the published price, but your price will move up or down as a percentage of that market indicator price.

Market standards

Selling recyclables isn't just about price and quantity. Quality is just as critical. There are a number of ways that material can be rendered useless. By far the most common is to deliver recyclables with contaminant levels that make material uneconomical, or unfeasible, for use in the manufacturing process.

To research quality specifications for your materials, you can consult the PSI specification book, also known as the ISRI Scrap Specifications Circular, from the Institute of Scrap Recycling Industries. This publication includes a description of each material as well as detail on applicable quality standards. (See *Appendix A* for information on obtaining this circular.)

Why not go direct?

If you generate enough material and you have the cash to invest in processing equipment, why not simply bypass the intermediate processor and sell upgraded materials directly to end users?

Selling directly to end-users is not just a question of quality grades and volume. Selling direct requires that you study markets constantly, and it requires pockets deep enough to keep your processing operation afloat when markets head south.

Negative markets are typically short-term events, according to veteran buyers Allan Zozzaro and Jerry Lobasco, whose companies have seen 96 years of price movements. Neither buyer recalls a negative market lasting for more than three years since their companies have been in business. Nonetheless, as a processor, you still need to be able to survive for three years.

Talking to markets: A checklist

The following checklist for surveying potential buyers of recyclables is adapted from The International City/County Management Association's report *Marketing Recyclables*.[7]

- ☐ contact information (name of buyer and firm, location, phone, fax, e-mail and website)
- ☐ type of market (broker, processor or end-user)
- ☐ types of material purchased
- ☐ specifications for each material, including listing of contaminants, acceptable contamination levels, and the physical form required (baled, loose, compacted)
- ☐ shipping requirements, including minimum and maximum size of loads, method of delivery, capacity, and any distance restrictions
- ☐ availability of transportation assistance
- ☐ procedures for determining weights and contamination levels
- ☐ price and payment schedules, including any pricing tied to a market indicator
- ☐ availability of long-term contract
- ☐ number of years in business
- ☐ references

Notes:

Notes:

5 Contracts

Smart contracting

Definitions

From bid to contract

- Service parameters
  - Material to be collected
  - Community demographics
  - Roads
  - Collection parameters
    - Collection specifics
    - Containers
    - Collection schedules
    - Ownership of material
    - Vehicle requirements
- Protective measures
  - Insurance requirements
  - Indemnification
  - Liquidated damages
  - Violation of specifications
  - Failure to collect and failure to perform
  - Performance bonds

Legal considerations

- Correctable and non-correctable bid items
- Other reasons to reject a bid

Negotiating contracts with markets

Note: This chapter does not purport to substitute for legal advice. The requirements for bidding in New Jersey are outlined in (N.J.S.A. 40A:11-1 et seq.). Anyone preparing a bid document should carefully review these statutory requirements with a lawyer. This chapter will acquaint recycling coordinators with some key provisions of the statute that are often overlooked when bid documents are prepared.

Smart contracting

In-house or outsource? That's a cost question many program managers ask. Should you use your own staff and equipment to collect recyclables or should you contract for those services? If you choose to outsource collection, you should master the practical and legal requirements of the bidding process. Both the language of the contract and the bid process itself must be clear and specific to minimize misunderstandings that can cause delays, increase costs and invite legal challenges.

For municipalities contracting for recycling collection, your legal guide is the Local Public Contracts Law (N.J.S.A. 40A -11.1 et seq.). And if recycling collection is coupled with a solid waste collection contract, bid specifications must also conform with (N.J.A.C. 7:26H - 6.1 et seq.); the Uniform Bid Specifications for Solid Waste Collection.

Thus, if you go the outsourcing route for collection, you have two important responsibilities:

1. developing bid specifications
2. writing a contract that is fair to both parties

Legal requirements are different for marketing recyclables, but a similar question arises. Do you sell your materials yourself, or contract with a private company? When selling recyclables, coordinators are not legally required to go out for public bid, and can negotiate directly with a buyer. Public bidding is required, however, if marketing is combined with collection service. And if you choose to solicit public bids to sell recyclables, the process must meet the requirements of the Local Public Contracts law, as explained in *Who has to bid what?*

Who has to bid what?

The following guidelines can help public sector recycling coordinators determine which projects must follow the requirements of the Local Public Contracts Law; (N.J.S.A. 40A-11.1 et seq.), or The Uniform Solid Waste Collection Bid Specifications; (N.J.A.C 7:26H-6.1 et seq.), or both.

- If you are bidding for recycling collection *and* marketing, the bid must conform to the requirements of the Local Public Contracts Law.
- If you contract only to *sell* recyclables, you may negotiate directly with a buyer, and don't need to go out to bid.
- If you choose to publicly solicit bids for buyers of recyclables, you must follow the requirements of the Local Public Contracts Law.
- If you are bidding for recycling collection *and* garbage collection combined, you must follow the requirements of the Local Public Contracts Law and the Uniform Solid Waste Collection Bid Specifications.

Definitions

A bid is defined in Barron's Law Dictionary as "...an offer ...to buy goods or services at a stated price..." It is the promises made by a service provider that wants to perform work for another party. First, you define the promises in the bid, then you clearly state them in the contract. Contract disputes often arise because two parties have different understandings of the promises upon which they base their assumptions.

Barron's defines a contract as "a promise, or set of promises, for breach of which the law gives a remedy, or the performance of which the law in some way recognizes as a duty." Contracts for collection and marketing of recyclables are often referred to as "bilateral contracts," which Barron's defines as contracts "in which there are mutual promises between two parties to the contract, each party being both a promiser and a promisee."[1]

In practical language, a contract is the written terms of a promise, and it helps ensure that both parties keep to their bargain. A good contract must go further, advises attorney Joseph Maraziti, Jr. "A good contract is one where most of the terms are self-enforced. When one party has a question, that party can go to the contract and review the terms. The paper often ends the disagreement since the parties can see the terms, and thus, the confusion is cleared up immediately."[2]

From bid to contract

In addition to meeting the legal requirements of the Local Public Contracts Law, all contracts should contain two practical elements:

1. service parameters
2. protective measures

Service parameters

Service parameters define the scope of work expected from the contractor. They also provide standards to measure a contractor's performance. Because bid specifications usually become part of the final contract, service parameters are the heart of your bid.

You can help develop accurate service parameters by giving bidders complete and accurate data about your community and your solid waste management program. The time you invest in data collection can save you money in the contract price because it reduces guesswork by the bidders. When bidders are forced to guess, they often estimate costs on the high side to ensure they can service your contract profitably. By providing complete information on the questions below, you'll reduce those margins of error.

Material to be collected

Here's an area where bidders often complain about incomplete information. Exactly which materials and which specifications of materials will you collect? What grades of paper, for example? Which kinds of plastics? Include current and projected tonnages of each material, including historical trends, program growth and any other information to help bidders better understand how much material your program will generate. At a minimum, try to include five years of tonnage information and be sure to note any program changes that might affect tonnage.

The Uniform Solid Waste Collection Bid Specifications provide a good working model of a data sheet, but you should tailor your sheet to your program.[3]

Be as specific as possible for each material. For example, will you collect number 6 news or some other grade? Other materials might include aseptic packaging, plastic film, chip board, textiles or other recyclables. If yard waste is included, be specific about the materials to be collected and any changes in frequency of collection during the year. If you include all paper as a single stream or if you collect all containers as commingled material, note that in the description section of the bid document.

Municipal collection information data sheet

Tonnage reports:	**Year** _____	**Year** _____
Material recycled:	(Tons)	(Tons)
Glass		
Amber	_____	_____
Green	_____	_____
Brown	_____	_____
Aluminum		
Used beverage containers	_____	_____
Scrap foil	_____	_____
Steel cans		
Plastic containers		
PETE	_____	
_____		
HDPE	_____	_____
Newspaper (grade)	_____	_____
Corrugated cardboard	_____	_____
Other paper	_____	_____

Community demographics

The demographics of a community tell your bidders how many customers, and what kinds of customers, they can expect to serve during the life of the contract. Include current and projected numbers of households and a demographic breakdown of the community. For example, if the bid requires collection from multi-family, retail businesses, office buildings, schools, non-profits, or municipal facilities, provide current and projected totals for the number of units and tonnage for each category. The *Municipal demographic information data sheet* provides a sample.

Provide as much detail as possible. If a new apartment complex will open next year or a major subdivision will be completed, include that information in this section.

Municipal demographic information data sheet



	Current year	Projected
Residential sources		
Single family	_____	_____
Multi-family(up to four family)	_____	_____
Apartments/condominiums	_____	_____
Other	_____	_____
Commercial sources (by type)		
Office building	_____	_____
Retail	_____	_____
Restaurant/bar	_____	_____
Supermarket	_____	_____
Convenience store/deli	_____	_____
Institutional sources	_____	_____
Schools	_____	_____
Hospitals	_____	_____
Houses of worship	_____	_____
Municipal sources	_____	_____
Municipal buildings	_____	_____
Libraries	_____	_____
Municipal depots*	_____	_____
Parks	_____	_____

* This includes collection at any recycling depots the municipality may operate.

Development trends	
New housing units in the past 5 years	( )
New housing units approved for the next year	( )
New housing units projected over the life of the contract	( )
New retail or commercial units or square footage next year	( )

Roads

Provide the latest road map with the bid specifications. If you have established collection zones, include them on the map as well. Be sure to highlight any important constraints, such as one-way streets, narrow or restricted roads, low bridges, weight limits and other traffic or road conditions that might affect collection efficiency.

Collection parameters

Consider the exact level of service you want. But be mindful of what you ask for, because you can expect your bill to increase as your requirements increase.

To avoid "sticker shock," begin planning the bid **at least six months** before you expect to put the specifications out for consideration. Allot even more time if you're going to bid a service for the first time, or if you're making substantive changes to your existing program. Six months lead time gives you a number of advantages.

Begin planning bids at least six months before you expect to put specs out for consideration

1. You have time to review your existing service parameters and determine whether you need to provide the same level of service in the future.
2. You have time to prepare an in-house estimate of the service you're requesting. This is a valuable, but often ignored, exercise. An in-house estimate can support the recommendations you make to community decision makers. It also gives you a benchmark to use if you decide to reject all bids because their prices are too high.
3. Ample lead time for you helps provide sufficient lead time for the successful bidder. A new contractor has enough start-up time to serve your community. Contractors need time to secure equipment and labor, survey routes and coordinate with municipal staff collections. Aim to give the contractor a minimum of 30 days from the date of award to start up.
4. You have time to re-bid if necessary. If you reject all bids, you want to re-bid while you're still operating under an existing contract. If you need to award an emergency contract extension, your negotiating position could be painfully weak, and you could be forced to accept whatever charges your current contractor imposes. (The contractor's costs may in fact be higher if his or her trucks and personnel are committed to other projects, which is common if the contractor does not participate in, or expect to win, the new bid process.)

Collection specifics

This section outlines the scope of work and level of service contractors will provide. For example:

> *The Contractor shall provide recycling collection services for all residential units within the municipality on a one (1) time per week basis.*
>
> *The Contractor shall provide recycling collection services at all houses of worship and small commercial businesses as noted.*

These two, brief sentences contain some critical terms. First, the term "shall" has a specific meaning in contracts. "Shall" is an absolute term. It allows no debate about the scope of the work to be provided. In contrast, the term "may" is permissive rather than absolute. Also, note that the number one is both written out and repeated as a number in parentheses. This redundant format helps avoid confusion that can be caused by a typographical error.

The narrative should spell out specific service requirements. For example:

> *The Contractor shall provide recycling collection services at designated municipal facilities and public properties as indicated on the following pages and on the map on page xxx.*

Be as specific as possible. If you require service at multiple locations, list each one. If you want municipal facilities collected on a different schedule than residential collections, state that clearly. The narrative also should be precise about miscellaneous locations, such as parks, roadside stops or bins on streets. Include the number of containers at each stop and any collection schedule requirements.

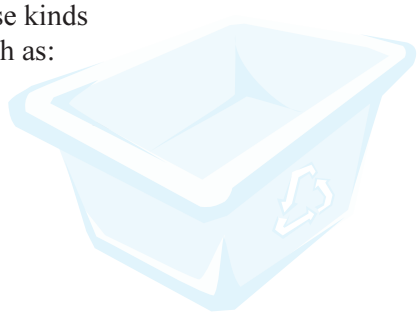
Avoid ambiguous language regarding the frequency of collection, such as *More frequent collections may be required*. Vague language makes it difficult for bidders to calculate an accurate cost, so they may be forced to guess high, which inflates your final price. This does not stop you from requiring more frequent collections; simply explain clearly what you require. For example, seasonal populations may dictate twice per week collection between May 15 and September 15 and once every two weeks in all other periods. Write those dates and frequencies in your narrative.

Containers

Who will provide the containers for the curbside collection program? What size, type and color will be provided? Do you require a specific logo? How many will you need and at what locations? What performance specifications (expected life, strength, weight, for example) will you require? What brands will you accept? These are not simply questions of style. If the contractor provides the containers, these are cost considerations, so your answers should be included in your bid document.

In some cases, the responsibility may be split between the contractor and the municipality. Municipalities often have recycling containers in stock for residential units, but they may lack larger containers, such as roll offs and dumpsters, for multi-family or commercial units. If you do require these kinds of containers, include specific language about safety requirements, such as:

> *All recycling compactor boxes, dumpsters and roll off containers shall conform to New Jersey Department of Environmental Protection and ANSI Z245.30, Safety Requirements for waste containers standards and shall be maintained in conformance with the provisions of N.J.A.C. 7:26 et. seq.*



Be careful about what you require in addition to safety requirements. Requiring new containers at the start of the contract term will add to the cost of service. Requiring a specific type of container or requiring a painting schedule or even a specific color may add to the price as well. Simply be aware that each requirement can add to the bidder's cost of operation, and in turn to your cost of service.

Because recycling contracts are bilateral agreements, the municipality also must agree to provide safe access to the facilities and containers being serviced. For example:

> *The Contractor will be provided with safe and reasonable access to recycling containers. The Contractor is not required to render service if the presence of any interference prevents access to a recycling container and/or poses a threat to the Contractor's employees or agents. The Contractor shall collect all materials from containers as soon as possible, but no later than 24 hours after the problem that prevented the pick-up is rectified.*

Collection schedules

Provide bidders with specific requirements for collection operations. This section should describe when the contractor may begin, or is required to begin, and when work must be completed. For example:

> *All collections as described in these specifications, shall be performed between the hours of 7:00 a.m. and 7:00 p.m. EST.*

The times are up to you. However, you should note that if your recycling collection contract is not combined with solid waste collection, the successful bidder need not be a licensed public utility. If you award the contract to a non-regulated, non-public utility company, the contractor is subject to local noise ordinances. Therefore, consult those ordinances when you develop your specifications. Conversely, any company that collects solid waste in New Jersey must be licensed according to statutes of the Board of Public Utilities and the Department of Environmental Protection. If a company is regulated as a public utility, it is not subject to municipal noise ordinances. However, it is still subject to the terms of your contract, so you can write those noise restrictions into your specifications.

Also be sure to include when collections will be performed. Is it limited to Monday through Friday, or are weekends okay? Include your holiday schedule instructions for making up collections missed because of holidays. These are important cost considerations. Will you allow the contractor to skip the holiday collection and pick up on the next scheduled service day for that area? Or will you require the contractor to collect from those units on the day before or after the holiday? Expect prior-day or next-day pick up to cost more because you are essentially requiring twice the work in a single day. The contractor has to pick up the regularly scheduled customers plus the holiday workload. That usually means overtime bills, and it often requires extra equipment. Picking up extra materials on the next scheduled service day should be less expensive because you are requiring a lower level of service.



Ownership of material

Who owns the recyclables can affect what you pay to collect them. If you maintain ownership, your collection contract needs to include transportation to the markets you select. Your bid specifications should require transporting materials to potential markets or require a per-mile charge for transport.

You also can choose to relinquish ownership of the material. This will simplify the contract specifications, but also means giving up some control and all the potential value of the material recycled by your program. If you choose this option, you should still maintain some level of oversight about how the contractor markets your materials. No one wants headlines revealing that your recyclables are being landfilled! Consider inserting language that grants you approval power over marketing, such as:

> *The Contractor shall take ownership of all recyclables collected from the municipality and shall be responsible for the marketing of these materials. Disposition of these materials must be at an approved market or processing facility. An approved market or processing facility shall be determined by the municipality in consultation with the contractor. Approval shall not be unreasonably withheld.*

Vehicle requirements

Safety, material protection and reasonable appearance are the critical issues involving recycling vehicles.

Safety can be covered with language that ties vehicle maintenance to statutory requirements for trucks of the type being used. For example:

> *All vehicles shall be maintained in conformance with the requirements of the New Jersey Department of Transportation and the New Jersey Department of Environmental Protection.*

To protect the material being collected, consider requiring vehicles to be fully enclosed.

> *All recycling collection vehicles shall be completely enclosed and shall be designed so as to prevent spillage of the recyclable material that is collected.*

To protect against contractors that use dirty or noisy equipment, consider adding the following language about maintenance requirements and customer complaints.

> *All vehicles shall be maintained in good working order and shall be constructed, operated and maintained so as to reduce unnecessary noise*, spillage, and odor. The Municipality shall have the right to inspect the vehicles at any time during the term of this contract, and the Contractor shall comply with all reasonable requests relative to the maintenance and repair of said vehicles.*

The municipality may order any vehicle used in the performance of the contract out of service if the vehicle is not maintained in accordance with the requirements of these work specifications. In such event, the Contractor shall replace such vehicle, at its sole cost and expense, with a vehicle satisfactory to the Municipality.

* "Unnecessary noise should be related to local noise ordinances.

This language places a reasonable cost burden on bidders with poorly maintained or substandard equipment. Of course, these provisions must be administered reasonably; they are not designed as tools of punishment during disagreements with the contractor. The term "reasonable" is open to interpretation. In fact, that's what courts often do. For the record, however, "unreasonable" is defined in Barron's Law Dictionary as:

"arbitrary, capricious, absurd, immoderate, or exorbitant; not conformable to reason, irrational, beyond bounds of reason or moderation."



Protective measures

A good contract must do more than state services to be performed. Its must also protect you from serious problems that may arise during the course of the contract. Protective measures also can be cost-savers if they prevent problems that otherwise might have occurred. However, each level of protection can add to the cost of the service. Your goal is to strike a balance between cost and protection. Consider the following protection items in developing your specifications.

Insurance requirements

The question of insurance is not whether to have it, but how much is enough. Setting the requirement too high can hurt you in two ways. First, requiring high levels of general liability insurance tends to limit the number of bidders. Small companies may have difficulty securing more than $3 million in aggregate liability insurance, for example, and this could leave only larger organizations to bid on your work. Second, your costs rise as your insurance requirements rise simply because it costs more to get more.

So, how do you determine an insurance limit for a collection contract? Start by reviewing accident records of companies that have historically provided recycling or solid waste collection in your municipality. If collection has been done by a public agency, review the local accident history of the department that did the work. Ask the key question: has there ever been an accident that caused more than $3 million in total general liability or $1 million in individual liability? If not, you may reasonably decide not to require higher levels.

The Uniform Bid Specifications for Solid Waste Collection limit how much general liability insurance you may require for solid waste collection specifications. The uniform bid law also sets limits for automobile liability insurance ($500,000 for each person and $1 million per occurrence) and for

property damage ($1 million per occurrence). Although these limits do not legally apply to contracts for collection of recyclables only, they can still serve as useful guidelines when you consider the risk history of your community.

Finally, consider the risks associated with worker's compensation insurance. The state law prohibits limits on worker's compensation in solid waste specifications. This is an important issue because solid waste and recycling collection have high rates of worker injuries compared to other occupations.

Indemnification

Regardless of your insurance protection, you and your organization always face the risk of being sued by contractors, residents or markets. An indemnification provision can help protect you in those cases. The following example has language that covers most contingencies.

> *The Contractor shall indemnify and hold harmless the municipality from and against all claims, damages, losses, and expenses including all reasonable expenses incurred by the municipality on any of the aforesaid claims that may result or arise directly or indirectly, from or by reason of the performance of the Contract or from any act or omission by the Contractor, its agent, servants, employees or any subcontractors and that results in any loss of life or property or in any injury or damage to persons or property.*

Liquidated damages

Liquidated damages are a common source of contract disputes. To summarize the Barron's Law Dictionary definition, liquidated damages are "a reasonable estimation of the damages" that are "likely to actually result from" a breach of contract. By stating these amounts in the contract, both parties agree to set a maximum limit on the estimated cost of those damages. Be clear on one important point: liquidated damages are not penalties. A penalty punishes a contractor for failing to perform duties as required by contract, and New Jersey courts do not recognize penalty provisions of contracts as enforceable. On the other hand, liquidated damages attempt to recover actual costs or economic harm caused by a contractor's failure to perform contractual duties, and they are enforceable. Here's an example of a liquidated damages provision:

> *If the contractor does not clean up spillage as required in these specifications, the work will be performed by municipal employees or a designated contractor. As a result, liquidated damages will be assessed against the Contractor in an amount equal to the cost of municipal clean up, but in no event shall the damages be less than $100 per occurrence.*

This is an assessment of damages incurred each time the contractor does not perform a specified function. The $100 figure is a cost estimate of work performed, not a penalty for breach of contract. Similarly, you can include language for failure to complete collection, or for improperly disposing material because they cost your organization lost productivity, revenue or credibility. Missed collections can cause a flood of customer complaints or inquiries that

require staff attention, or they may require special pick-ups by your staff. Improper disposition may require investigation and enforcement time and personnel. The key is to estimate the economic damage associated with those activities.

Conversely, language stating that the contractor "shall pay $1,000 to the township for each failed pick up" probably could not survive a legal test as liquidated damages. Using the term "payment" rather than "assessment of damages" is one indication that the amount may not be based on costs. If there is no clear explanation of the harm created by missed collection and if the $1,000 amount is unrelated to the projected cost of that harm, the $1,000 would probably be deemed a penalty, and therefore, unenforceable in court.

Violation of specifications

Liquidated damages cannot serve as a penalty, but contract writers have other tools to ensure that contractors perform work as promised. Consider including the following language, which establishes a severe potential and justifiable remedy for breach of contract.

> *Any violation of these specifications shall be sufficient cause for the immediate cancellation of the contract by the municipality, who may thereupon employ the necessary labor to perform the work or re-advertise or relet the work, at the expense of the offending Contractor and his sureties.*

This is a serious step that should be reserved for major contract violations. Therefore, you should establish intermediate steps to be taken before claiming irrevocable violation of specifications. Complaints should be carefully documented.

Failure to collect and failure to perform

These provisions provide some of those intermediate steps to correct contractor performance that does not meet specifications. This language can cover most problems encountered during the performance of the contract. Here are two examples:

> *The Contractor shall report to the municipality within one (1) hour of the start of the collection day, all cases in which severe weather conditions preclude the collection of designated recyclable materials.*
>
> *The Contractor shall promptly and properly attend to all complaints and all notices, directives and orders of the municipality within twenty-four (24) hours of receipt of the same. The contractor shall be required to maintain a log of all complaints received and the action taken to remedy the complaints. The municipality shall have the right to inspect the complaint log upon request.*

You may also include language regarding property damage as well as meetings to discuss service or to resolve complaints.

Performance bonds

Performance bonds are your protection against the biggest failures. What if your contractor goes out of business or is simply unwilling or unable to service the contract? A performance bond guarantees that your program and organization will be protected financially even if you're forced to hire a new contractor to complete the service. According to attorney Joseph Maraziti, Jr., performance bonds come in three flavors:

- *Third Party Guarantee*
- *Performance Bond*
- *Letter of Credit*

Your strongest protection against contractor failure may be the care and research you invest in evaluating and selecting the successful bidder. Even with the most thorough research, it's still prudent to include one of these three kinds of a performance bond.

Third-Party Guarantee

This is normally used by the subsidiaries of larger companies, and the corporate parent guarantees the subsidiary's performance. It is the least costly of the three kinds of performance bonds because it simply requires a binding agreement between a subsidiary and its parent company. However, it also provides the lowest level of protection. A third-party guarantee assumes the parent company will be able to honor its promise and provide the services required in the contract.

Performance Bond

By far the most common form of protection used in contracts with public agencies, performance bonds cost more than third-party guarantees, but offer a higher level of protection. A performance bond is essentially an insurance policy that a contractor buys from an insurance company. The insurance company is putting its money "on the line" in case the contractor fails to perform, so it has a keen incentive, and financial obligation, to research the company applying for insurance. Firms with a history of defaults have trouble buying this kind of insurance, so this requirement essentially gives you the expertise of independent reviewers to help weed out unqualified bidders.

There are two potential downsides to performance bonds.

The first one, the bonding level you require, is avoidable. In most cases, it's a mistake to require a performance bond equal to the full value of the contract. A five-year, $5 million contract, which costs $1 million annually, does not require a $5 million performance bond. Instead, it's far less costly to require a bond equal to the annual value of the contract. And big bond requirements aren't just more expensive: they also may prevent smaller firms from bidding on your project because larger bonds are harder to obtain.

The Uniform Bid Specifications for Solid Waste Collection allow public agencies to require a bond equal to the annual value of a contract. It must be a renewable bond reflecting the annual cost of the contract, and may not exceed the value of the contract. Although this law does not apply to recycling collection contracts, it's still a good cost containment strategy.

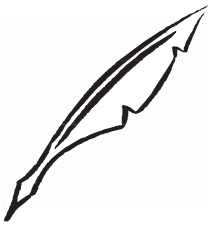
A similar, but more expensive, strategy is to allow use of a depreciating term bond. In the first year of a multi-year contract, these bonds insure the full value of the contract. Each year, the insured value of the bond declines to cover the services still to be delivered.

The second problem with performance bonds is more challenging to solve. Performance bonds can be difficult to collect. The insurance company's money is at risk, so it's no surprise they will only pay claims that are thoroughly documented and tenaciously pursued, according to attorney Joseph Maraziti, Jr.[4]

Letter of Credit

The letter of credit may be your highest level of protection in bid specifications, but it's so restrictive that it may intimidate many organizations from bidding on your work. A letter of credit acts more like a certified check than an insurance policy. It requires contractors to put their financial assets on the table as collateral against a failure to perform.

Remember, your goal is to develop an agreement that allows the contractor to do the job to your specifications with a minimum of interference, dispute and necessary expense. To achieve that goal, your up-front strategy is to write clear requirements into the bid specifications and to ensure the successful bidder has the ability to fix problems that may arise.



Legal considerations



For public agencies, the requirements for bidding in New Jersey are outlined in the Local Public Contracts Law.[5] This manual cannot substitute for legal advice, and anyone preparing a bid document should carefully review these statutory requirements with a lawyer. The section will, however, highlight key provisions of the statute that are often overlooked in preparing bid documents for recycling.

Legal challenges to the bid process cost you in lost time and hard dollars. No surprise there. Bid awards are most often contested when a low bidder is not awarded a contract, or when unsuccessful bidders claim that the lowest bidder was not the lowest responsible bidder. That's the tricky legal question: what is the lowest responsible bidder and when is that different than the lowest bidder? The devil is in the details.

For solid waste collectors, a responsible bidder is specifically outlined in N.J.A.C. 7:26H-6.8, *lowest responsible bidder*. Once again, bids for recycling collection alone are not bound by these regulations, but they are useful guides. Specifically this section states that:

> *(a) The responsible bidder is one who at the time of the bid submission:*
>
> *1. Conforms to all requirements of the bid specifications*
>
> *2. Has an approved uniform tariff on file with the Department*
>
> *3. Has experience in the type of work to be performed*
>
> *4. Has the equipment necessary to perform the work described in the bid specifications*
>
> *5. Has the financial ability to perform the work.*
>
> *(b) The governing body may reject an otherwise complete bid proposal when the bidder has a history of intentional noncompliance with mandatory terms and conditions of similar collection contracts with any contracting unit or has failed to fully perform a prior collection contract with the contracting unit.*

Only condition 2 is not relevant to recycling collection contracts (no tariffs are required for recycling collection alone).

Price is not the sole determinant in awarding a contract. This language gives you some flexibility to protect against "lowball" bidders who may not be able to perform the work. Proceed with caution, though. You need tangible, documented reasons for not awarding the contract to the lowest bidder.

Correctable and non-correctable bid items

Mistakes happen. But not all mistakes are created equal. In the language of bids, they fall into two main classes: correctable and non-correctable errors. The easiest reason to reject a bid is non-conformance with a non-correctable defect in the bid submission.

A correctable error (often called a correctable defect) is typically considered a minor mistake in a bid submission, such as failing to write out a price quote in addition to printing a numeric quote in the document. The mistake is not material in the bid and can easily be corrected. Of course, the bidder can't change the number being submitted, but otherwise, this mistake is easy to correct.

On the other hand, if a bidder forgets to submit a price at all, that's a non-correctable error, a material defect, and you must disqualify the bid. Other examples of non-correctable errors include:

- failure to submit a bid bond
- failure to submit required documents as outlined in the bid specifications

N.J.A.C. 7:26H-6.5(a) includes a list of non-correctable defects, including failing to comply with the following requirements:

- a completed questionnaire
- a non-collusion affidavit
- a stockholder statement of ownership
- a consent of surety
- a bid proposal

If your recycling bid is combined with solid waste collection, failing to include a certificate of public convenience and necessity also would be a non-correctable defect.

Other reasons to reject a bid

A public agency also has the right to reject a bid if it fails to conform with the provisions of the public bidding laws of the state. Thus, you should work closely with a lawyer in developing bid specifications.

From a practical viewpoint, the reasons for rejection should be clearly spelled out. That's one advantage of using the Uniform Solid Waste Collection Bid Specifications. These specifications state much of what normally needs to be considered in a bid document in relatively clear and concise language.

Finally, if you have a good reason, you can reject all bids. If all of the prices submitted are higher than your projection, you can reject all bids based on price. That's why it is valuable to perform an in-house estimate before you go out to bid.

The bid process

Competition helps keep a lid on costs, so you want to attract a healthy pool of bidders. Give bidders plenty of time. New Jersey's general bidding statutes (N.J.S.A. 40A-11.22) require only 10 days from the day your legal ad for

recycling collections appears to the day bids are due, but 60 days is a better target. By giving bidders ample time for questions, clarifications, addenda and research, you should receive more and better quotes. You may want to consider the following six-month schedule.

- two months to write the specifications
- one month to handle pre-bid questions and addenda
- one month for award
- one month for contingency
- one month for the successful bidder to prepare

Advertising

The team that prepares the bid should include a purchasing agent, legal counsel and the recycling coordinator. The purchasing agent often prepares the advertisement for services, but the lawyer and recycling coordinator should review it to ensure the accuracy of services being requested.

Pre-bid conferences

A pre-bid conference is a meeting where anyone interested in submitting a bid can ask questions of the officials in charge of the bid. Subsequently, those officials issue a response document and any addenda required to clarify the bid document. A pre-bid conference can help eliminate costly confusion about bid specifications. When bidders are unsure about assumptions or specifications, they tend to overestimate costs to protect themselves. Pre-bid conferences also allow you to see potential bidders face-to-face, so you are no longer dealing with anonymous third parties.

The downside of pre-bid conferences? They create more work . Somebody needs to take accurate notes and prepare a response document and perhaps an addendum.

Addendum

An addendum is just what its name implies. Because it is an alteration of the original bid document, an addendum must be sent to all bidders and it must be advertised at least five days prior to the receipt of bids. This process allows you to correct errors, alter specifications problems, and otherwise improve the bid document before bids are received. This extra step can reduce the likelihood of litigation caused by a misunderstanding or an error in the bid documents.

Receipt of the bids

This is a fairly straightforward process, handled in most cases by the purchasing agent. The rules for bid openings are clearly articulated in N.J.S.A. 40A:11-1 and are not subject to variation.

Negotiating contracts with markets

Recycling collection contracts must be put out to public bid. To sell the recyclables you collect, however, you can choose to go through the bid process, or you can negotiate directly with buyers.

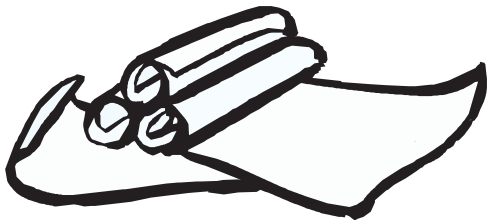
Regardless of the route you follow, you need to clearly define the services you require of your buyers and agree on those terms in your contract. This is true even if you operate solely on a verbal agreement rather than a written contract. A verbal agreement may be considered an oral contract, which is defined by Barron's Law Dictionary as "...one which is not in writing or which is not signed by the parties....it is a real existing contract which lacks only the formal requirement of a memorandum (signed by the party to be charged)."

The terms of your contract should include safeguards against poor performance by your market, such as failure to:

- pick up materials when promised
- provide trucking equipment as promised
- pay as promised

However, because this is a negotiated process, be prepared for the market to insist on safeguards as well, such as protection against:

- material that does not meet specifications
- damage caused to their equipment
- delivery of promised material
- misrepresentation of what is being marketed



A good marketing agreement requires front-end research.

1. Start with the goals of your marketing program because your aims often dictate your negotiation strategy. For example, security may be your priority. You want a reliable buyer willing to move your materials in even the worst markets. Or revenue may be your priority, so price rather than stability drives your decisions.

2. Determine both the quantity and the quality of each type of material you're marketing. Quality is defined by market specifications for each type of material, so it's critical to know your specifications.

3. Decide what services you require of buyers. Do they need to provide transportation, storage, processing, equipment, promotional materials, training, reports or credit? The services you require may dictate whether you will sell directly to an end user or to an intermediary, such as a broker or processor. Intermediaries usually provide a wider range of services than end users.

4. Research your local markets. How do local market conditions compare to national averages? What buyers are available? How long have they been in the market and how reliable have they been in different kinds of markets? What are local trucking rates? Stay current on market indicators, which are discussed in Chapter 4. How will your price change as market indicators change?

After the preliminary research has been completed, it's time to negotiate with potential market outlets for each of your materials. Then those terms must be written clearly into the contract. The contract should also spell out payment terms in advance. How, where and by whom will materials be weighed? Will you use tare or gross weights? When will you expect payment? If cash flow is a priority, you may include a bonus (for example a 1% discount if payment is received within 15 days) for prompt payment.

One of the most important elements of any agreement is not the words themselves, but that they are honored with ethical behavior, Lefke advises. That may mean refusing a higher price if you have already promised to deliver your material to another buyer. Breaking agreements hurts your operation, even if no one ever takes legal action against you. Your reputation as a reliable business partner may be irreparably damaged. The result: you may have trouble finding buyers when you need them most.

One way to ensure both parties retain a clear understanding of their agreement is to be absolutely clear about the words used in the contract. Or as Joseph Maraziti, Jr. says, "The contract is only as good as its words. The language is the key."

Market suitability checklist

Brian Lefke, director of solid waste operations for the Atlantic County Utilities Authority, suggests the following checklist to determine the suitability of a potential market.[6]

- ☐ Review a credit report on the company.
- ☐ Research the company's payment history and outstanding debt.
- ☐ Are there are any legal claims pending against the company?
- ☐ Who owns the company and how long has it been in business?
- ☐ Visit the operation if possible. Check the operation for cleanliness, quality of equipment and attitude of employees.
- ☐ Talk to other customers of the market. Ask about the company's payment history, accuracy of weigh tickets and customer service.
- ☐ Compare the price you are offered against the general market price for that grade of material and against competing offers. A price that appears too good to be true probably is.

Notes:

Conclusion: Recycling your way to sustainability

This manual combines and condenses information from economics, accounting, finance, law and marketing. It focuses almost exclusively on the financial aspects of recycling rather than the environmental ones. Yet, New Jersey's state recycling policy was built on and is sustained by the premise that recycling generates economic and environmental benefits that are not covered by the financial analysis discussed in this manual, including:

- conservation of virgin resources
- job creation and economic development
- extending the life of landfills and incinerators, which are notoriously expensive and difficult to site in New Jersey
- increased self-sufficiency in solid waste management
- energy conservation
- greenhouse gas reductions
- increased exports that improve state and federal trade balances

These benefits are real and quantifiable, so why aren't they factored into the financial analysis in this manual? Most recycling coordinators acting alone have little control over those issues. In many cases, they may be determined by worldwide market forces (or natural forces in the case of greenhouse gasses) that literally no one can control alone. In other cases, they may be determined by state and federal policies that are beyond the authority of recycling program managers.

Cast your dollar vote for recycling

Even if you cannot control these forces, you can help push them in the right direction. For example, you can help increase demand for recycled-content products by promoting "Buy Recycled" campaigns to residents and businesses and adopting them for your own purchasing guidelines. Given the law of supply and demand, your campaigning alone may be too small to affect the markets for paper, just as your single vote may not affect the outcome of a national election. However, the collective force of millions of people individually casting their "dollar votes" in favor of products with recycled content ultimately may increase

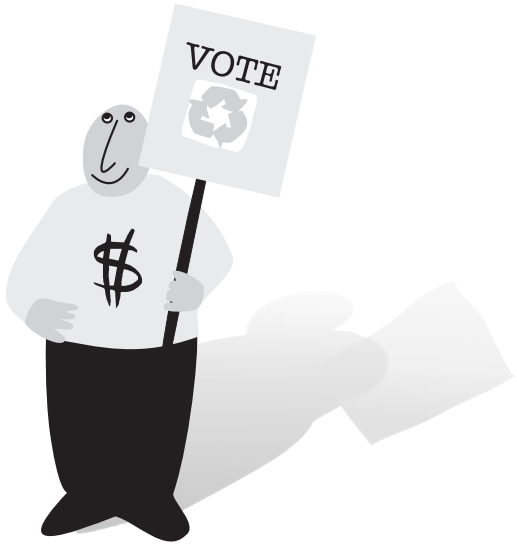
the prices coordinators receive for the recyclables they collect. You may not be able to dictate the outcome, but you can become part of the solution by understanding the importance of your dollar vote.

The recycling coordinator as environmental technologist

In the meantime, you can control, or at least recommend how to control, the costs of your recycling programs. Reducing those costs is guaranteed to increase the cost-benefit scenario for recycling in their communities, regardless of what happens to other factors in the equation. That puts coordinators in a powerful position. Using tools of financial analysis discussed in this manual, you have the power to design sustainable recycling programs that provide short and long-term economic and environmental benefits.

The U.S. Office of Science and Technology defines an "environmental technology" as "a technology that advances sustainable development by reducing risk, enhancing cost-effectiveness, improving process efficiency and creating products that are environmentally beneficial or benign. The word 'technology' is intended to include hardware, software, systems and services."[1] That definition makes New Jersey's recycling coordinators "environmental technologists" who are reducing risks, improving efficiency and cost-effectiveness, and helping create new environmentally beneficial products.

That's a worthy goal. The recycling programs that reach it will be designed and operated by recycling professionals with a commitment to recycling and an understanding of financial analysis. Take control of your program by mastering these tools and making the numbers work for you.



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Talking like an accountant

Accrual accounting is a system that recognizes costs when they occur, or accrue, regardless of when cash outlays are made.

Amortization is an accounting method for calculating the current annual costs related to obligations for future outlays. For example, current payments needed to retire a debt by maturity are amortization expenses.

Avoided cost is the reduction in costs of one activity made possible by the operation of a different activity. In solid waste management, avoided costs often mean savings realized in the cost of collecting, transferring, transporting, and disposing garbage that is made possible by waste reduction, recycling and composting.

Bid is an offer to buy goods or services at a stated price.

Bilateral contract is a contract in which there are mutual promises between two parties.

Capital outlay is an outlay of cash to acquire a resource that will be used for more than one year. Capital outlays are converted into annual costs using the accounting method of depreciation.

Cash flow accounting, also known as cash basis accounting or general fund accounting, is a system where cash outlays for goods and services are recorded as they are actually paid out.

Cost means the dollar value of resources used for an operation during a given period.

Depreciation is an accounting method for allocating costs of capital outlays over the useful life of a resource. Useful life is a projection of how long a resource is expected to provide services; it may differ significantly from the actual amount of time the resource is used.

Direct costs are costs that can be linked specifically to an activity, program or department.

Externality is a benefit or harm caused by an activity for which there is no compensation paid by the party generating the activity. In solid waste management, for example, reduced depletion of natural resources is often cited as a positive externality of recycling, and potential for groundwater contamination in the future is often cited as a negative externality of landfills.

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Fixed costs are costs that do not change with the level of a given activity over a specific time period. In solid waste management, they often include interest, depreciation, overhead and many salaried positions that cannot be changed quickly in response to changes in program operations or service levels.

Full cost accounting is a systematic approach for identifying, summing, and reporting the actual costs of solid waste management, taking into account past and future outlays, overhead costs and operating costs. It does not include "externalities" that are not reflected in current market prices. In this manual, full cost accounting terms and definitions are used in accordance with the U.S. Environmental Protection Agency's "Full Cost Accounting for Municipal Solid Waste Management: A Handbook" (Document EPA530-R-95-041).

Future outlay means an expenditure of cash in the future that is obligated by current or prior activities.

GAAP stands for Generally Accepted Accounting Principles, which are the rules, procedures and practices that define accepted accounting practices.

GASB stands for the Government Accounting Standards Board, an independent organization that sets accounting standards for state and local governments.

Hidden costs are costs of activities or resources that appear to be free, or are understated, because the actual expense is incurred or recorded by another agency or organization.

Indirect costs are costs that are not exclusively related to one activity or program. Indirect costs for solid waste can include accounting, collections, payroll, personnel, legal, purchasing, information systems, record keeping, custodial, management, and expenses related to governing bodies of an organization.

Integrated solid waste management incorporates multiple approaches to manage the entire municipal solid waste stream. In an integrated system, increased activity in one activity – recycling, for example – creates savings that can be captured in another activity, such as garbage collection, transfer and disposal.

Liquidated damages are "reasonable estimates" of damages likely to result from a breach of contract. They are not penalties for failure to perform.

Marginal cost is the change in total costs resulting from a specific decision or change in activity**.** Also called incremental cost.

Net cost of a solid waste management activity is its full cost, minus its by-product revenues.

Operating costs are regularly recurring costs of resources that are used over a relatively short period of time (usually less than one year).

Opportunity cost is the value placed on activities or alternatives foregone when a decision is made to employ or allocate a resource.

Outlay is an expenditure of cash.

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Overhead costs are the management and support costs of running an organization. They cannot be tied to a particular activity or program, so they are allocated to all departments or programs using a variety of formulas. They are one kind of indirect cost.

Pay-as-you-throw (PAYT) pricing is a strategy for pricing garbage collection and disposal service in which the total amount paid by a customer is related to the amount of garbage disposed. Also known as "per-unit pricing" or "variable rate pricing."

Performance bond is a guarantee that protects an organization or individual in the event that a contractor fails to perform services required by contract.

Sunk costs are costs that cannot be recovered at the time a decision is made and, therefore, are irrelevant to any cost-benefit calculation.

Time value of money is the financial principal that a dollar in hand today is worth more than a dollar received tomorrow.

Variable costs change with the level of a given activity, such as recycling collection or garbage disposal. They are often operation, maintenance and other costs that can be reduced quickly in response to lower waste disposal tonnage.

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Appendices

Appendix A: Market indicators

The following publications list market indicators for commodity pricing. Publications are subscription-based with the exception of the ISRI Scrap Circular, which is updated at the discretion of the association.

1. ***The Fibre Market News***
   4012 Bridge Avenue
   Cleveland, Ohio 44113
   tel. 216-961-4130
   fax 216-961-0364
   toll free: 1-800-456-0707
   Published 24 times per year.

2. ***Official Board Markets; The Yellow Sheet***
   8 Anchor Way
   Port Washington, NY 11050
   tel 516-767-6444
   fax 516-767-2822
   Published weekly.
   Generally, mill direct pricing for paper.

3. ***Waste News***
   PO Box 07942
   Detroit, Michigan 48207-9862
   tel 1-800-678-9595
   fax 313-446-6777
   Published weekly.
   This is also a general industry news publication.

4. ***The Paper Stock Report***
   13727 Holland Road
   Cleveland, Ohio 44142-3920
   tel 216-362-7979
   fax 216-362-6553
   Published weekly.

5. ***Pulp and Paper Week***
   525 Market Street, Suite 500
   San Francisco, California 94105
   tel 800-289-0969
   fax 785-841-2634
   Published 48 times per year.

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6. ***SEFEX***
121 McBride Avenue
Paterson, New Jersey 07501
tel 973-278-1199
fax 973-278-8686
www.sefex.com

7. ***Recycling Markets***
255 Revere Drive, #01
Northbrook, Illinois 60062
tel 1-800-962-3001
fax 847-962-3001
Published twice per month.
Provides paper prices.

8. ***Platt's Metals Week (Platt's Standard and Poor's)***
1221 Avenue of the Americas
New York, New York 10020
tel 212-512-3065
fax 212-512-4008
Published weekly.
Non-Ferrous metals pricing.

9. ***Plastics Recycling Update***
PO Box 10540
Portland, Oregon 97296-0540
tel 503-227-1319
fax 503-227-6135
Covers plastics usage and market trends.

10. ***American Glass Review***
1011 Clifton Ave. #B-1
Clifton, NJ 07013-3518
tel 201-779-1600
fax 201-779-3242

11. ***SCRAP Magazine***
Institute of Scrap Recyclers
1325 G. Street, NW, Suite 1000
Washington, D.C. 20005-3104
tel 202-737-1770
fax 202-626-0900
Published bi-monthly.
Contains scrap metals and pricing.

12. ISRI Scrap Specifications Circular

Institute of Scrap Recyclers
1325 G. Street, NW, Suite 1000
Washington, D.C. 20005-3104
tel 202-737-1770
fax 202-626-0900
General publication providing guidelines for scrap specifications, including quality standards.

13. American Metal Market

350 Hudson Street, 4th Floor
New York, New York 10014
tel 212-887-8550
fax 212-887-8493
e-mail: rwilliam@chilton.net
Published daily.
Covers pricing and market conditions for metals.

14. Recycler's World

www.recycle.net/
On-line resource for most commodities.

Other sources of information

1. Glass Packaging Institute

1627 K Street, NW, Suite 800-L
Washington, DC 20006
tel 202-887-4850
fax 202-785-5337
e-mail: gpiwest@aol.com
Glass packaging trade association.

2. National Association of PET Container Resources

2105 Water Ridge Parkway
Suite 570
Charlotte, NC 28217
tel 704-423-9400
fax 704-423-9500
PET container trade association.

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Appendix B: PSI Specifications

ISRI's Scrap Specifications Circular 1998, Guidelines for Paper Stock, PS-98 Domestic Transactions

(1) Mixed Paper
Consists of a mixture of various qualities of paper not limited as to type of baling or fiber content. Prohibitive materials may not exceed 2%. Total outthrows may not exceed 10%.

(2) (Grade not currently in use)

(3) Super Mixed Paper
Consists of a baled, clean, sorted mixture of various qualities of paper containing less than 10% of groundwood content. Prohibitive materials may not exceed 1/2 of 1%. Total outthrows may not exceed 3%.

(4) Boxboard Cuttings
Consists of baled new cuttings of paperboard used in the manufacture of folding cartons, set-up boxes, and similar boxboard products. Prohibitive materials may not exceed 1/2 of 1%. Total outthrows may not exceed 2%.

(5) Mill Wrappers
Consists of baled paper used as outside wrap for rolls, bundles, or skids of finished paper. Prohibitive materials may not exceed 1/2 of 1%. Total outthrows may not exceed 3%.

(6) News
Consists of baled newspaper as typically generated from newsdrives and curbside collections. Prohibitive materials may not exceed 1%. Total outthrows may not exceed 5%.

(7) Special News
Consists of baled, sorted, fresh newspapers, not sunburned, containing not more than the normal percentage of rotogravure and colored sections. Prohibitive materials are not permitted. Total outthrows may not exceed 2%.

(8) Special News De-Ink Quality
Consists of baled, sorted, fresh newspapers, not sunburned, free from magazines, white blank, pressroom over-issues, and paper other than news, containing not more than the normal percentage of rotogravure and colored sections. This grade must be tare-free. Prohibitive materials are not permitted. Total outthrows may not exceed 1/4 of 1%.

(9) Over-issue News
Consists of unused, overrun newspapers printed on newsprint baled or securely tied in bundles, containing not more than the normal percentage of rotogravure and colored sections. Prohibitive materials are not permitted. Total outthrows - None permitted

(10) Magazines
Consists of baled coated magazines, catalogues, and similar printed materials. May contain a small percentage of uncoated news-type paper. Prohibitive materials may not exceed 1%. Total outthrows may not exceed 3%.

(11) Corrugated containers
Consists of baled corrugated containers having liners of either test liner, jute, or kraft. Prohibitive materials may not exceed 1%. Total outthrows may not exceed 5%.

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(12) Double Sorted Corrugated
Consists of baled, double sorted corrugated containers, generated from supermarkets and/or industrial or commercial facilities, having liners of test liner, jute, or kraft. Material has been specially sorted to be free of boxboard, off-shore corrugated plastic, and wax. Prohibitive materials may not exceed 1/2 of 1%. Total outthrows may not exceed 5%.

(13) New Double-Lined Kraft Corrugated Cuttings
Consists of baled new corrugated cuttings having liners of either test liner, jute or kraft. Insoluble adhesives, butt rolls, slabb or hogged medium, and treated medium or liners are not acceptable in this grade. Prohibitive materials are not permitted. Total outthrows may not exceed 2%.

(14) (Grade not currently in use)

(15) Used Brown Kraft
Consists of baled used brown kraft bags free of objectional liners and original contents. Prohibitive materials are not permitted. Total outthrows may not exceed 1/2 of 1%.

(16) Mixed Kraft Cuttings
Consists of baled new brown kraft cuttings, sheets and bag scrap free of stitched paper. Prohibitive materials are not permitted. Total outthrows may not exceed 1/2 of 1%.

(17) Carrier Stock
Consists of baled printed or unprinted, unbleached new beverage carrier sheets and cuttings. May contain wet strength additives. Prohibitive materials are not permitted. Total outthrows may not exceed 1%.

(18) New Colored Kraft
Consists of baled new colored kraft cuttings, sheets and bag scrap, free of stitched papers. Prohibitive materials are not permitted. Total outthrows may not exceed 1%.

(19) Grocery Bag Scrap
Consists of baled, new brown kraft bag cuttings, sheets and misprint bags. Prohibitive materials are not permitted. Total outthrows may not exceed 1%.

(20) Kraft Multi-Wall Bag Scrap
Consists of new brown kraft multi-wall bag cuttings, sheets, and misprint bags, free of stitched papers. Prohibitive materials are not permitted. Total outthrows may not exceed 1%.

(21) New Brown Kraft Envelope
Cuttings Consists of baled new unprinted brown kraft envelopes, cuttings, sheets. Prohibitive materials are not permitted. Total outthrows may not exceed 1%.

(22) Mixed Groundwood Shavings
Consists of baled trim of magazines, catalogs and similar printed letter, not limited with respect to groundwood or coated stock, and may contain the bleed of cover and insert stock as well as beater-dyed paper and solid color printing. Prohibitive materials are not permitted. Total outthrows may not exceed 2%.

(23) Telephone Directories
Consists of clean telephone directories printed for or by telephone directory publishers. Prohibitive materials are not permitted. Total outthrows may not exceed 1/2 of 1%.

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(24) White Blank News
Consists of baled unprinted cuttings and sheets of white newsprint or other uncoated white groundwood paper or similar quality. Prohibitive materials are not permitted. Total outthrows may not exceed 1%.

(25) Groundwood Computer Printout
Consists of groundwood papers which are used in forms manufactured for use in data processing machines. This grade may contain colored stripes and impact or nonimpact (e.g., laser) computer printing). Prohibitive materials are not permitted. Total outthrows may not exceed 2%.

(26) Publication Blanks
Consists of baled unprinted cuttings or sheets of white coated or filled groundwood content paper. Prohibitive materials are not permitted. Total outthrows may not exceed 1%.

(27) Flyleaf Shavings
Consists of baled trim from magazines, catalogs and similar printed matter. May contain the bleed of cover and insert stock to a maximum of 10%. dark colors. Beater-dyed paper may not exceed 2%. Shavings of novel news or newsprint grades may not be included in this grade. Prohibitive materials are not permitted. Total outthrows may not exceed 1%.

(28) Coated Soft White Shavings
Consists of baled unprinted, coated, and uncoated, shavings and sheets of white groundwood free printing paper. May contain a small percentage of groundwood. Prohibitive materials are not permitted. Total outthrows may not exceed 1%.

(29) (Grade not currently in use)

(30) Hard White Shavings
Consists of baled shavings or sheets of unprinted, untreated white groundwood free paper. Prohibitive materials are not permitted. Total outthrows may not exceed 1/2 of 1%.

(31) Hard White Envelope Cuttings
Consists of baled groundwood free cuttings, shavings or sheets of unprinted, untreated and uncoated white envelope paper: Prohibitive materials are not permitted. Total outthrows ma not exceed 1/2 of 1%.

(32) (Grade not currently in use)

(33) New Colored Envelope Cuttings
Consists of baled groundwood free cuttings, shavings, or sheets of untreated, uncoated bleachable colored envelope paper. Prohibitive materials are not permitted. Total outthrows may not exceed 2%.

(34) (Grade not currently in use)

(35) Semi Bleached Cuttings
Consists of baled sheets and cuttings of unprinted, untreated, groundwood free paper such as file folder stock, manila tabulating card trim, untreated milk carton stock, or manila tag. Prohibitive materials are not permitted. Total outthrows may not exceed 2%.

(36) Manila Tabulating Cards
Consists of printed groundwood free, bleachable manila-colored cards which have been manufactured for use in tabulating machines. This grade may contain manila-colored tabulating cards with tinted margins. Prohibitive materials are not permitted. Total outthrows may not exceed 1%.

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(37) Sorted Office Paper

Consists of baled paper, as typically generated by offices, containing primarily white and colored groundwood free paper, free of unbleached fiber. May include a small percentage of groundwood computer printout and facsimile paper. Prohibitive materials may not exceed 2%. Total outthrows may not exceed 5%.

(38) Sorted Colored Ledger

Consists of printed or unprinted sheets, shavings, and cuttings of colored or white groundwood tree ledger, bond, writing, and other paper which has a similar fiber and fiber content. This grade must be free of treated, coated, padded or heavily printed stock. Prohibitive materials may not exceed 1/2 of 1%. Total outthrows may not exceed 2%.

(39) Manifold Colored Ledger

Consists of sheets and trim of new (industrially generated) printed or unprinted colored or white groundwood free paper used in the manufacture of manifold forms, continuous forms, data forms, and other printed pieces such as sales literature and catalogs. All stock must be uncoated and free of nonimpact printing. A percentage of carbonless paper is allowable. Prohibitive materials may not exceed 1/2 of 1%. Total outthrows may not exceed 2%.

(40) Sorted White Ledger

Consists of printed or unprinted sheets, shavings, guillotined books, and cuttings of white groundwood free ledger, bond, writing, and all other papers which have a similar fiber and filler content. This grade must be free of treated, coated, padded, or heavily printed stock. Prohibitive materials may not exceed 1/2 of 1%. Total outthrows may not exceed 2%.

(41) Manifold White Ledger

Consists of sheets and trim of new (industrially generated) printed or unprinted white groundwood free paper used in the manufacturing of manifold forms, continuous forms, data forms, and other printed pieces such as sales, literature and catalogs. All stock must be uncoated and free of nonimpact printing. A percentage of carbonless paper is allowable. Prohibitive materials may not exceed 1/2 of 1%. Total outthrows may not exceed 2%.

(42) Computer Printout

Consists of white groundwood free paper in forms manufactured for use in data processing machines. This grade may contain colored stripes and impact or non-impact (e.g. laser) computer printing, and may contain no more than 5% groundwood in the pack. All stock must be untreated and uncoated. Prohibitive materials are not permitted. Total outthrows may not exceed 2%.

(43) Coated Book Stock

Consists of coated groundwood free paper, printed or unprinted in sheets, shavings, guillotined books and cuttings. A reasonable percentage of paper containing fine groundwood may be included. Prohibitive materials are not permitted. Total outthrows may not exceed 2%.

(44) Coated Groundwood Sections

Consists of printed, coated groundwood paper in sheets, sections, shavings or guillotined books. This grade may not include news quality groundwood paper. Prohibitive materials are not permitted. Total outthrows may not exceed 2%.

(45) Printed Bleached Board Cuttings

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Consists of groundwood free printed bleached board cuttings, free from misprint sheets, cartons, wax, greaseproof lamination, gilt, inks, adhesives or coatings that are insoluble. Prohibitive materials may not exceed 1/2 of 1%. Total outthrows may not exceed 2%.

(46) Misprinted Bleached Board
Consists of groundwood free misprint sheets and cartons of bleached board, free from wax, greaseproof lamination, gilt, and inks, adhesives or coatings that are insoluble. Prohibitive materials may not exceed 1%. Total outthrows may not exceed 2%.

(47) Unprinted Bleached Board
Consists of groundwood free unprinted, untreated bleached board cuttings, sheets or rolls, free from wax, greaseproof lamination and adhesives or coatings that are insoluble. Prohibitive materials are not permitted. Total outthrows may not exceed 1%.

(48) #1 Bleached Cup Stock
Consists of baled, untreated cuttings or sheets of coated or uncoated cup base stock. Cuttings with slight bleed may be included. Must be free of wax, poly, and other coatings that are insoluble. Prohibitive materials are not permitted. Total outthrows may not exceed 1/2 of 1%.

(49) #2 Printed Bleached Cup Stock
Consists of baled printed, untreated formed cups, cup die cuts, and misprint sheets of coated or uncoated cup base stock. Glues must be water soluble. Must be free of wax, poly, and other coatings that are insoluble. Prohibitive materials are not permitted. Total outthrows may not exceed 1%.

(50) Unprinted Bleached Plate Stock
Consists of baled groundwood free bleached coated or uncoated, untreated and unprinted plate cuttings and sheets. Prohibitive materials are not permitted. Total outthrows may not exceed 1/2 of 1%.

(51) Printed Bleached Plate Stock
Consists of baled groundwood free bleached coated or uncoated, untreated printed plates and sheets. Must be free of coatings or inks that are insoluble. Prohibitive materials are not permitted. Total outthrows may not exceed 1%.

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Appendix C:
Local Public Contracts Law Reference Guide

This appendix provides an index to New Jersey's Local Public Contracts Law (N.J.S.A. 40A-11.1 et seq.).

An asterisk indicates the topic is discussed in Chapter 5 of this manual. Some bid language recommended in Chapter 5 is optional; other language may be mandated by statute. To ensure legal compliance, review specifications with a lawyer before implementing a bid package.

This appendix provides an outline of the law. Refer to the statute for complete details.

The Local Public Contracts Law

Table of contents

40A:11.1	Short title; citation
40A:11.2	Definitions
40A:11-3	Purchases, contracts or agreements not required to be advertised
40A:11-4	Contracts and agreements required to be advertised for
40A:11-5	Exceptions
40A:11-6	Emergency purchases and contracts
40A:11-6.1	Award of purchases, contracts or agreements
40A:11-7	Contracts not to be divided
40A:11-8	Periodic solicitation for proposals of work or materials and supplies required
40A:11-9	Purchasing agent, department or board; establishment; powers
40A:11-10	Joint agreement for the purchase of work, materials, supplies; authorization
40A:11-12	Purchases through state agency
40A:11-12.1	Definitions
40A:11-12.2	Contracts between governing bodies for joint operation; authorization; combination and compilation of records
40A:11-12.3	Contract; terms; amendment
40A:11-12.4	Local unit party to contract; authority as agent
40A:11-12.5	Application to director of division of local finance to enter contract; approval; grounds; regulations

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40A:11-12.6	Application to director of division of local finance to enter contract; approval; grounds; regulations
40A:11-13	Specifications
40A:11-14	Form and execution of contracts and bonds *
40A:11-15	Duration of certain contracts *
40A:11-15.1	Insurance to fund pension system
40A:11-16	Separate plans for various types of work; bids; contracts
40A:11-16.1	Contracts over $100,000 for improvement of real property; requirement for withholding of payment of percentage of amount; agreement by contractor or in lieu deposit; disposition of interest
40A:11-16.2	Contracts over $100,000 for improvement to real property; partial payments
40A:11-16.3	Withholding of payment from partial payment
40A:11-16.4	Partial payments for materials; conditions; limitations
40A:11-16.5	Renegotiation of certain contracts for increased solid waste costs *
40A:11-17	Number of working days specified
40A:11-18	American goods and products to be used where possible
40A:11-19	Liquidated damages *
40A:11-20	Certificate of bidder showing ability to perform contract
40A:11-21	Guarantee to accompany bid; amount *
40A:11-22	Guarantee to surety company; certificate *
40A:11-23	Advertisements for bids; bids; general requirements *
40A:11-24	Time for making awards; deposits returned *
40A:11-25	General power to provide qualification for bidders *
40A:11-26	Standard questionnaire; effect of unsatisfactory answers
40A:11-27	Standard statements and questionnaires; prospective bidders; responses
40A:11-28	Classification of prospective bidders; notice
40A:11-29	Reclassification of prospective bidders; request for; time limit
40A:11-30	Board of review upon classification; membership, etc.
40A:11-31	Reconsideration by board of review; request for time limit
40A:11-32	Rejection of bids after qualification of bidder, hearing
40A:11-33	Forfeiture of deposit in certain cases
40A:11-34	Penalties for false statements
40A:11-35	Indemnity agreements; federal projects for benefit of municipality
40A:11-36	Sale or other disposition of personal property

40A:11-37	Division of local finance to assist contracting units
40A:11-38	Statutes repealed
40A:11-39	Effective date
40A:11-40	Specific materials; limitation on price; resolution; filing; procedure; report
40A:11-41	Definitions
40A:11-42	Qualified minority, women, or small business set aside program; establishment
40A:11-43	Award of contracts or subcontracts
40A:11-44	Application of Local Public Contracts Law
40A:11-45	Bidding for contracts or subcontracts; advertisements, publication
40A:11-46	Cancellation of set-aside contracts; notice; resolicitation of bids
40A:11-47	Award of contract based on false information; penalties; hearing
40A:11-48	Report; publication of agency's attainments
40A:11-49	Rules and regulations

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Appendix D: Uniform Solid Waste Bid Specifications Reference Guide

This appendix provides an index for the Uniform Solid Waste Bid Specifications (N.J.A.C 7:26H-6.1 et seq.). Bids that combine recycling collection with solid waste collection must conform to these specifications. A bid for recycling collection service alone must conform to the Local Public Contracts Law, but need not follow the requirements of the Uniform Solid Waste Bid Specifications.

An asterisk indicates the topic is discussed in Chapter 5. Some bid language recommended in Chapter 5 is optional; other language may be mandated by statute. To ensure legal compliance, review specifications with a lawyer before implementing a bid package. This appendix is only an outline of the law. Refer to the statute for complete details.

Uniform Solid Waste Bid Specifications Reference Guide

Table of contents

NJAC 7:26H-6.1	Purpose
NJAC 7:26H-6.2	Scope and applicability
NJAC 7:26H-6.3	Definitions
NJAC 7:26H-6.4	General instructions
NJAC 7:26H-6.5	Bidding requirements *
NJAC 7:26H-6.6	Conditions and limitations *
NJAC 7:26H-6.7	Award and execution of contract
NJAC 7:26H-6.8	Lowest responsible bidder *
NJAC 7:26H-6.9	Performance bonds *
NJAC 7:26H-6.10	Vehicle dedication affidavit
NJAC 7:26H-6.11	Contracts required to be filed
NJAC 7:26H-6.12	Work specifications
NJAC 7:26H-6.13	Conditions for curbside and rear yard collection

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NJAC 7:26H-6.14	Authorized disposal facility
NJAC 7:26H-6.15	Additional terms and conditions
NJAC 7:26H-6.16	Invoice and payment procedures
NJAC 7:26H-6.17	Insurance requirements *
NJAC 7:26H-6.18	Recycling *

Appendix A Contains the language and the format of the Uniform Solid Waste Bid Specifications.**

**In some circumstances the New Jersey Department of Environmental Protection allows minor deviations from required language in the specifications. You should consult a lawyer before doing so.

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Appendix E: Worksheets

The following worksheets and the information they contain may be reproduced and used in your recycling program. Please acknowledge the source of the worksheets if they are reproduced for the purposes of distribution.

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Full cost accounting for collection crews, cont.

Estimated cost for collection crews	**Annual cost**	
Operating costs		
Labor		
Direct labor	_____	
Backup labor	_____	
Crew leader	_____	
Mechanic	_____	
Recycling coordinator	_____	
Labor subtotal		_____
Fringe benefits	_____	
Fringe benefits subtotal		_____
Vehicle operation & maintenance		
Replacement parts	_____	
Fuel & fluids	_____	
Insurance	_____	
Licenses & taxes	_____	
O&M for backup vehicle	_____	
Vehicle operation & maintenance subtotal		_____
Other operating expenses		
Employee training	_____	
Direct supplies	_____	
Promotion/education	_____	
Other operating expenses subtotal		_____
Subtotal operating expenses		_____

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Full cost accounting for collection crews, cont.

Capital costs		**Annual cost**
Item: collection vehicle		_____
Purchase price	_____	
Useful life	_____	
Annual depreciation — collection		_____
Item: backup vehicle		_____
Item: pick-up truck		
Purchase price	_____	
Useful life	_____	
Annual depreciation — pick-up truck		_____
Item: containers		
Purchase price	_____	
Useful life	_____	
Annual depreciation — containers		_____
Subtotal capital costs		_____
Subtotal direct costs		_____
Overhead costs		
Indirect and overhead costs		_____
Subtotal overhead costs		_____
	Grand total	**$** _____
	Cost per day	**$** _____
	Cost per hour	**$** _____

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Talking to markets: A checklist

The following checklist for surveying potential buyers of recyclables is adapted from The International City/County Management Association's report *Marketing Recyclables*.

- ☐ contact information (name of buyer and firm, location, phone, fax, e-mail and website)
- ☐ type of market (broker, processor or end-user)
- ☐ types of material purchased
- ☐ specifications for each material, including listing of contaminants, acceptable contamination levels, and the physical form required (baled, loose, compacted)
- ☐ shipping requirements, including minimum and maximum size of loads, method of delivery, capacity, and any distance restrictions
- ☐ availability of transportation assistance
- ☐ procedures for determining weights and contamination levels
- ☐ price and payment schedules, including any pricing tied to a market indicator
- ☐ availability of long-term contract
- ☐ number of years in business

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Municipal demographic information data sheet

	Current year	Projected
Residential sources		
Single family	_____	_____
Multi-family(up to four family)	_____	_____
Apartments/condominiums	_____	_____
Other	_____	_____
Commercial sources (by type)		
Office building	_____	_____
Retail	_____	_____
Restaurant/bar	_____	_____
Supermarket	_____	_____
Convenience store/deli	_____	_____
Institutional sources	_____	_____
Schools	_____	_____
Hospitals	_____	_____
Houses of worship	_____	_____
Municipal sources	_____	_____
Municipal buildings	_____	_____
Libraries	_____	_____
Municipal depots*	_____	_____
Parks	_____	_____

* This includes collection at any recycling depots the municipality may operate.

Development trends	
New housing units in the past 5 years	( )
New housing units approved for the next year	( )
New housing units projected over the life of the contract	( )
New retail or commercial units or square footage next year	( )

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Municipal collection information data sheet

Tonnage reports:	**Year _____**	**Year _____**
Material recycled:	(Tons)	(Tons)
Glass		
Amber	_____	_____
Green	_____	_____
Brown	_____	_____
Aluminum		
Used beverage containers	_____	_____
Scrap foil	_____	_____
Steel cans		
Plastic containers		
PETE	_____	_____
HDPE	_____	_____
Newspaper (grade)	_____	_____
Corrugated cardboard	_____	_____
Other materials	_____	_____

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Data to collect in a route audit

Truck and route information

Model and year of truck: _____

Truck ID or license number: _____

Capacity: _____

Number of compartments: _____

Material collected and capacity per compartment:

1 _____

2 _____

3 _____

4 _____

5 _____

6 _____

Contents of vehicle at start of shift: _____

Crew size: _____

Frequency of collection: _____

Total length of route: _____

Odometer at first stop: _____

Odometer at last stop of first load, if one load: _____

Odometer at MRF: _____

Odometer at return to route (for second load): _____

Odometer at last stop of second load: _____

Odometer at return to route: _____

Odometer at return to garage: _____

Observed route statistics _____

Total number of stops on route: _____

Single family: _____

Multi-family: _____

Commercial/non-profit: _____

Total number of stops with set outs: _____

Single family: _____

Multi-family: _____

Commercial/non-profit: _____

Total number of items collected: _____

Single family: _____

Multi-family: _____

Commercial/non-profit: _____

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Data to collect in a route audit, cont.

Number of stops served first load: _____

Single family: _____

Multi-family: _____

Commercial/non-profit: _____

Number of stops served second load, if more than one: _____

Single family: _____

Multi-family: _____

Commercial/non-profit: _____

Tonnage for first load: _____

Tonnage for second load: _____

Key time statistics (in minutes)

Length of work day: _____

From start of work day to leaving for route: _____

Drive time to first stop on route: _____

Drive time to marketing facility: _____

First load: _____

Second load: _____

Total unloading, weighing and turnaround time at market facility: _____

First load: _____

Second load: _____

Lunch and break time: _____

Compaction or compartment adjustment: _____

Refueling: _____

Breakdowns or unscheduled delays: _____

Other (clean up of spillage or breakage, customer interaction, etc.): _____

At garage at end of work day: _____

Time available for collection: _____

Calculations

Average collection seconds per stop: _____

Single family: _____

Multi-family: _____

Commercial/non-profit: _____

Average number of items per set out: _____

Single family: _____

Multi-family: _____

Commercial/non-profit: _____

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New Jersey
Department of Environmental Protection

MISSION STATEMENT

VISION: The Department of Environmental Protection is committed to providing a high quality of life for the residents of New Jersey.

MISSION: To assist the residents of New Jersey in preserving, sustaining, protecting and enhancing the environment to ensure the integration of high environmental quality, public health and economic vitality. We will accomplish our mission in partnership with the general public, business, environmental community and all levels of government by:

- Developing and integrating an environmental master plan to assist the department and our partners in decision-making through increased availability of resource data on the Geographic Information System
- Defining and publishing reasonable, clear and predictable scientifically based standards
- Achieving the department's goals in a manner that encourages compliance and innovation
- Employing a decision-making process that is open, comprehensive, timely, predictable and efficient
- Providing residents and visitors with affordable access to safe and clean open space, historic and natural resources
- Assuring that pollution is prevented in the most efficient and practical way possible
- Assuring that the best technology is planned and applied to achieve long-term goals
- Assuring that non-treatable wastes are isolated, managed and controlled
- Enhancing environmental awareness and stewardship through education and communication
- Fostering a work environment that attracts and retains dedicated and talented people
- Committing to an ongoing evaluation of the department's progress toward achieving our mission