

September 2005



Recycle 101: The Basics & The Benefits



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The Recycling Basics



What is Recycling?



- Recycling is the process by which materials that would otherwise be destined for disposal, are collected, separated, processed and used to manufacture new products.



Successful recycling requires:

- 1) Collection and processing of recyclable materials
- 2) Manufacture of new products using recycled materials
- 3) Purchase of new products containing recycled materials by consumers



Recycling Definitions



Diversion Rate

- The amount of materials recycled and diverted as a percentage of the total MSW stream.

$$\text{Diversion Rate} = \frac{\text{Total MSW Recycled} + \text{Diverted}}{\text{Total MSW Generated}}$$

Recycling Rate

- The amount recycled divided by total MSW generated.

$$\text{MSW Recycling Rate} = \frac{\text{Total MSW Recycled}}{\text{Total MSW Generated}}$$



Recycling Definitions *(continued)*



Calculating Diversion & Recycling Rates

Recycle City, TX: Waste Generation (in tons)

Total MSW Generated 2,000,000

Waste Reduction Methods	Amount	Diversion	Recycling
Curbside Recycling	200,000	200,000	200,000
Drop-off Recycling	80,000	80,000	80,000
Yard Waste Collection	200,000	200,000	-
C&D	-	-	-
Commercial Recycling	150,000	150,000	150,000
Total MSW Diverted/Recycled	630,000	630,000	430,000

MSW Disposed 1,370,000

$$\begin{aligned} \text{Diversion Rate} &= \frac{630,000}{2,000,000} \\ &= 32\% \end{aligned}$$

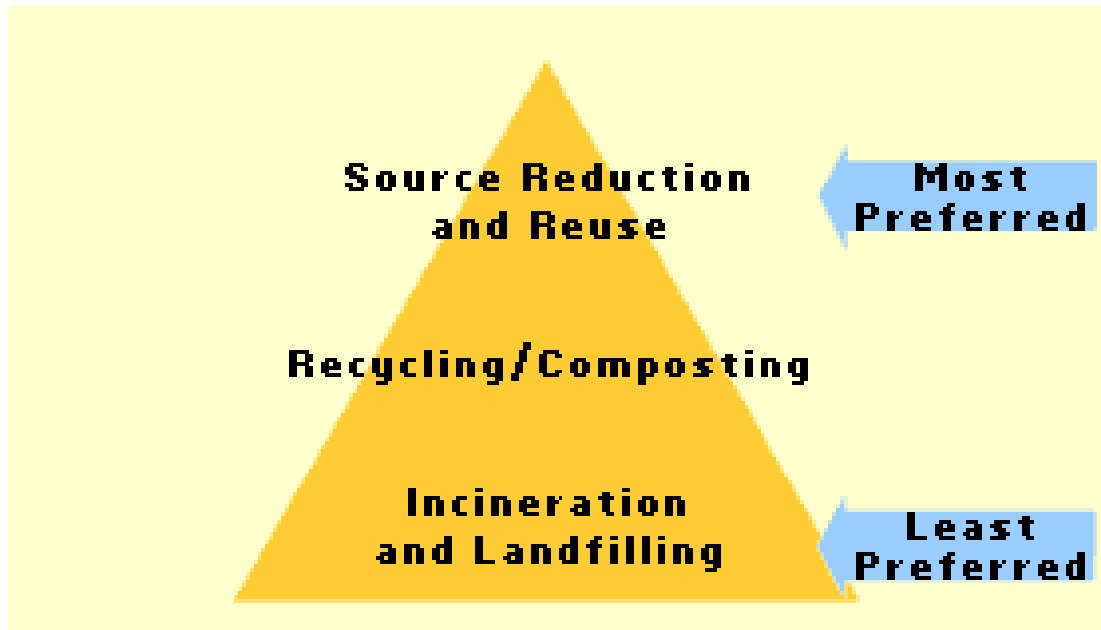
$$\begin{aligned} \text{Recycling Rate} &= \frac{430,000}{2,000,000} \\ &= 22\% \end{aligned}$$



Recycling Definitions *(continued)*



Solid Waste Management Hierarchy



Recycling Definitions *(continued)*



Recovery Rate

- The gross amount collected for recycling minus residuals and contaminants.

Participation Rate

- The percentage of households within a given community that participate in a recycling program at some point during a defined time period (e.g. month).

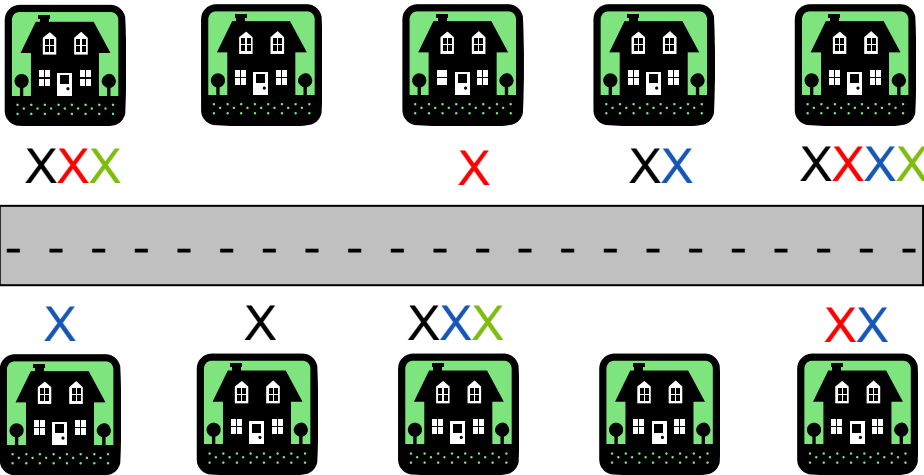
Set-out Rate

- The percentage of generators on a residential collection route who provide (or set-out) solid waste and/or recyclables for collection on a specific day.



Recycling Definitions *(continued)*

**Participation Rate = Number of Households Source Separating
Total Number of Households Served**



X = Week 1 X = Week 2 X = Week 3 X = Week 4

Calculation:

Participation Rate Over a Month

Number of Households Separating & Setting Out at Some Point During the Month = 8

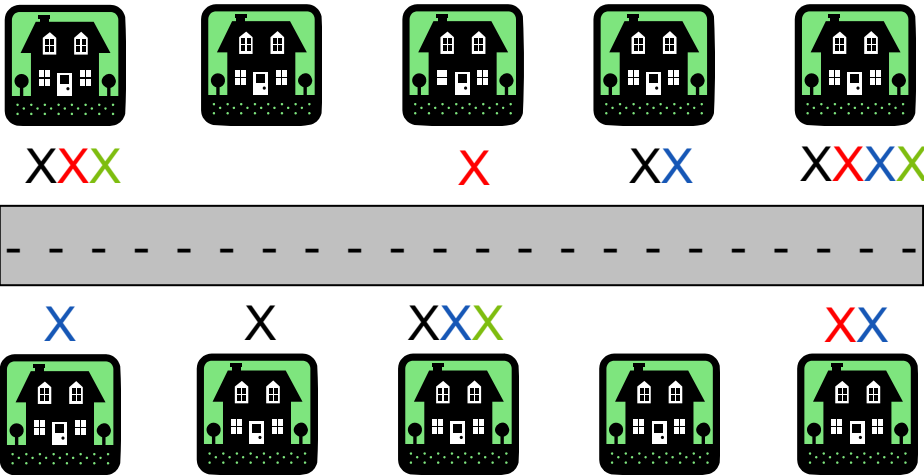
Number of Households Served = 10

$$\text{Participation Rate} = 8 \div 10 = 80\%$$



Recycling Definitions *(continued)*

$$\text{Set-out Rate} = \frac{\text{Number of Individual Set-outs on Collection Day}}{\text{Total Number of Households Served}}$$



Calculation:

Set-out Rate for Week 2

Number of Individual Set-outs on Collection Day = 4

Number of Households Served = 10

$$\text{Set-out Rate} = 4 \div 10 = 40\%$$

Set-outs Over the Course of a Month:

X = Week 1 X = Week 2 X = Week 3 X = Week 4



Recycling Definitions *(continued)*



Materials Recovery Facility (MRF)

- A facility that separates mixed recyclables into various components and processes those components for sale as commodities.

Processor

- A company or firm that buys and prepares recyclable materials to meet the specifications required by end users through processes such as sorting, densifying and packaging.

End User

- A company or organization that incorporates recycled materials into products it uses or manufactures.



Recycling Definitions *(continued)*



Closing the Loop

- Buying recycled products is often referred to as "Closing the Loop". When consumers purchase products or packaging made from recycled materials they help to encourage markets for those products.



Notes

- Local, state, and federal governments may promote buying recycled products through purchasing programs and "green" guidelines.
- The U.S. EPA estimates there are 4,500 recycled-content products available. These include items like cereal boxes, paper towels, carpeting, aluminum cans, newspaper, trash bags, glass containers, detergent bottles and motor oil.



Recycling Definitions *(continued)*



- When buying recycled products, look for items that contain “post-consumer waste”.

Post Consumer Waste

- Waste that has been through the hands of consumers.

Examples:

- Newspaper you read each day
- Aluminum can that contained your beverage
- Glass jar from the jam you finished this morning

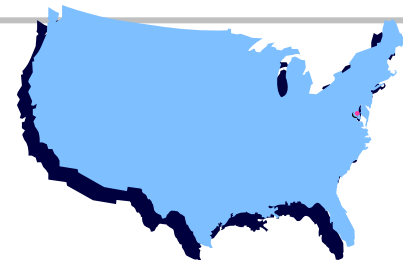


Notes

- When a product is labeled “recycled”, this simply means that the product contains some recycled fibers or materials that were once considered waste.
 - This waste could be pre-consumer waste or post-consumer waste. Pre-consumer waste is the scrap or waste from production processes or waste that has never actually been used by a consumer and has, in many cases, never actually reached the waste stream.
 - Looking for the term ”post-consumer waste” ensures that you are buying products that contain material that has been diverted from the waste stream.
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Recycling Laws, Rates & Trends

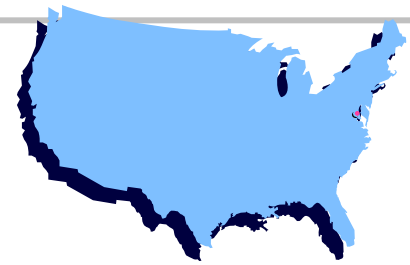


- There are no Federal or State of Texas laws related to a required recycling or diversion rate.
- The U.S. Environmental Protection Agency (EPA) establishes national recycling goals.
 - *Current Goal (set in 2002): Achieve 35% recycling rate by 2005*
- In 1991, the Texas legislature established a 40% statewide **waste reduction goal** to be achieved by 1994.
 - *The same goal remains in effect today and is monitored by the Texas Commission on Environmental Quality (TCEQ).*



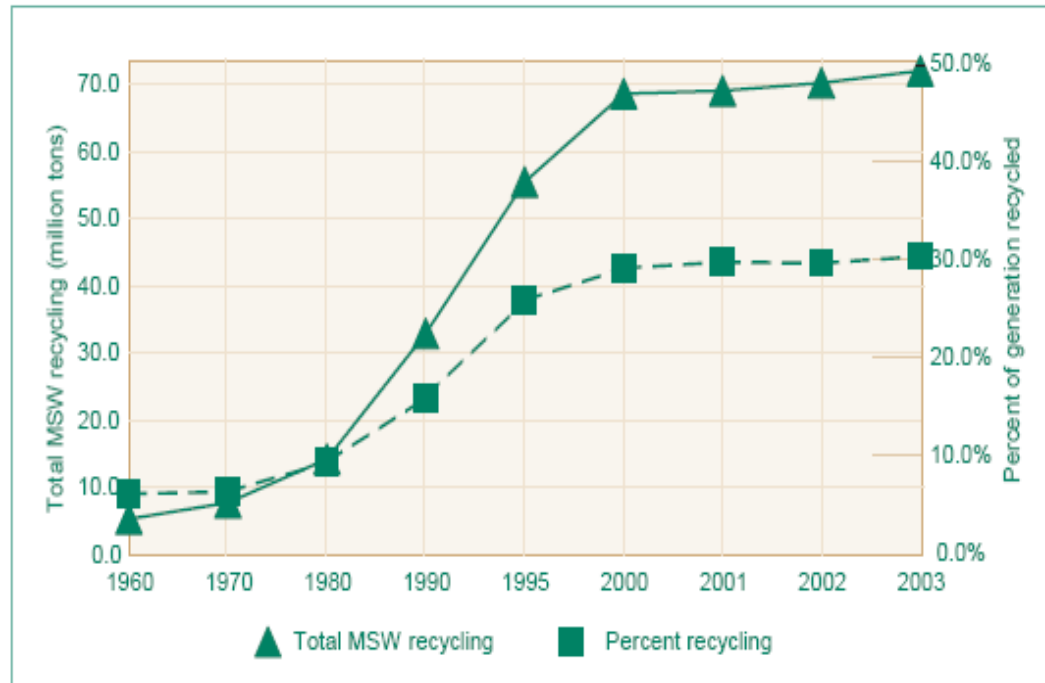
Recycling Laws, Rates & Trends

(continued)



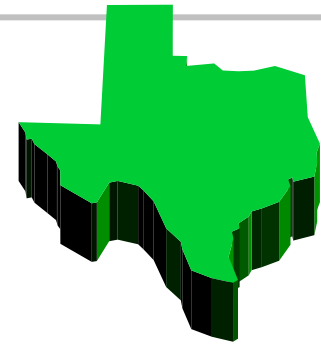
- Overall, national recycling rates have stagnated in recent years.

MSW Recycling Rates 1960-2003 (Source: US EPA, 2005)



Recycling Laws, Rates & Trends

(continued)



Current Recycling Rates: Major Texas Cities

City	Population	Recycling Rate
Austin, TX	672,011	28.5%
Dallas, TX	1,208,318	8.3%
El Paso, TX	584,113	1.0%
Fort Worth, TX	585,122	25.4%
Houston, TX	2,009,690	5.0%
San Antonio, TX	1,214,725	8.5%

Source: Municipal Recycling Survey. Waste News. February 14, 2005.

Weighted Average Recycling Rate = 10%

Percent of Texas Population Represented = 29%



Recycling Laws, Rates & Trends

(continued)



H-GAC Region

- H-GAC regional **waste reduction goal**: 80% reduction in per capita solid waste by the year 2012.
- Curbside recycling
 - Available to 37% of homeowners in the region (H-GAC, 2000)
 - Offered by 49 different communities (H-GAC, 2000)
- Drop-off recycling
 - 74 municipal recycling drop-off centers in the region (H-GAC, 2001)



Recycling Laws, Rates & Trends

(continued)



Summary of Goals & Rates

	Waste Reduction Goal	Recycling Goal	Diversion Rate	Recycling Rate	Per Capita Disposal Rate
United States	-	35%	30%	28%	4.5 lbs/pp/day
Texas	40%	-	31%	35%	7.3 lbs/pp/day
H-GAC Region	80%	65%	-	31%	8.9 lbs/pp/day

Sources:

- U.S. recycling goal – *U.S. EPA, 2002*
- U.S. diversion rate & recycling rate – *EPA, 2003*
- Texas recycling rate – *TCEQ, 1997*
- Texas diversion rate – *TCEQ, 2003*
- Texas waste reduction goal - *TCEQ, 2005*
- H-GAC waste reduction goal – *H-GAC, 2002*
- H-GAC recycling goal & recycling rate – *H-GAC, 2005*



Evaluating Recycling Needs & Programs



Setting a Community Recycling Goal



- 1) Inventory Existing Recycling Activities and Resources
- 2) Assess Results of Current Recycling Efforts
- 3) Evaluate the Waste Stream
- 4) Assess Needs and Identify Opportunities
- 5) Evaluate Program Options to Meet Those Needs
- 6) Establish Goal that is Realistic Given Your Community's Specific Circumstances, Needs and Resources



Notes

Steps for Setting a Community Recycling Goal:

1) Inventory Existing Recycling Activities and Resources

- Includes resources and infrastructure provided by both government programs and private programs.
- Collect and evaluate information on all solid waste management practices.

2) Assess Results of Current Recycling Efforts

- What are current recycling rates, participation rates, etc. in your community?

3) Evaluate the Waste Stream

- Determine amount, composition and source of waste generated.
- Consider conducting a waste audit.
- Analyze projected future waste generation trends.

4) Assess Needs and Identify Opportunities

- Where do the biggest opportunities for improvement exist?



Notes *(continued)*

5) Evaluate Program Options to Meet Those Needs

What is involved in various program types?

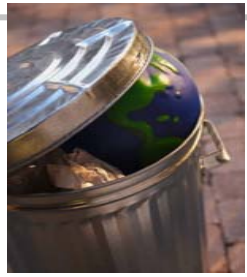
- Ease of implementation
- Costs (or cost savings)
- Waste reduction/diversion potential
- Facility and equipment requirements
- Market accessibility
- Compatibility with existing system

6) Establish Goal that is Realistic

- Goal should be generated and prioritized in a public process.
- Commitment to the goal is needed from decision-makers, general public, staff and all other affected parties.
- Goal should clearly specify a direction and desired outcome, and impart explicit purpose to programs.
- A goal should be realistic and achievable, but challenging.
- Progress toward achieving goals should be measurable.



Conducting a Waste Audit



The Waste Audit: A Valuable Tool

- Waste audits identify the types, sources, and quantities of wastes being generated and can pinpoint the practices and procedures that generate waste in your community.
- Excellent tool for determining what materials can be reduced and recycled within your community.



Conducting a Waste Audit *(continued)*



Types of Waste Audits:

- Examining facility disposal records
- Facility spot checks
- Collecting waste and doing a detailed waste sort

Recyclable materials you can expect to find in the waste stream:

Newspaper

Cardboard

Mixed office paper

Magazines

Glass

Steel cans

Aluminum cans

Plastics



Conducting a Waste Audit *(continued)*



Other Benefits of Conducting a Waste Audit:

- *Demonstrating need for recycling program.*
- *Cost benefit analysis of trash vs. recycling.*
- *Creating awareness and gaining PR for recycling efforts.*
- *Public education tool.*
- *Designing integrated waste management plan that promotes reduction, reuse, and recycling.*



Evaluating Recycling Needs & Programs

- Evaluate the different characteristics, needs and preferences of various customer types and design programs accordingly.

- Major Customer Types:

- *Single-Family Residential*
- *Multi-Family Residential*
- *Commercial*



Evaluating Recycling Needs & Programs

(continued)

Single-Family Residential

Program Design Options

- Curbside vs. Drop-Off Recycling

Factors to evaluate:

- *Residential density (primarily urban, suburban or rural population)*
- *Proximity to processing facility / MRF*
- *Proximity to end markets*
- *Overall size of population*



Evaluating Recycling Needs & Programs

(continued)

Single-Family Residential

• Curbside vs. Drop-off Recycling Comparison



	Drop-off Recycling	Curbside Recycling
Cost	Lower (pennies-\$1/hh/mo)	Higher (\$1-\$3/hh/mo)
Level of Effort	Borne primarily by the customer	Reduced customer effort / increased provider effort
Labor	Lower (small numbers & less skilled)	Higher (greater numbers & more skilled)
Equipment	Lower (collection containers only)	Higher (collection trucks & containers for customers)
Processing Needs	Lower	Higher (driven by program design)
Recycling Rates	Lower (0-10%)	Higher (5-20%)
Public Education	Equal (focus on encouraging participation)	Equal (focus on minimizing contamination)



Evaluating Recycling Needs & Programs

(continued)

Multi-Family Residential

Program Design Options

- Off-Site (Drop-Off) vs. On-Site Recycling
- Voluntary vs. Mandatory Participation
- Exclusive Contract vs. Open System



Evaluating Recycling Needs & Programs

(continued)

Multi-Family Residential



• Off-Site (Drop-Off) vs. On-Site Recycling

	On-Site Recycling	Off-Site Recycling
Cost	Higher	Lower
Convenience to Residents	Higher	Lower
Diversion Tonnage	Higher	Lower
Contamination	May be Higher	May be Lower
Apartment Manager Buy-In	Critical	Important



Evaluating Recycling Needs & Programs

(continued)

Multi-Family Residential

• Voluntary vs. Mandatory Participation



Factors to evaluate:

- *Without mandated participation, multi-family complex managers have little incentive to take part in a recycling program.*
- *Voluntary participation is likely to divert less materials than mandatory participation, making cost of service more prohibitive.*



Notes

- If recycling is not mandatory, apartment managers will have little incentive to participate in a recycling program, particularly when participation means incurring higher total refuse collection costs that must be passed along to residents.
- If a community is thinking about implementing a multi-family recycling program, R. W. Beck generally recommends that multi-family recycling programs be mandatory for complexes above some minimum size (ex: 25 units).



Evaluating Recycling Needs & Programs

(continued)

Multi-Family Residential

- Exclusive Contract vs. Open System

Factors to evaluate:

- *Equally high levels of expected participation.*
- *Both mandate that apartment complexes employ private sector recycling services.*
- *However, total cost of multi-family collection tends to be higher under open competition.*



Notes

- Total cost of multi-family collection (costs incurred by the City and costs incurred by residents or apartment complexes) tends to be higher under open competition.
 - This circumstance is a result of two factors:
 - 1) An individual apartment complex has substantially less leverage in the negotiation of a single collection contract than does the City negotiating terms of a contract on behalf of all multi-family units within its jurisdiction.
 - 2) Companies providing collection under exclusive contracts may be able to offer reduced rates because of economies of scale.
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Evaluating Recycling Needs & Programs

(continued)

Keys to Successful Multi-Family Recycling:

- Convenient access
- Public education
- Apartment buy-in



Evaluating Recycling Needs & Programs

(continued)

Commercial Recycling

- Examine local factors very carefully when evaluating whether or not your community should enter the commercial recycling business.

Factors to evaluate:

- *Existing Operations*
- *Market*
- *Financial Analysis*



Evaluating Recycling Needs & Programs

(continued)

Commercial Recycling

Existing Operations

- Should already be collecting commercial refuse and have excess capacity.
- Need access to processing facilities.

Market

- What materials are being generated?
- Is there a market for those materials?
- Are sufficient quantities of high-value materials being generated? (ex: paper and cardboard)
- Have businesses already contracted for collection?

Financial Analysis

- Conduct cost/benefit analysis.
- Rates must be viable.





Program Design Considerations



Privatization



Collection and processing services for recyclables can be provided by:

- Public sector
- Private sector
- Combination of public & private

Role of privatization in Texas:

- Curbside Collection – fairly even mix of public and private service providers.
- Drop-Off Collection – predominantly public.
- Processing – predominantly private.



Privatization *(continued)*

Private Collection and Processing

Advantages:

- Better positioned to get contracts with end users.
- Employ people with industry specific expertise.
- May be easier to contract with a processor than with an end-user.
- Contract with processor reduces market uncertainties.
- Can collect materials from a broad area, thereby reducing per ton transportation and processing costs.

Disadvantages:

- Share of any profits will be reduced.
- May charge a premium for their services.
- May only have interest in collecting certain types of materials.



Privatization *(continued)*

Public Collection and Processing



Advantages:

- Can haul material to whatever companies offer the best price.
- Provides option to increase recycling services.
- May be able to provide services at lower cost due to cheaper access to capital and lack of need to generate profit.

Disadvantages:

- Very capital intensive (multi-million dollar investment in MRF)
- May be difficult to get contract with an end-user if cannot generate significant volume of material.
- Distances to recycling markets may make it economically infeasible to transport materials.
- May be difficult to hire people with industry expertise.
- May not have sufficient quantities of materials for efficient processing.



Privatization *(continued)*

Tips for Building a Better Contract



- Include incentives for collector to divert as much clean material as possible.
- Include specific data and reporting requirements.
- Set standards for maximum allowable contamination rates.
- Specify who is responsible for reducing contamination, should it become necessary.
- Include provisions for revenue sharing.
- Specifying processing fees, floor prices and market indices for each type of commodity collected.
- Consider inclusion of educational activities paid for by the operator.
- Contract provisions that allow for additional processing capacity



Regionalization



Combining recyclables from several communities within a region can make processing and marketing of recyclables more economically feasible.

Potential Benefits of Regionalization:

- Greater economies of scale.
- Increased flexibility.
- Environmental improvement.
- More cost effective processing and marketing of materials.
- Better bargaining position for sales contracts.
- Promotes sharing of limited resources.



Regionalization *(continued)*



Potential Obstacles to Regionalization:

- Potential partners may have different goals.
- Multi-state or multi-county regional programs can face varying regulations.
- Costs and benefits for all partners may not be equal.
- Transporting waste across jurisdictions may cause conflicts.
- Trade-off between cooperation and autonomy.

The structure of a regional cooperative recycling effort must be tailored to meet the specific interests of potential participants.



Single-Stream vs. Dual-Stream



- Strong trend toward dual-stream or single-stream collection.
- Over 85% of MRF processing capacity in U.S. is designed to process single- or dual-stream recyclables.

Single-Stream



Dual-Stream



Notes

- **Single-stream collection** - Residents separate recyclables from waste materials and set them out in a single container for pick up in a commingled fashion by the collection crew.
 - **Dual-stream collection** - Recyclables are separated by the resident into two separate containers (one for fibrous recyclables such as paper and cardboard and another for recyclable containers such as plastic and glass bottles and metal cans) and collected in this separated fashion by the collection crew.
 - Within the H-GAC region, there are a number of processing facilities that are designed to process dual- or single-stream recyclables.
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Single-Stream vs. Dual-Stream *(continued)*



This change has been fueled by:

- Desire to increase number and quantity of recyclables.
- Customer desire for convenience and ease of use.
- Improvements in MRF processing technologies.
- Improvements in automated collection technologies.
- Pressure to reduce overall system costs.



Single-Stream vs. Dual-Stream

Single-Stream Collection



Advantages:

- Saves time and money in collection
- More convenient for residents
- Less wind scatter and litter
- Protection of paper from rain
- Can use standardized collection trucks
- Allows for automated collection
- Improved community aesthetics
- Net increase in total materials recovered

Disadvantages:

- Requires special processing
- Less quality control at the curb
- Low recovery of glass by color
- Potentially high contamination
- Higher MRF capital and processing costs
- Potentially lower value of materials
- Potential increase in MRF residuals
- Potential increase in disposal costs
- Higher costs for education and enforcement
- High cost of containers



Single-Stream vs. Dual-Stream *(continued)*



Dual-Stream Collection

Advantages:

- Reduce processing needs slightly
- May improve quality of materials collected
- Generally results in less contamination and residue to be disposed

Disadvantages:

- Increases collection costs
- Provides less convenience to participants
- Requires dual compartment recycling collection vehicles



Single-Stream vs. Dual-Stream *(continued)*



Things to Remember in Evaluating Different Collection Methods:

- Consider the total cost differences between methods.
- Economic feasibility of various recycling collection methods will be determined by local factors.
- If utilizing an existing processor, the collection system must be designed to accommodate them.



Notes

Consider the total cost differences between methods.

- Be aware of the total cost differences between a dual-stream system and a single-stream system.
- The separation method chosen will affect the type of recovery equipment required, how the material will be processed, and the efficiency of collection.

The economic feasibility of various recycling collection methods are determined by local factors (local collection, processing and marketing costs).

- Important to use local economic data in assessing economic feasibility of different collection options for a community or service area.

If utilizing an existing processor, then the collection system must be designed to accommodate them.



Glass Recycling



Problems with Glass Recycling:

- More prone to breakage when collected commingled.
- When glass is broken during the single-stream collection and sorting process:
 - Otherwise usable glass is lost to breakage; and
 - Other recyclable materials may become contaminated, resulting in increased residual rates, higher processing costs due to wear and tear on processing equipment and lower quality of materials for sale to end users.
- Glass markets are dwindling in many areas, thus driving up transport costs for many communities.
- Alternatives to container applications may not be well established and have a lower value.



Glass Recycling *(continued)*



Issues to Consider in Deciding Whether or Not to Recycle Glass:

- Availability of local markets for glass.
- Balancing program economics with environmental benefits.
- Impacts of eliminating glass collection on diversion rates.
- Economic viability of developing and marketing glass to alternative markets.
- Viability of alternatives to single-stream collection.



Legal Aspects of Recycling



Local

- Need to set clear rules under which recycling programs will operate
- Common ordinance provisions related to recycling:
 - Anti-scavenging ordinance
 - Set-out ordinance
- Decisions on operational rules should go through public process to lend credibility to the program.
- Many cities already have recycling ordinances in place.
 - No need to re-invent.

State

- Important that design of any recycling program be consistent with state law.



Notes

- Anti-scavenging ordinance – prohibits removal of materials from recycling containers that have been set out for collection.
- Set-out ordinance – regulates when containers may be set out for collection.
- There are no state laws related to the design of drop-off or residential curbside recycling programs, but processing and processing facilities may be subject to certain state requirements.



Marketing Recyclable Materials



Recycling is market driven! In fact, recycling is only possible because a demand exists for recovered materials other than disposal.

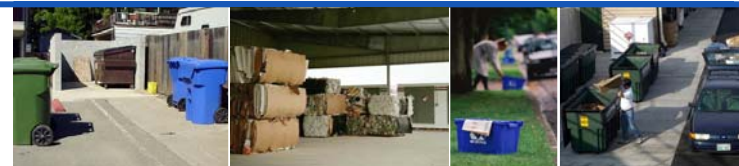
The marketing process has two major phases:

- Market Analysis Phase
 - Data and information gathering related to: supply, quality, demand, identity of markets, and assessment of marketing options.
- Market Implementation Phase
 - If sufficient market demand exists to justify recovery of material, then determine which outlet is most appropriate and negotiate agreements.



Notes

- Market - a customer (or group of customers) who is willing and able to accept the product or commodity that is being offered.
- Marketing - refers to the process of identifying intermediate and end-user markets and making arrangements for those markets to accept recyclables.



Marketing Recyclable Materials *(continued)*

Keys to Marketing Recyclables:

- Identify reliable markets
- Collect only materials with a market
- Well drafted market contracts
- Monitor markets regularly
- Consider privatization of marketing
- Track supply and demand for recyclables
- Minimize transportation distance of markets
- Maintain complete/efficient infrastructure
- Know availability of processing facilities
- Use cooperative markets
- Develop relationships with end users



Marketing Recyclable Materials *(continued)*

Example of a Regional Cooperative:

- **Central Texas Recyclers Association (CTRA)**
 - *Provides cooperative marketing of recyclable commodities.*
 - *Promotes development of end markets for recyclables in Texas.*
 - *Promotes education about recycling.*



CENTRAL TEXAS RECYCLING ASSOCIATION



Emerging Trends



Construction & Demolition (C&D)



What is C&D Debris?

- Materials produced during construction, renovation, or demolition of structures including buildings of all types, roads and bridges.

▪ Typical examples include:

- | | | |
|------------|-----------|--------------|
| ▪ Asphalt | ▪ Metal | ▪ Wood waste |
| ▪ Bricks | ▪ Drywall | ▪ Rock |
| ▪ Concrete | ▪ Roofing | ▪ Insulation |



Notes

- Following implementation of recycling programs that focus on residential and commercial sources of MSW, many communities have recognized a need to explore additional options to increase diversion rates.
- One way to further increase diversion is the implementation of an effective construction and demolition (C&D) waste minimization strategy.



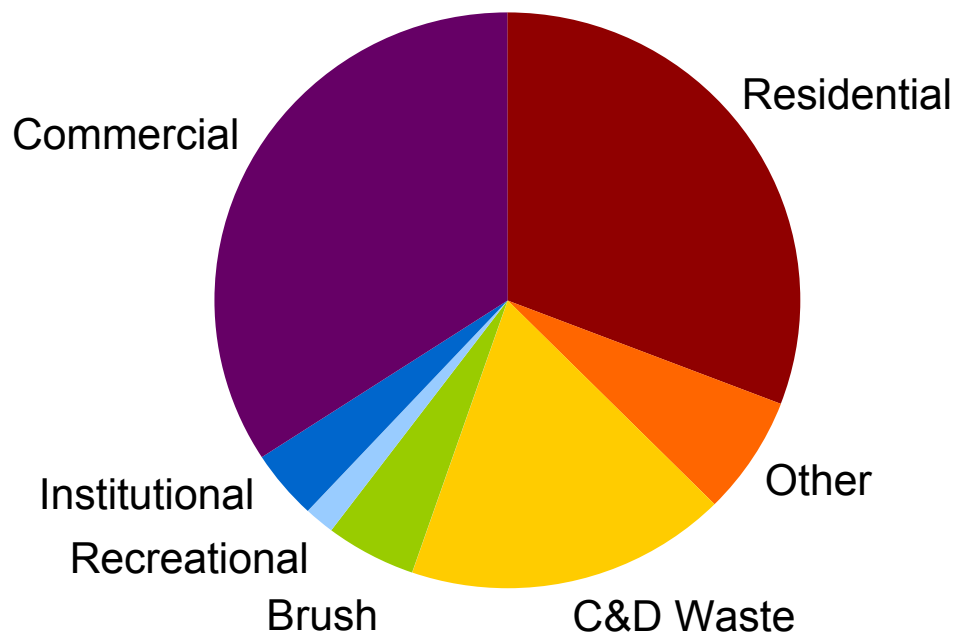
Construction & Demolition (C&D) *(continued)*

Benefits of a C&D Debris Diversion Program:

- Avoid trash collection and disposal fees.
- Make new products from old materials.
- Help your community meet local and state waste reduction goals.
- C&D represents a significant percentage of the waste stream.
- Reduce illegal disposal costs of C&D materials.
- Marketing tool for the building industry.

Character of the Texas Waste Stream

Source: TCEQ Annual MSW Facility Report



Construction & Demolition (C&D) *(continued)*

Examples of C&D Waste Minimization Programs:

- C&D Materials Recovery Facility
- Green Building Program
- On-Site Grinding
- LEED Deconstruction
- ReStore



Notes

- A C&D Materials Recovery Facility (MRF) is a processing center that accepts mixed C&D waste, and then sorts it by material type. While several C&D MRFs exist in the U. S., none are in Texas.
- Green building is an environmentally responsible approach to land development and housing construction in an effort to conserve natural resources.
- On-site grinding is the practice of grinding and crushing building materials and depositing them onsite as a soil amendment or for use in erosion control.
- Deconstruction is the selective dismantlement or removal of materials from buildings for reuse or recycling.



Household Hazardous Waste (HHW)

- Households discard many common items such as paint, cleaners, oils, batteries, and pesticides, that contain hazardous components.
- Leftover portions of these products are called household hazardous waste (HHW).
- These products, if mishandled, can be dangerous to your health and the environment.



Notes

Benefits of HHW Management:

- Conserves resources and energy that would be expended in the production of more products.
- Saves money and reduces the need for generating hazardous substances.
- Prevents pollution that could endanger human health and the environment.



Household Hazardous Waste (HHW)

(continued)

Collection Options:

- Permanent collection or exchange.
- Special collection days.
- Local business collection sites.



Notes

- **Permanent collection or exchange** - Facilities that collect HHW year-round. Some of these facilities have exchange areas for unused or leftover paints, solvents, pesticides, cleaning and automotive products, and other materials. By taking advantage of these facilities, materials can be used by someone else, rather than being thrown away.
- **Special collection days** - Designated days for collecting solid waste at a central location to ensure safe management and disposal.
- **Local business collection sites** – Some local businesses may allow for drop-off of materials for recycling or proper disposal.
- In all cases, municipalities should check with TCEQ regarding any additional permitting or notification requirements.



Electronic Waste (E-Waste)

The environmental impact of electronics at the end of their useful life can be reduced through reuse, donation and recycling.

Why Prevent E-Waste?

- Fast-growing portion of the waste stream.
- Contain hazardous materials.
- They are made with valuable materials.



Electronic Waste (E-Waste) *(continued)*



Ways to Reduce E-Waste:

▪ Reuse or Donation

- Extends the lives of valuable products and keeps them out of the waste management system for a longer time.

▪ Recycling

- Avoids pollution and the need to extract valuable and limited virgin resources.

▪ Buying Green

- Encourages electronics manufacturers to design greener electronics designed with environmentally preferable attributes.



Notes

E-Waste Recycling

- A growing number of municipalities are offering computer and electronics collections as part of household hazardous waste collections or special events. In addition, public and private organizations and some electronics manufacturers have emerged that accept computers and other electronics for recycling. In some cases, these services are provided free-of-charge.
 - Cell phones, batteries and printer cartridges can be collected and sent to (often free) national mail-in programs that provide mailers and free postage. There are often also local charitable organizations who will take some of these materials, especially cell phones. This offers an additional service to the community at little or no cost.
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Discuss Feasibility Within H-GAC Region



Public Outreach



Public Outreach Objectives

- Integral part of initiating or expanding a recycling program.
- Creates awareness, excitement and understanding thereby increasing participation and support.

Objectives of a Public Outreach Program:

- Capture the attention of target audience(s).
- Deliver effective message in target audience's own language.
- Motivate audience to take action.
- Provide feedback to reinforce behavior.
- Receive feedback from program participants.



Notes

Objectives of a Comprehensive Public Outreach Program:

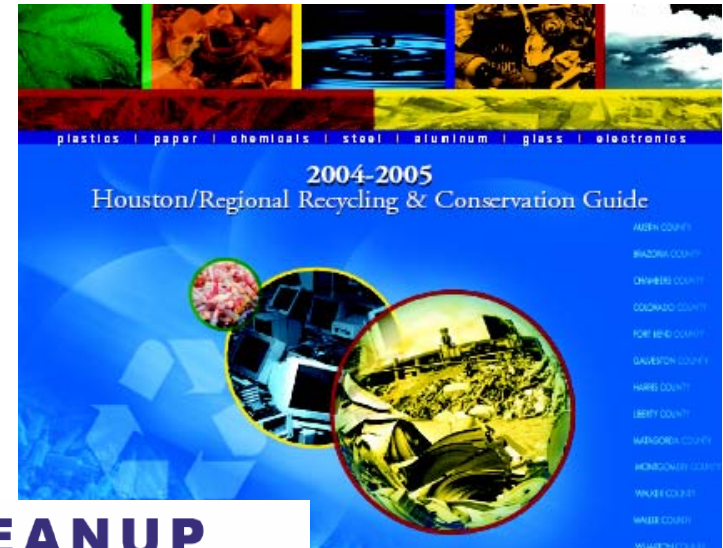
- **Capture the attention of the target audience(s)**
 - General public
 - Other educators
 - Businesses
 - Government
 - Other groups – environmental, neighborhood, non-profit, or civic
 - **Deliver effective messages in the target audience's own language**
 - Provide concise, attention-grabbing information on the benefits of recycling and describe how to recycle.
 - **Motivate the audience to take action**
 - **Provide feedback to reinforce behavior**
 - **Receive feedback from program participants**
-



Ideas for Public Outreach

Common Public Outreach Tools:

- Media Publicity
- Special Events
- Advertising
- Non-Media Publicity
- Direct Contact



1-800-CLEANUP
Pull the Plug on Waste. Recycle Your Electronics.



www.cleanup.org

KEEP SUGAR LAND BEAUTIFUL
CITY OF SUGAR LAND



Notes

Media Publicity – press kits/news, seminars, annual reports, editorial space, public service announcements, feature columns.

Special Events – contests, games, sweepstakes, fairs and trade shows, exhibits, kick-off events.

Advertising – print ads (newspaper, magazine, periodicals, trade journals, billboards), broadcast ads (radio, television, cable), packaging inserts.

Non-Media Publicity – brochures, booklets, bill stuffers, school curricula, newsletters, incentives, educational flyers, directories, posters and leaflets, premiums (stickers, buttons, magnets, t-shirts, pens).

Direct Contact – presentations, sales meetings, telemarketing, incentive programs, fairs and trade shows, door-to-door canvassing, block leader programs, school assemblies, speakers bureaus.



Ideas for Public Outreach *(continued)*



Keep Huntsville Beautiful



RECYCLING BUILDING MATERIALS

TIP WAREHOUSE
590 IH-45 NORTH

OPERATING HOURS
Monday-Saturday
7:30 a.m. to 5:00 p.m.

Phone (936) 294-5724



Keeping Momentum

Ideas for Keeping Momentum

- *Quarterly reports or newsletters.*
- *Press releases and news articles that highlight program milestones and track success.*
- *Ongoing public speaking engagements.*
- *Reward the community for participation (Examples: planting trees with revenue generated, random cash prize awarded to participants).*
- *Block leader programs.*
- *Weather channel/public access ads (reach all areas within the region).*
- *Movie theater PSAs (reach good demographic mix).*
- *Signs at recycling centers that promote accomplishments.*



Dealing With Resistance and Change



Why Recycle?

- **Conservation of Natural Resources**
- **Energy Savings**
- **Environmental Benefits**
- **Saves Landfill Space and Disposal Costs**
- **Economic Benefits**



Notes

Conservation of Natural Resources - making products from recycled materials rather than virgin materials conserves land, timber and water and reduces the need to drill for oil and dig for minerals.

Energy Savings - takes less energy to make recycled products.

Environmental Benefits - In most cases, making products from recycled materials creates less air pollution and water pollution than making products from virgin materials.

Saves Landfill Space and Disposal Costs - When the materials that you recycle go into new products, they don't go into landfills or incinerators, thereby conserving landfill space.

Economic Benefits - Recycling creates far more jobs than landfills or incinerators, and recycling can frequently be the least expensive waste management method for cities and towns.



Myths & Facts



Some Widely Circulated Myths and Facts About Recycling

(Sources: Global Recycling Network & Institute for Local Self Reliance)

MYTH #1: We can recycle only 25 to 30% of our solid wastes.

FACT: *Twenty-five percent was considered a maximum level in 1985. Today it should be considered a minimum, not a maximum.*

Recycling continues to grow. The recycling rate in the United States has increased from just 9% in 1980 to 28% in 2003. A dozen states are recycling 30% or more of their municipal solid wastes, and within these states, hundreds of communities have reached recycling rates of 50% or higher.



Myths & Facts *(continued)*



- **MYTH #2: Recycling is more expensive than trash collection and disposal.**
- **FACT:** *When properly designed, recycling programs are cost-competitive with trash collection and disposal.*

When the average cost of collection and disposal is compared to the overall average cost of collection and recovery, the economics of recycling and composting often look impressive.



Myths & Facts *(continued)*



- **MYTH #3:** Since we have plenty of landfills, recycling isn't important.
- **FACT:** *Concentrating only on landfill space misses the point. Recycling has many more benefits than reduced landfill use.*
- *The greatest environmental benefits of recycling occur in reducing natural resource damage, pollution and energy consumption that arises when extracting virgin raw materials and manufacturing new products.*



Myths & Facts *(continued)*



- **MYTH #4: Landfills are significant job generators for rural communities.**
- **FACT:** *Recycling creates many more jobs for rural and urban communities than landfill and incineration disposal options.*

Just sorting collected recyclable materials sustains 10 times more jobs than landfilling. However, it is making new products from the old that offers the largest economic pay off.

New recycling-based manufacturers employ even more people and at higher wages. Recycling-based paper mills and plastic product manufacturers, for instance, employ 60 times more workers than do landfills.



Myths & Facts *(continued)*



- **MYTH #5:** The marketplace works best in solving solid waste management problems; no public-sector intervention is needed.
- **FACT:** *The solid waste system has always operated under public sector rules and always will. Currently the rules encourage unchecked product consumption and disposal. Public-sector intervention is needed to shape a system in which materials are produced, used, discarded and recovered efficiently.*



Myths & Facts *(continued)*



- **MYTH #6: Recycling programs will make money.**
- **FACT:** *Many well-run recycling programs with good participation find it very difficult to generate a profit.*

Case Study: City X Recycling Revenues and Costs

	FY 06/07
Recycling Revenue	
Recycling Sales Revenue	\$ 2,100,000
Interest Income	\$ 200,000
Residential Recycling Fees	\$ 200,000
	<u>\$ 2,500,000</u>
Cost of Recycling Service	
Collection	\$ 2,200,000
Inspection & Education	\$ 150,000
Administration	\$ 85,000
Total	<u>\$ 2,435,000</u>
Excess Revenue/Loss	<u>\$ 65,000</u>



Notes

The Cost of Recycling:

All waste management, including recycling, has costs. In general, recycling costs include:

- **Collection and transportation** - costs to collect and transport recyclables from households, schools, businesses, and institutions represent the bulk of recycling costs.
 - **Separation and recovery** - Once recyclables get to the materials processing facility (MRF) they must be separated, sorted to remove contaminants, and baled.
 - **Contamination** - The market value of recyclables is significantly reduced when they are "contaminated" by food, hazardous materials, dirt, broken glass, other non-recyclable materials.
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Building a Program Over Time



Recycling programs will vary greatly between communities, both in the types of programs offered and the processes used to implement them.

Typical Progression of Community Recycling:

- Start with drop-off sites.
- Pilot residential curbside program.
- Expanded residential curbside collection.
- If local factors make it feasible, may want to expand into another of the following types of recycling:
 - *Multi-family collection*
 - *Commercial recycling program*
 - *Construction and Demolition Waste Recycling*



Notes

- During each stage it is important to monitor effectiveness using performance measures and surveys to evaluate whether there is a need for changes or additions to existing recycling programs.
- When expanding services or making changes to recycling programs (i.e. change in collection days, change in materials collected, etc.), public outreach and the provision of alternative recycling opportunities are imperative.



Performance Measurement



Performance Measures



Recycling program monitoring can be a valuable tool in attaining success.

The Value of Tracking Recycling Data Includes:

- Compliance with permit requirements.
- Tonnage rebates.
- Promotion of program success.
- Assistance with planning and decision making.
- Setting recycling or diversion goals.
- Identifying recycling trends.
- Determining viability and capacity of existing solid waste recycling and disposal facilities.
- Identification of areas for program improvement.



Performance Measures *(continued)*



Common Performance Measures:

- *Participation rate*
- *Set-out rate*
- *Recovery rate*
- *Diversion rate*
- *Cost per set-out*
- *Cost per customer*

Feedback and data related to the program can be obtained from a variety of sources:

- ***Custodial Staff & Employees*** - *input regarding material quality and handling practices.*
- ***Customers*** - *opinions concerning convenience.*
- ***Waste Hauler or Recycler*** - *data on type and amount of material recycled.*



Performance Measures *(continued)*

Case Study: City X

- City conducts periodic performance audits to assess the effectiveness of their collection and processing program.
- 2002 performance measures:
 - **Contamination rate = 26%**
 - **Set-out rate = 754 lbs/household/year**
 - **Residual rate = 24%**
 - **Average revenue per ton = \$94.00**
- Will need to conduct new performance audit in the near future to update these figures and evaluate the current state of the program.



Helpful Recycling Resources



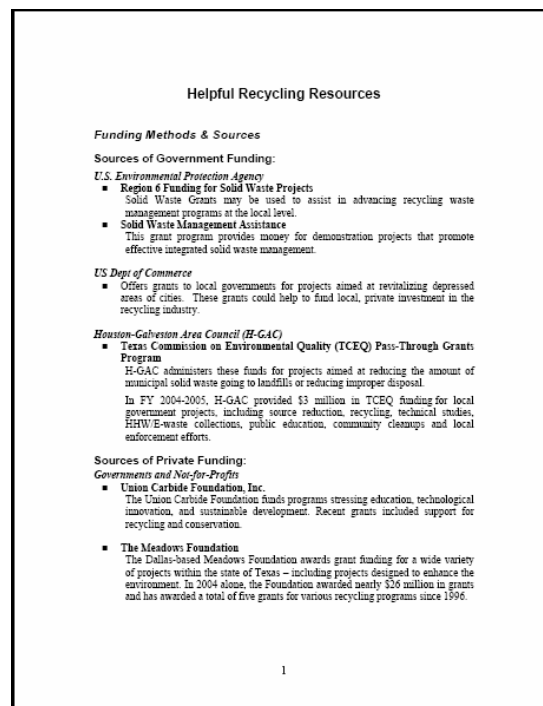
Funding & Information Sources



Helpful Recycling Resources Handout

Contains information on:

- Resources for information and assistance
- Sources of government funding
- Sources of private funding



Questions or Comments?

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