



Community Solid Waste Recycling Systems

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Recycling is becoming an important element of solid waste management programs in many communities. The purpose of recycling is to take waste products that would be landfilled, or otherwise disposed, out of the waste stream and place them back into use as feedstocks or raw materials for new or useful products.

The rising costs of waste disposal are creating cost competitive opportunities for recycling. Recycling, therefore, may cost less than disposal. In cases where there is strong public support for recycling, citizens are paying for recycling services as a normal part of their solid waste collection and disposal fees.

There are a variety of options for developing a recycling system which best meet the needs of a community. The goals for a recycling program must be carefully matched to capital and operating costs to ensure that the program is successful and sustainable. For example, unattended drop-off centers have the lowest capital and operational costs. However, they produce the lowest recycling rates due to contamination, misuse, and inconvenience to users. Curbside recycling collection offers the most customer convenience, but is also the most expensive method of community recycling. Therefore, complete business planning analysis helps to create a sustainable program. Community leaders and citizens need to work together to develop a recycling system that best suits their needs and attitudes.

The purpose of this fact sheet is to assist community leaders by the following:

- identifying materials commonly recycled in Oklahoma,
- reviewing collection system alternatives, and
- outlining the components of a community recycling action plan.

Buy Recycled Program

A step toward effective recycling is a "Buy Recyclables" program. Recycling can only take place if there are industries which need recycled material to make new products. Therefore, the most important action any individual or organization can pursue to support recycling is to buy products made from recycled materials (like the paper used for this fact sheet). A "Buy Recycled" program is required by state law for any

public entity receiving state funds. The program should be the cornerstone for any community recycling effort.

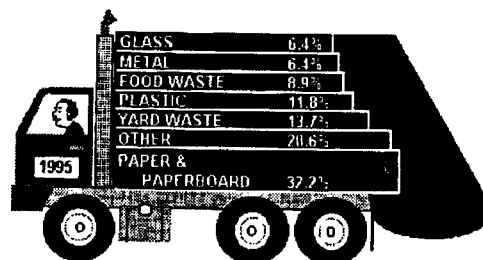
Recyclable Materials

Recyclables are products, and/or product containers, which can be recycled after the products are used. The contents of the typical American garbage can are presented in Figure 1. These data can be used to estimate the recycling potential for Oklahoma communities. Of the materials listed, much of the glass, metals, plastic, yard waste, food waste, paper, and paperboard can be recycled and kept out of the waste stream.

The national recycling rate projected for each material in the year 2000 is listed in Table 1. This information can be used to estimate the volumes that can be recovered if a community recycling program receives broad public support. While there is an increasing number of national examples of communities who have reduced their waste stream over 50 percent, the 1994 national recycling rate of 23.6 percent is a much more realistic goal for a successful community program. Communities need to plan ahead for wide fluctuations in markets, demand, and supplies of recyclables.

Yard Wastes

Although not normally thought of as recyclables, grass clippings, tree branches, and other landscaping debris can comprise as much as 20 percent of an Oklahoma community's



Source: Characterization of MSW in the US: 1996 Update, US EPA, Washington, DC

Figure 1. Net Waste Discards

Table 1. Projected Recycling Rates by Material, 2000.

Material	1995 Recycling Rate	Projected Recycling Rate
Paper & Paperboard	40.0%	43 to 46%
Glass	24.5%	27 to 36%
Ferrous Metal	36.5%	42 to 55%
Aluminum	34.6%	46 to 48%
Plastics	5.3%	7 to 10%
Yard Waste	30.3%	40 to 50%
Total Materials	27.0%	30 to 35%

Source: Characterization of MSW in the US: 1996 Update, US EPA, Washington, DC.

Printed from the MSW Factbook, Ver. 4.0, Office of Solid Waste, US EPA, Washington, DC, 1997.

waste stream. Yard waste recovery programs, therefore, yield significant waste reduction opportunities. Yard waste is high in organic content and can be applied directly to the land, chipped for mulch, or processed through composting. Where composting is used, additional waste reduction can be achieved by including food waste and non-recyclable papers. Virtually all Oklahoma soils benefit from the liberal application of compost or organic materials, so marketing or giving away the collected material is typically not a problem.

Collection, processing procedures, and costs are usually the biggest issues involved in planning a yard waste recovery program. The cities of Norman and McAlester operate yard waste composting programs. Ponca City, the Tulsa Metropolitan Environmental Trust, and the Central Oklahoma Metropolitan Environmental Association all have good public education programs which emphasize home composting of yard wastes. The Cooperative Extension Service's "Don't Bag It" program can assist communities in reducing the amount of yard waste going to a landfill, and thus reduce the tipping fees the community must pay.

Paper

Almost one third of a community's waste is composed of paper. Since there are a number of paper mills in and close to Oklahoma which need recycled paper as a feedstock, markets are generally available. Communities must coordinate closely with markets to take advantage of this recycling opportunity. However, not all paper is created equally. Proper sorting into grades (newsprint, cardboard, and high grade) is the key to a successful recycling program. The end use for the paper determines the sorting requirements and the value of the recyclables.

Newsprint. Old newspapers (ONP) are used to make new newsprint, cellulose insulation, construction materials like wallboard, and certain types of tissue products. Emerging markets include uses for animal bedding, composting, and direct land application. Advantages of ONP recycling are that citizens can readily identify the material, and they are already accustomed to storing their newspaper separately from other trash. Disadvantages are the low value of the fiber, and the

supply and demand volatility. Communities beginning new ONP programs should coordinate closely with their markets as they develop the project.

Cardboard. Old corrugated containers (OCC) are among the most frequently recycled items in Oklahoma. There is a large demand from both in-state and nearby paper mills. A collection network for bales of OCC exists throughout the state. Cardboard is generated primarily by commercial operations and can be easily separated as it is generated. A disadvantage is that OCC must be baled for shipment to market. Although the fiber normally commands a relatively low value, there are numerous Oklahoma examples which demonstrate that the recycling costs are less than disposal costs.

High Grade Paper. Computer paper, copy paper, stationery, junk mail, and most of what is typically thrown away in schools, offices, print shops, and banks, are forms of what the recycling industry calls "high grades." These types of paper are used to make new kinds of paper — ranging from the paper type used for this fact sheet, to fine tissue products. Compared to the other grades, high grades have an increased monetary value.

Metals

Steel mills in Oklahoma and Texas ensure a stable demand for ferrous metals generated in Oklahoma. Ferrous metal opportunities in the waste stream range from appliances, to food containers. Scrap metal businesses are markets throughout the state. Ferrous metals have a relatively low monetary value, but the cost of recycling is frequently lower than the cost of mining new ore and/or disposal.

Aluminum recycling is a national success story. Aluminum waste is easy to identify, collect, sort, and prepare for secondary sale. Since most bauxite, the ore from which aluminum is made, is imported, recycling has become America's largest source of aluminum. Tremendous energy savings from using recycled aluminum, rather than virgin ore, help to create the metal's relatively high monetary value. With markets located throughout the state, every community can offer some type of aluminum recycling program.

Plastics

Plastics make up an increasingly large volume of the waste stream. Like paper, there are a number of different types of plastics, and each must be separated for most recycling uses. In Oklahoma, community plastic recycling opportunities are typically limited to containers. Soft drink bottles are used to make materials ranging from carpet to clothing. Milk jugs and soap containers are used to make new containers.

Plastics have a relatively high value per pound, but are bulky and difficult to handle. Community leaders considering plastic recycling programs should coordinate closely with markets to determine the practicality of handling these materials. Some plastic recyclers accept mixed containers, but most require separation by plastic type, as small amounts of contamination degrade batches and are then rejected and landfilled. Elimination of plastics from the waste stream is especially important because of their large landfill volume relative to weight, and their resistance to biodegrading.

Glass

Eastern Oklahoma is home to a number of glass plants, each of which want recycled glass to make new glass. In order to be recyclable, however, the glass must be sorted by color and free of metal and ceramic contaminants. Although the demand is strong, glass is bulky and heavy and commands a low value. This makes it difficult to afford transportation costs from western Oklahoma to the glass plants. Some communities have saved transportation expenses by back-hauling on trucks which deliver their goods in the west, and return empty to the east.

Waste Oil

Recycling is the only good way to dispose of waste oil. Any other type of disposal has the potential to create environmental damage. Small amounts of oil can contaminate large amounts of water. Most public and private vehicle maintenance facilities have well-developed systems to store their waste oil for recycling. However, "do-it-yourselfers" account for a large percentage of the oil changes in any community. Therefore, it is important for community recycling and solid waste management programs to include a system for waste oil collection. In Oklahoma, waste oil is blended for fuel oil and typically shipped to out-of-state markets.

Collection System Alternatives

Once community leaders identify recycling markets which are available, the next step is to develop the most practical collection system. There are three principal systems of collecting recyclables:

- drop-off centers,
- buy-back centers, and
- curbside collection.

The type of collection system chosen will determine the operating costs of the recycling program. Usually, citizen participation rates are directly related to the simplicity and convenience of collection programs. While some recovered materials can be sold, sales revenues rarely cover operating costs. The positive economics of recycling include savings on disposal costs, but such savings cannot be used as actual cash flow to support the program. It is critical, therefore, that a detailed business planning analysis be conducted for each collection option, and especially for the system that is selected.

Drop-off Centers

A drop-off center is an area that has containers for the various recyclables collected. Residents bring recyclables to the center and deposit them in the appropriate containers. The centers can be located strategically throughout a community. Expenses for this system include site, area improvements, container rental or purchase, and an attendant. Refer to fact sheet 894, Rural Community Convenience Centers, for more expense details.

The most successful centers are staffed by an attendant. The attendant ensures the proper sorting of the materials, excludes waste and other material which the center is not designed to accept, keeps the center clean, and assists in educating customers.

The center should be fenced, well kept and lit, and have a series of signs which provide clear instructions for the customers. Containers for recycling centers are available in various sizes, and can be purchased, leased, or included in the specifications for private vendor services to the center.

An advantage of drop-off centers is that they have the lowest capital and operating costs for any type of recycling collection. This must be balanced against the disadvantage that they are the most inconvenient collection system for customers to use. Therefore, they may not achieve as good of a waste reduction impact as other types of recycling systems. Participation can be improved with good public education and convenient locations. Good examples of recycling centers include those operated by the Tulsa region Metropolitan Environmental Trust (M.e.t.) and the city of Norman.

Buy-back Centers

Buy-back centers are drop-off centers which pay customers for some or all of the materials which they bring to the center. While the financial return to customers may provide an incentive for increased participation, the low value of most recyclables makes it very difficult to recoup the purchase price and any processing costs. Because of this, most buy-back centers are private operations specializing in certain types of recycled materials. The city of Owasso operates the only public buy-back program in Oklahoma.

Curbside Collection Systems

Curbside collection programs collect recyclables in the same manner as normal solid waste. They can be designed in three basic ways:

- customers sort recyclables before collection,
- collection workers sort materials as they are collected, and
- materials are commingled and sorted at a materials recovery facility.

Since collection is the largest single expense in a solid waste management system, curbside collection is the most expensive type of recycling system. However, it offers maximum convenience for the customer and should yield the highest participation rates. Curbside collection of old corrugated containers from commercial businesses may be cost effective in many areas of the state. Sections of Oklahoma City are served by a residential curbside collection program. Elk City, Atoka, McAlester, and Norman all operate successful cardboard recovery programs for commercial customers.

Processing

All recyclables must be processed in some manner for manufacturing customers prior to shipment. Processing steps usually involve sorting, removal of contaminants, and packaging the material into a form that facilitates its transportation to market. For example, OCC must typically be baled for shipment. Proper processing adds value to the recyclables, but it also increases costs. Community recycling programs may include processing, or the processing can be handled by private vendors. However accomplished, processing is an integral element of the recycling system, and must be evaluated in the planning process.

Public Education

Public education is an essential ingredient for any type of recycling program. The educational effort must be continuous and broad-based. Customers need to be motivated to participate, and they need directions for proper participation. The education campaign should be targeted through a variety of approaches to reach all sectors of the community. The more effective the educational program, the better the citizen participation.

Plan of Action

Good business planning is critical to the long-term success of any recycling project. The community's needs and objectives must be identified, and costs and finances must be determined. Once a program is implemented, community leaders should continually monitor it, not only to improve operations, but also to signal the need to change with changing conditions.

A variety of resources are available for recycling planning. Public agencies such as the Oklahoma Department of Environmental Quality (405-271-3775) and the OSU Cooperative Extension Service can assist community leaders with all aspects of planning and implementation. Assistance is also available through private non-profit organizations such as the Association of County Commissioners of Oklahoma (405-524-3200), the Oklahoma Recycling Association (405-945-1932), and the Solid Waste Institute of Northeast Oklahoma (918-456-0116).

Conclusion

Communities are changing their waste disposal practices. Many materials in an average waste stream can be recycled. Incorporating recycling into a waste management system can reduce the waste going to a landfill by half. Recycling

prolongs the life of existing landfills. There are several types of recycling systems. A community needs to consider many variables to determine which type of system best suits its needs. A successful program includes educating the public, thorough planning and management from community leaders, and public support, dedication, and participation. Usually, recycling systems are not self-supporting and must be subsidized. Oklahoma Cooperative Extension Service and state agencies will assist communities in planning waste collection and disposal systems.

References

Data and figures are from the Municipal Solid Waste Factbook, Ver. 3, U.S. EPA Office of Solid Waste, Washington, D.C. 1996.

For additional waste management information, contact your local County Extension Service office or refer to the following extension publications:

- AGEC-881 Solid Waste Transfer Stations for Rural Oklahoma
- AGEC-887 Rural Community Yard Waste Composting Systems
- AGEC-894 Rural Community Convenience Centers
- AGEC-900 Roadside Dumping: Possible Solutions
- MP-140 A Guidebook for Community Convenience Centers:
 - One Solution to Illegal Roadside Dumping
- The "Don't Bag It" series for yard waste disposal:
 - L-251 Mulching with Wood Chips
 - L-252 Leaf Composting
 - L-253 Lawn Care

These publications and others can also be downloaded from the Solid Waste Management and Education Web site at http://www.okstate.edu/OSU_Ag/asnr/agec/Kimball/SOLID.HTM.

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