

Case studies in rural recycling: part 2

This article summarizes case studies of two rural recycling programs: Prairie du Sac, Wisconsin and the Arcata Community Recycling Center in Arcata, California. The programs were presented in a report published in November 1987, *Case Studies in Rural Solid Waste Recycling*. Research for the report was conducted by The Minnesota Project, a nonprofit rural community development organization based in Minneapolis. A 1986 grant from the Ford Foundation funded the study of solid waste management in rural areas.

PRAIRIE DU SAC, WISCONSIN

The Village of Prairie du Sac, Wisconsin, is an example of a mandatory curbside recycling program with more than five years of experience that depends on a separate organization to process and market the recyclable materials it collects.

Prairie du Sac is located in south central Wisconsin, about 30 miles northwest of Madison. The estimated 1980 population was 2,145, a 13 percent increase from 1970. Prairie du Sac is immediately adjacent to the village of Sauk City with a 1980 population of 2,703. Both villages are located in Sauk County which had a 1980 population of 43,469. Median household income in Prairie du Sac is higher than state and national averages.

Solid waste generation, collection and disposal

An estimated 3.7 tons of solid waste are generated each day in Prairie du Sac, or 1,368 tons each year - about 60 percent of which is residential solid waste. The village collected its own residential and commercial trash on a weekly basis until January 1987, when it decided to contract with a private waste hauler as a means of saving municipal funds.

The annual contract requires the hauler

to provide once-a-week curbside trash collection for around 900 households and businesses. The hauler disposes of the village's trash in the Middleton landfill located 30 miles away in Dane County. The tipping fee is currently \$15 per ton. The Middleton site is expected to reach capacity in one to two years.

A combination of user fees and general funds pay for the garbage contract. Households are billed \$3 per month on their village utility bills for garbage services; businesses are billed \$7.50 to \$50 per month based on the volume of garbage collected.

Recycling program

Village trustees initiated solid waste recycling in 1980 as a means of cutting solid waste transportation and tipping fees. In 1980-1982, the village operated a voluntary drop-off box for recyclable materials in front of the village garage. Wisconsin Intercounty Nonprofit Recycling (WINR), Inc., located 10 miles away, picked up the village's recyclables for free on a regular basis. WINR processed and marketed the recyclables.

In January 1982, a mandatory curbside recycling ordinance went into effect for all households and places of business in the Village of Prairie du Sac. The village made a concerted effort to inform the public by sending notices to residents and businesses in the utility bills, making presentations to civic groups and clubs, and publishing ads and articles in the local paper.

Beginning in January 1982, the village delivered four clear plastic bags each month to households and businesses for recyclables. Village workers collected recyclables every other Tuesday using a truck pulling a trailer and delivered the materials every other week to WINR.

Village workers enforced the ordinance by tagging bags of recyclables and/or garbage with warnings indicating refusal to

pick up trash if recyclables were not separated correctly. These warning tags seemed to be enough of an incentive for residents to learn how to recycle materials and dispose of garbage properly. Although no fines have been levied to date, the ordinance does allow their use to encourage compliance.

Program operations

A few changes have been made in the Prairie du Sac Recycling Program since it became mandatory in 1982. In January 1987, when the village began contracting for trash collection, the agreement included provision for pickup and delivery of recyclables. The hauler's support for recycling was so enthusiastic that he suggested increasing recycling collection to once a week for the convenience of residents and businesses.

The hauler collects recyclable materials every Tuesday from about 8:00 a.m. to 12:00 noon. The plastic bags containing recyclables are placed in a compactor truck, although they are not compacted.

As stated earlier, the village ordinance includes penalties for noncompliance. The hauler can refuse to pick up trash if the household or business fails to recycle, or the village can levy a fine of up to \$50. However, rather than enforce the ordinance strictly, the hauler prefers to approach households or businesses personally to explain why and how to recycle. Both the village and the hauler think this personal approach is working well.

Prairie du Sac residents are asked to recycle glass containers, aluminum cans and scrap, newspaper, corrugated boxes, tin cans, office paper, cooking grease, used motor oil and plastic containers. Residents are not asked to separate recyclables; rather, they need only place recyclables together in the plastic bags provided by the village.

According to the village clerk, little public information and education takes place



at present because residents already know how to recycle. New residents and businesses are given written and oral information when applying for village utility service.

All materials are donated to WINR. Immediately after the hauler delivers Prairie du Sac's recyclable materials, WINR workers begin sorting and processing items.

WINR operates with a full-time but unpaid director, three part-time paid employees and a pool of about 30 volunteers. Approximately 10 volunteers are scheduled to help process materials at any one time.

WINR is located in a 5,000-square-foot building just off Highway 12 in North Freedom, Wisconsin. The center operates with a mill-sized baler, glass crusher, forklift, magnetic separator, and sorting tables. Recyclables are stored before market either inside or just outside the building.

1 Loading recyclables in Prairie du Sac, Wisconsin.

2 Separating glass by color at Arcata Community Recycling Center in Arcata, California.



2

According to the Prairie du Sac hauler and the WINR director, 24 tons of recyclables are delivered each month from the Village of Prairie du Sac. The recovered volumes represent approximately \$7,000-\$8,000 in revenues each year for WINR.

Materials and markets

The Village of Prairie du Sac has nothing to do with the processing or marketing of

recyclables. WINR markets all of the village's recyclables along with those received from the general public and other communities in Sauk and Dane counties. Nearly all materials are backhauled by semi-trucks for delivery to end users in Wisconsin and Illinois.

Scrap corrugated containers constitute 25 percent by weight, or 72 tons per year, of the village's secondary materials. Glass containers and newspaper constitute an important portion of the village's recyclables as well. A specific breakdown of the village's materials and volumes is not available since WINR handles materials from so many different people and places. According to the WINR manager and the village hauler, volumes have continually increased over the five-year history of the village's mandatory recycling program.

The 288 tons of recyclable materials collected annually from Prairie du Sac equal 21 percent of the solid waste stream. It is estimated it would have cost the private hauler \$4,320 in tipping fees to dispose of the 288 tons of material. Avoided disposal fees are accrued by the village and the hauler's contract reflects these savings.

Finances

The village does not separate the recycling budget from the trash budget. Both activities are included in the \$82,000 annual contract with the private hauler.

The hauler estimates that annual labor, truck and transportation costs for recycling are about \$8,000. The city spends \$2,400 on clear plastic bags and \$720 for delivery of bags each year. The total the village spends for recycling collection services is estimated to be \$12,000 annually.

The costs of processing and marketing the village's recyclables are not incurred by the Village. WINR estimates that 37 percent of the recyclables it handles come from Prairie du Sac: Therefore, it may be assumed that 37 percent of WINR expenses might be attributable to processing and marketing Prairie du Sac's recyclables. This figure equaled about \$13,000 in 1986. In all, the Prairie du Sac Recycling Program appears to cost about \$25,000 per year.

Problems

The village, the hauler and the WINR director indicate no big problems with the Prairie du Sac Recycling Program. The hauler feels that households and businesses need more than four bags each month for recyclables. In fact, he suggests distributing color-coded bag tags rather

than clear bags for recyclables, leaving the purchase of bags to residents. The hauler also sees a need to encourage more recycling among apartment dwellers. Finally, he needs time to meet individually with households and businesses to encourage proper recycling.

Plans and prospects

The Village of Prairie du Sac its hauler and WINR may well pursue remedies for the above-mentioned problems in the near future. The village may decide to distribute more recycling bags or to switch to a recycling bag tagging system. The hauler will continue to meet personally with private residents to increase recycling activities and to ensure that recycling is done properly. In addition, the village may, in time, institute a full user fee to pay for the recycling system.

Changes in overall village waste management practices will occur as well. The village's trash hauler will have to find a new disposal site in the near future. The Middleton site is near capacity and is expected to close in one to two years. Trash fees will likely rise, which may affect the amount of village recycling. To date, no discussion of volume-based user fees for residential garbage collection has taken place.

Changes in Sauk County may affect Prairie du Sac's recycling and solid waste management system. The county's solid waste management plan is being updated and the new plan may well include financial support for recycling and may require mandatory countywide recycling.

WINR's future looks good, which bodes well for the Prairie du Sac recycling program. WINR's recycling volumes continue to rise and Sauk County currently provides some funding to operate the center. Most people involved in the area's waste management expect this county support for WINR to continue,

ARCATA, CALIFORNIA

The Arcata Community Recycling Center is an example of a private nonprofit recycling program with four methods of collecting recyclables: drop-off, buy-back, commercial collection and neighborhood drop sites.

Arcata, California is located 300 miles north of San Francisco in Humboldt County on California's northern coast. Arcata's 1980 population was 12,340, a 37 percent increase from 1970; approximately 6,000 residents are Humboldt State University students. The population

of Humboldt County is around 113,000. In 1981, 50 percent of the county's population lived outside incorporated areas. Arcata's median household income is below state and national averages.

Solid waste generation, collection and disposal

An estimated 30 tons of solid waste are generated each day in Arcata, or 11,000 tons each year, 70 percent of which is estimated to be residential waste. Arcata Garbage Company holds an exclusive 10-year franchise to collect and dispose of Arcata's residential and commercial solid waste.

The company picks up garbage on a weekly basis from residences. Households are billed \$4.50 a month for this one-can-a-week collection; garbage bills are higher if the household places more than one 30-gallon container a week at the curb. Collection costs for commercial establishments depend on the frequency and volume of collection.

All garbage haulers operating within Humboldt County are required by the county to haul trash to a designated transfer station. Haulers pay a tipping fee of \$6.85 per ton to the Eureka Transfer Station operator. The transfer station compacts the garbage and as required by the county, transports all waste to the Cummings Road Landfill, 10 miles east of Eureka.

The county pays the landfill operator \$6.85 per ton for disposal of the transfer station waste. According to the landfill operator, the disposal site has more than 20 years of remaining capacity.

The costs of garbage collection in Arcata are covered through fees paid directly by households and businesses to Arcata Garbage Company. The city incurs no additional solid waste management expenses. The cost of Arcata's final garbage disposal at the landfill, which amounts to around \$75,350 a year (\$6.85 per ton x 11,000 tons), is paid by Humboldt County through a combination of county general funds and some user fees paid by Arcata Garbage Company.

Recycling program

The Arcata-based Northcoast Environmental Center (NEC), a nonprofit consortium of environmental groups in the Humboldt County area, started a recycling project in Arcata in July 1971. A recycling drop-off site, which was open to the public on Saturdays, was established on a vacant lot in Arcata. Volunteers spent Saturdays receiving, sorting and processing the donated recyclables, and used



The Arcata Community Recycling Center includes a Reusables Depot for clothing, household and building items. Other recyclable materials accepted at the center include newspapers, glass containers, whole wine bottles, aluminum cans and scrap, office paper, cardboard and used motor oil.

a borrowed truck to transport recyclables to a donated site for storage.

The Arcata Community Recycling Center (ACRC), as it came to be known, accepted donated glass containers, newspaper and aluminum cans. In its first few years, ACRC handled less than 100 tons of recyclables a year.

ACRC grew and evolved as an NEC project during the 1970s. Recycling revenues, with some financial help from the NEC, allowed ACRC to pay a project director a very minimal salary in the early years. All other labor was volunteer and

all equipment and space was donated or very low cost. In the mid-1970s Humboldt County contributed around \$40,000 in federal revenue sharing dollars to ACRC. The center used those designated funds to buy equipment and a truck and to move to its present location in a light industrial area of Arcata.

At about the same time, the county began supplying the recycling center with workers through VISTA, CETA, JTPA and other job training programs. The county funding was meant to support an environmental and resource conservation effort

rather than a solid waste management strategy.

ACRC formed a separate nonprofit organization in 1979. By 1980, ACRC had nine core staff members as well as county work program workers who were processing and marketing secondary materials. The amount of material handled by ACRC by 1980 had increased to over 500 tons per year.

ACRC's financial position has strengthened throughout its history. Money from the sale of recyclables has continually provided most of the revenue and the most stable part of it. However, outside support has proven critical.

Besides financial assistance from Humboldt County, a local foundation has helped to pay for capital expenses. Also, community donations have provided a lot of help in some very hard times. In fact, when ACRC purchased its leased building for \$90,000 in 1985, \$30,000 of the purchase price was raised through community donations and fundraising events.

Operations

The center handles newspaper, glass containers, whole wine bottles, aluminum cans and scrap, office paper, cardboard, used motor oil, and reusable clothing, household and building items. ACRC currently collects materials in four ways.

First, about 50 percent of the recyclable materials are donated by Arcata area residents at the center's drop-off area.

Second, the center buys secondary materials from the public and community groups. Cash is paid to individuals or credited to the accounts of community groups for monthly payment. In 1986, around 15 percent of the center's total materials (primarily aluminum cans) were generated through buy-back activities, which amounted to \$16,149 in payments. Over 100 community groups participate in the ACRC redemption program, receiving an average of \$50-\$150 a month.

Third, in 1986 ACRC started a pilot neighborhood drop-off program in two Arcata neighborhoods. ACRC has placed a set of three recycling canisters for glass bottles, newspaper and aluminum cans in each neighborhood and organized block leaders as a peer-to-peer way to increase participation. The total cost of this pilot project is \$12,500; the City of Arcata has contributed \$8,000 to the effort.

Finally, ACRC picks up corrugated boxes and office paper from about 250 establishments in the Arcata area. At least one ACRC employee is on a scheduled route, five days a week, collecting these

Continued on page 64.

the material out of landfills. RU's response was to strive to make improvements in its plastics collection and processing program.

In 1986, as the plastics industry improved end-user technologies, markets developed for dairy bottles granulated with labels left on. This change removed a major barrier in RU's system. Processing rates jumped to 100 pounds per person-hour, reducing direct regrind processing costs to \$125 per ton.

This nearly three-fold reduction dramatically improved the economics of RU's overall collection and processing costs. By the end of 1986, total costs (including overhead) for collecting and processing dairy bottles was approximately \$440 per ton, a tremendous improvement over the figure of \$1,000 per ton. However, regrind selling prices had dropped to \$90 a ton, still leaving a significant gap between revenue and expenses.

The most recent development regarding plastic processing is RU's purchase, with a grant from the state's Clean Michigan Fund, of a Ball & Jewell granulator with conveyor feed. This fully automated, 30 horsepower granulator produces 300

pounds of regrind per person-hour, with maximum per-hour capacities reaching 500 pounds. This increase in processing efficiency has reduced RU's direct processing cost to \$42 a ton.

In addition, regrind prices increased to \$360 a ton. With RU's overall cost (collection, processing and overhead) to produce one ton of regrind at \$360, the gap between expense and income has been eliminated. The methods to reduce collection costs discussed above may help RU continue making financial improvements in its plastics recycling program.

Prospects

Profitability is desired by community recycling operations, but it is not necessary to justify their activities. Predictions concerning eventual profitability of residential plastics recycling, therefore, are both unwise and unnecessary, particularly when one considers the unpredictability of recycling markets.

At the same time, financial responsibility must be demonstrated by those charged with operating community recycling programs. From a purely economic standpoint, residential plastics recycling

may not have been justified in the past.

Recent technological and market advances, however, have improved the economic feasibility of residential plastics recycling to the point where it compares very favorably with the costs of handling the more commonly recycled materials generated by residents.

It is hoped that these financial improvements, coupled with the obvious advantages of keeping plastics out of landfills and incinerators, will lead to increased recovery of residential plastics. RR

Case studies

(continued from page 45)

materials. Commercial pickups make up about 35 percent of all materials handled by ACRC. The center has equipped a truck with a mobile baler so that cardboard can be baled as it is collected. Two businesses have elected to pay ACRC an amount equal to their monthly garbage bill savings for this recycling service.

ACRC processes recyclables at least

pad-time, six days a week. Processing activities by core staff and workers from the county's general relief program include flattening and blowing aluminum cans into a semi-truck; sorting and packing unbroken wine bottles by size and shape; crushing glass containers by color; baling cardboard; storing newspaper and high-grade paper in Gaylords; and accepting, sorting and marking items at "The Reusables Depot." Materials are stored in and around the ACRC building until they are marketed.

ACRC currently has five core staff, including a full-time executive director, three full-time operations staff, and a part-time manager of the Reusables Depot. The center relies on about five part-time workers from county work programs to process materials.

ACRC has two flatbed trucks with capacities of 1 1/2 and 2% tons for picking up recyclables. Center equipment includes two magnetic metal separators; platform scale; warehouse-sized baler; four bottle crushers; forklift; pallet jack; bins, barrels and Gaylords for storage; metal drop-off container bins; aluminum can flattener and blower; small baler;

banding gun; hand tools; and a small paper shredder.

The center's director and some board members dedicate time to public education. Ads are run in the local papers each fall. Brochures and door hangers have been printed regularly for distribution. A speakers bureau helps keep the recycling word out in the community. In 1986, around \$500 was spent on these information efforts, excluding staff and board time.

Materials and markets

Yearly tonnage of recyclable materials handled by ACRC increased until 1984 and has leveled off in the past three years. Corrugated, newsprint, glass and aluminum currently represent the biggest revenue sources of ACRC.

In 1986, ACRC handled 1,223 tons of recyclable material. Seventy percent, or 856 tons, is estimated to be generated by Arcata residents and businesses. (This estimate is based on an ACRC User Survey.) If these assumptions hold true, then ACRC handles approximately 7.8 percent of Arcata's solid waste each year. Avoided tipping fees are estimated at \$11,727.

ACRC's executive director, working with brokers in California and Oregon, handles all materials marketing. ACRC holds no long-term contracts for materials. All recyclable materials, with the exception of aluminum cans, are shipped via locally leased trucks to various markets. Aluminum cans are picked up by Alcoa and taken to Sacramento for densifying; the densified aluminum is shipped to a smelter in the Midwest.

Finances

Arcata Community Recycling Center expenses in 1986 totaled nearly \$112,000. About 53 percent of this amount was for staff salaries and related personnel costs. Nearly 20 percent of the total expenses covered shipping and transporting recyclables to market. The remainder went to mortgage payments, utilities, insurance, etc. ACRC's revenues in 1986 were \$111,294, of which \$106,889 came from the sale of recyclables.

Although special expenses such as the mobile cardboard baler, the pilot neighborhood drop-off program and the building purchase would not have been possible without outside funding, ACRC has

managed to come close to breaking even with revenues from the sale of recyclables.

Problems

Both staff and board members indicate difficulty over the years in balancing the business of recycling with the strong environmental and recycling values inherent in the community. For example, ACRC does not accept tin cans or plastics since a cost-effective market does not exist for these materials. Many Arcata residents, however, feel these materials should be recycled at a loss.

The center has also had to deal with the ebb and flow of outside funding. Special purchases are made when outside funding is available, but both staff and special activities, such as multi-material drop-off sites in rural communities, are cut when outside funding is low.

Plans and prospects

ACRC enjoys widespread support in Arcata, a community which displays strong environmental values. A 1984 survey indicated that 75 percent of Arcata residents knew about ACRC. And 60 percent of Arcata residents used ACRC at least once a month. Given this strong community support, ACRC will no doubt continue to maintain the current recycling level over the long term.

Revenues from recyclables will likely continue to provide bread and butter to the operation. Given fluctuating markets and the need for new or stronger activities, outside funding will still be needed to

guarantee breaking even. Prospects for county and perhaps city funding look promising since recycling is accepted as a viable solid waste management strategy as well as an environmental effort.

ACRC staff and board representatives indicate five new or expanded activities which may have impact on the center in the near-term.

- ACRC will serve as a redemption center for California's beverage container redemption program.
- Results of the neighborhood pilot program may lead to expanded neighborhood efforts, contingent on funding.
- ACRC plans to make site and exterior building improvements in 1987.
- Humboldt County has authorized a \$17,000 countywide solid waste public education program in 1987.
- ACRC hopes to raise money to study the feasibility of starting a local end-use market for recyclable material. The center hopes that a local end user will eliminate the expense of transporting recyclables long distances. A local end user could also produce jobs, income and locally owned enterprise in Arcata.

RR

Plastics industry

(continued from page 31)

its high performance engineering polymers, in which the polymers have at least three lives, and which does away with current, more common types of plastics.

The first life for the GE materials would be in packaging, a short life cycle application. Used GE packaging materials would then be reformulated into compounds for automotive applications, an intermediate life cycle use. Finally, used plastic automotive parts would be recycled into products used in construction, a relatively long life cycle application. GE is prepared to handle the entire multi-life program, as long as the only plastic products in use are GE types of engineering polymers.

Huebner stated that current commodity plastics have no part in a materials strategy, because they cannot be recycled efficiently and economically. Similarly, thermoset plastics have no part in a materials strategy. Since they cannot be recycled, they are simply obsolete.

Conclusions

Plastics recycling is no longer the poor stepchild it was only a few short years ago. There is a great deal of public, industrial and academic attention being paid to

the problems and their solutions. The most important advance is the realization that plastics can be recycled, are being recycled, and that there are many people anxious to be in the plastics recycling business. There are not nearly enough people yet, but the numbers are growing steadily.

Aluminum recycling

(continued from page 41)

annual metal supply comes from reclaimed aluminum.

Ambitious goals

To work toward an 80 percent aluminum can recycling rate by 2000, Reynolds plans not only to add more recycling centers to its collection network, but also increase its use of reverse vending machines, making it easier for people to recycle at supermarkets, drug and convenience stores, and on shopping center parking lots.

Automotive scrap will account for an increasing amount of recoverable aluminum as newer, aluminum-rich cars reach scrap yards. To tap this source of aluminum, Reynolds will expand its effort to target the recovery of recyclable aluminum components in automobile aluminum from appliances and municipal refuse will be targeted as well. F

Information for the article was provided by Reynolds Metals Company.

Packaging design

(continued from page 37)

another 245,000 tons of aluminum used in foil form in flexible or rigid containers (1985 *Packaging Encyclopedia*)

Very little aluminum foil is recycled. About 60 percent of foil is used in rigid semi-rigid containers and could be fairly easily recycled; the 40 percent of foil flexible packaging is often in a multilayer structure and has very limited recyclability.

Although the magnetic nature of steel makes it easy to separate from other materials, steel recovery rates are not as high as aluminum. Recycled steel does not have the huge energy savings associated with aluminum recycling, and steel cost is less than aluminum. Therefore, the incentives to recover steel cans are not as great as for aluminum.