

WASTE EXCHANGES: MARKETPLACE FOR THE COTTON INDUSTRY'S RECYCLABLE MATERIALS

Mina M. Dioun, Director

Julia Kveton Apodaca, Research Associate/Librarian
Natural Fibers Research and Information Center
Bureau of Business Research
The University of Texas at Austin
Austin, TX

Abstract

A materials or waste exchange is an information clearinghouse, a facilitator of waste trade, and a marketing channel for commerce in recyclable materials. Most waste exchanges now provide information about "needed" and "available" materials on the Internet. It is expected that the convenience and worldwide accessibility of the Internet will make the exchanges more efficient. The cotton and related industries can take advantage of waste exchanges to reduce disposal costs, obtain inputs cheaply, and apprise other exchange users of available materials.

Introduction

A materials/waste exchange (referred to in this paper as WEX) is a clearinghouse of information, a facilitator of waste trade, and a marketing channel for commerce in recyclable materials. Most U.S. states have WEXes, as does Europe, the Caribbean, Canada, New Zealand, and other countries. WEXes provide an easy and inexpensive way for industries, businesses, government agencies, nonprofit organizations, and individuals to get information about buying or selling by-products, surplus materials, waste, and recyclable materials from each other. For nearly two decades, WEXes have been literally following the philosophy that "one person's trash is another person's treasure." WEXes facilitate the buying, selling, and donating of thousands of tons of unwanted materials that can be reused in their present form or recycled as feedstock in manufacturing.

Purpose of the Research

The purpose of this research is to study the role that WEXes play in increasing recycling and reuse and how electronic communications technology can make waste exchanges more efficient. Ways in which the cotton, textile, and apparel industries can utilize this marketing channel to buy or sell surplus and wastes will also be discussed.

Importance of Waste Exchanges

The main goal of a WEX is to create a marketplace for recycled, recovered, surplus, and waste materials and to encourage waste reduction and protection of the environment by providing listings of needed and available materials. Because of reduction in landfill space, high cost of disposal, citizens' concern for environmental quality, and high environmental regulation compliance costs, many industries are recycling their wastes and using recycled materials in their processes. In doing so, they can also reduce their input costs and increase their market share by marketing their companies and products as environmentally friendly. Often, however, industries are concerned about the reliability of demand and supply of recycled materials or simply the existence of a proper market for such materials. This has been the major issue for the development of successful and effective recycling programs. In some states, environmental agencies such as the Texas Natural Resources Conservation Commission (TNRCC) are actively involved in recycling market development.

WEXes, by providing information and other services, can boost recycling market development programs, producing economic benefits for industries as well as economic development, environmental, and health benefits for society as a whole. According to Dioun et al. (1997), among the possible economic benefits of recycling market development programs are a reduction in disposal costs for firms that are recycling their waste or by-products and a reduction in input costs for firms that use recycled materials. These cost reductions can result in increased competitiveness for the firm, leading to job creation. Recycling programs promote economic development by creating jobs and adding value through activities such as collection, transportation, processing, and marketing. The environmental benefits of recycling and reuse include a reduction in the use of landfill and the conservation of mineral and other scarce resources, including energy. Recycling programs can reduce air, water, and land pollution and mitigate harm to human health.

Analysis of Waste Exchanges

In this section, we will discuss the functions of WEXes and the increasing role of the Internet for disseminating their information. We also discuss results of a survey of WEXes that we conducted in the fall of 1997.

Functions of WEXes

WEXes help save natural resources by preventing waste from going to the landfill. WEXes constitute a partnership between business and state and local governments to reduce, reuse, and recycle waste and surplus materials.

While the basic function of WEXes is to disseminate information about available by-products and waste, they sometimes provide other services. According to the U.S. Environmental Protection Agency (1994), some WEXes *match buyers with sellers*, either by finding an exact match

for a waste or by linking potential buyers to potential sources of the material wanted. Some WEXes facilitate reuse and recycling by providing *outreach services* to create interest in a particular waste stream. Some WEXes locate *technical assistance* in the area of recycling and pollution prevention for companies that need it. In some states, WEXes are part of or affiliated with the state pollution prevention office. WEXes' relationship with pollution prevention offices allows them to easily refer clients to experts who can advise on trading or reducing waste. Another proactive role of WEXes is *facilitating market development* for potential waste. WEXes can find potential buyers and sellers and inform them about opportunities. Existing research about waste generation and its potential demand can aid in this effort (see Dioun et al. 1997a, b, c, which provides extensive research and information about the recycling market in Texas).

WEXes on the Web

Electronic commerce has become a new way of doing business. The electronic marketplace is very efficient in terms of finding customers and products in a global market. WEXes, as information clearinghouses, have provided information about waste and unwanted materials via a printed catalog or an electronic bulletin board system; however, in recent years, many exchanges have placed their information on their *Web sites on the Internet*. Web pages help WEXes disseminate their information widely because they have no geographic boundaries and can be easily accessed by buyers and sellers around the world, allowing larger numbers of companies and materials to be involved. The ease with which WEXes can be accessed on the World Wide Web makes recycling markets more efficient. The Web page is a new medium of communication where WEXes can provide a forum for global buyers and sellers to promote their wastes and surplus materials with more complete and timely information.

To provide an example of how a waste exchange on the Internet works, we refer to an item listed in RENEW, the Texas Natural Resources Conservation Commission's waste exchange on the web (TNRCC 1997):

“raw cotton fiber natural color contaminated with dirt, twig and leaf particles”

Any company, organization, or person in need of this material can simply access RENEW's Web page and find information about how to contact the seller and purchase it. The purchaser will get the material it needs inexpensively, and the seller will receive income and save on disposal costs.

Providing on-line trading opportunities on the Internet is likely to result in a huge increase in exchange activities for WEXes. The information superhighway will continue to enhance the quality of WEX services, thus encouraging

recycling and reuse, as the Internet becomes even more widely used by industries, organizations, and individuals.

Survey

In order to study the activities of WEXes and collect information about their exchanges, we sent surveys to about 75 waste or material exchanges in the U.S., Canada, and New Zealand in November 1997. Twenty-three responses were received, representing a 31 percent response rate. Table 1 contains the names and Web site addresses (URLs) of respondents to the survey.

Survey recipients were asked how their WEXes are funded. Many of them receive funding from more than one source, so a good deal of overlap exists in the breakdown. Eighty-three percent of survey respondents receive funding from state or local governments, 22% from the federal government, 13% from industry, 9% from subscriptions, and 22% from other sources such as membership fees, other product lines, and matching funds. Table 2 provides detailed information about funding sources.

In response to the question of how widely WEXes exchange, almost all of the WEXes trade regionally, but only 40% said their activities are *limited* to regional activities. On the other hand, 61% said their activities are nationwide, and 48% said they trade globally (see Table 3). We expect that the number of exchanges will be higher as the Internet is more widely used.

WEXes were asked whether they list and exchange hazardous as well as nonhazardous materials. All of the respondents list nonhazardous materials, and of those, 65% also list hazardous materials.

Results of our survey show that 87% of the respondents produce a periodic paper catalog listing “wanted materials” and “available materials” that is sent to their subscribers. However, electronic transmission of WEX information is more efficient and effective; it is also global and instantaneous. In fact, according to Mason (1993), “Materials exchange works like a commercial garage sale, except that the garage comes to the office by the way of the catalog (or onto the office computer by an electronic bulletin board)” or, increasingly, the Internet. Of the respondents, 91% use the Internet for on-line listings or information and in some cases for exchanges; 13% use bulletin board systems and 35% use other methods of communication. Clearly, some of the WEXes use several different methods simultaneously to disseminate their information.

What Materials are Listed on WEXes?

Waste exchange catalogs and on-line listings usually include a product description and the frequency and size of possible deliveries so that a firm can calculate whether an ample supply exists. Most WEXes list all kinds of materials regardless of type, purity, or size, so a great deal of variety

is available. Some WEXes, such as the American Plastic Exchange, are specialized in certain types of materials. One interesting feature of WEXes is that they deal with a large portion of the waste stream that is hard to trade, including complex or unusual wastes, contaminated wastes, wastes of small amounts, wastes from small companies that do not have enough access to markets and information, and wastes with little or no recognized market value. WEXes will list only those materials that companies or industries choose to be listed.

Categories will differ from one WEX to another based on what is needed and what is available. The following is a comprehensive list of the categories used by the (now-defunct) National Materials Exchange Network:

- acids
- alkali
- other inorganic materials
- solvents
- other organic chemicals
- oil and wax
- plastic and rubber
- textile and leather
- wood and paper
- metal and metal sludge
- laboratory chemicals
- construction material
- container and pallet
- glass
- paint and coatings
- agricultural by-products
- aerospace equipment and parts
- automotive
- beauty supplies
- computer components and semiconductors
- construction equipment and parts
- other durables and electronics
- foods
- furniture and appliances
- gems and jewelry
- manufacturing and processing equipment and parts
- maritime equipment and parts
- medical equipment and supplies
- toys and recreational merchandise
- miscellaneous

Waste from the cotton and textile industries usually appears under the “textile and leather,” “agricultural byproducts,” or “miscellaneous” categories. These industries can also trade dyestuffs and other chemicals, equipment, pallets, and other surplus items.

Cotton and Related Industries’ Wastes and By-products

The cotton ginning, oilseeds, textile, and apparel industries can reduce the high costs of regulation, disposal, and inputs by implementing pollution prevention and recycling programs. In this section, uses for some of the waste materials or by-products generated by these industries will be briefly discussed in order to highlight the potential for trading them through WEXes.

Cotton Ginning and Oilseed Processing

“Trash” (burrs, stalks, leaves, dust) is removed from cotton during the ginning process. The amount of cotton gin trash varies based on the harvesting machinery used (picker, burr-extracted stripper, and stripper). “It is estimated that each bale of picked cotton has about 125 pounds of trash in its contents and a bale of stripper cotton has about 700 pounds” (Todd 1994). Strippers are used only in Oklahoma and parts of Texas; for these two states, we applied the percentage of use of each harvesting method and the amount of waste for each method to compute the amount of gin trash (Williams 1997). For the rest of the U.S., we computed the amount of trash by multiplying the number of bales produced by the amount of waste resulting from picker-harvested cotton. The result of this estimation is 4,525 million pounds or 2 million metric tons. Previously, gins incinerated their waste, but no state permits burning of gin trash any longer, so gins are looking for alternatives to burning.

Gin trash is largely used for compost, cattle feed, and possibly in the future as biomass to generate renewable energy. It is estimated that, on average, one ton of dry gin trash has 25 pounds of nitrogen, 12 pounds of phosphorous, and 25 pounds of potassium (Todd 1994). These nutrients are very valuable for the soil. Gin waste is composted and used for soil conservation or to clean up soil that has been contaminated with oil and gas or pesticides such as Toxaphens or DDT (Truhett 1994).

Another waste material resulting from the ginning process is gin motes, the waste fibers left on lint cleaners. Sometimes gin motes are cleaned further, mainly to remove the dust, and sold to be used for padding and upholstery filling, mattresses, nonwovens, felt, filters, insulation, paper, some open-end yarns, and even archery targets.

Products and by-products of processing cottonseed are oil, hulls, cake and meal, and linters. Hulls are the shells left after the oil is crushed out of the seeds. Hulls as well as cake and meal are used for livestock feed. Linters, the short fibers left on the seed after ginning, are used for making paper and other products. In 1996, the U.S. produced 1,219.8 million pounds of crude cottonseed oil, 1,014.9 million pounds of cottonseed hulls, and 1,714.8 million pounds of cake and meal (U.S. Dept. of Commerce 1997).

According to USDA (1997), the total production of linters for the 1996-97 season was 1,015,000 bales.

Textiles

The textile industry produces waste at each stage of processing; this waste is categorized as either clean, dirty, or hard. Clean waste consists of potentially good fibers ejected from the system: sliver, noils, and pneumafil. Dirty waste, which needs cleaning and opening before return to the system, includes card flats and blow room waste. Card flats result from the carding process and are sometimes reworked into low-quality yarns. They are also re-baled and sold to mills for use as a raw material in making paper or rayon or stuffing for futons, cushions, mattresses, etc. Hard waste includes twisted roving, yarn, and fabric; these materials require special opening or shredding before they can be reused (Teichman and Rogers 1997).

For decades, textile manufacturers' waste and by-products such as fabric cuttings, selvage, and cotton bale wastes have been sent to recyclers for reuse. These wastes can be used for mattress padding, automobile fabrics, diapers, sanitary products, tennis ball coverings, and so forth. According to a 1992 survey of 348 U.S. textile facilities conducted by the American Textile Manufacturers Institute (ATMI), respondents stated that they recycled about 43% of their total solid waste, landfilled 39% of it, and disposed of the rest by other methods. Responding mills said they recycled 96% of their metals, 92% of their fiber waste, 88% of their carding, 85% of their assorted rags, 73% of their fabric waste, and 64% of their wood pallets (*The Cotton Digest International* 1993).

In recent years, the textile industry's recycling has dramatically increased, due largely to public concern about the environment, an improved market for waste materials, and ATMI's Encouraging Environmental Excellence (E3) program. Launched in 1992, E3 certifies textile companies and entitles them to use a logo recognizing them as leaders in environmental preservation in the textile industry. Certification, which is based on ten guidelines for reducing and recycling wastes, must be renewed annually (*The Cotton Digest International* 1993). Currently, 55 ATMI members (representing 48% of total membership) are E3-certified. ATMI's member companies use 80% of the total fibers consumed in the U.S. (Fleming 1997).

Apparel

The apparel industry is also concerned about environmental issues. According to a report based on a survey conducted by the Technical Advisory Committee of the American Apparel Manufacturers Association (AAMA) in 1995, 38% of the respondents place a high priority on environmental issues. Respondents chose "cutting waste" as their *number one* concern. Of the respondents, 68% said that landfilling was their company's primary method of disposal in 1995; 22% said recycling; and 9.6% said selling. However, when they were asked what they anticipate to be their primary

disposal method in the year 2000, only 45% of the respondents said landfill disposal, while 41% said recycling, and 13.1% said selling. The report also shows that the responding companies' disposal cost of one ton of waste increased about 51% between 1990 and 1995 (AAMA 1996).

Even though 74% of the AAMA survey respondents have already established a recycling program, they need to actively sell or trade their waste in order to increase their recycling. The survey asked what environmental issue respondents would like to have added to the survey. Among the suggestions were the selling of recycled products in the apparel industry and uses for blended fiber fabric waste. When asked for their primary motivating factors to improve environmental performance, 47% of the respondents said government regulation; 25%, economic reasons; 14%, corporate image; 10%, customer requirements; and 3%, marketing opportunity (AAMA 1996).

What can be concluded from the results of the AAMA survey is that the apparel industry is determined to reduce waste and increase recycling. WEXes can help the industry sell its waste to generate revenue and reach its goal of increasing recycling to avoid landfill disposal. For example, cutting room scrap, small pieces of fabric that result from the apparel manufacturing process, can be turned back into fibers and rewoven into yarn or used to make paper. Levi Strauss has been making a high-quality, pale blue paper from its factories' denim cutting room scrap for several years.

Fiber, textile, and apparel industry waste can be recycled and used in the production of high quality yarn. Recycled denim, for example, can be re-spun into yarn to produce knitted sweaters (Maycumber 1997). One apparel company that is "closing the recycling loop" makes sportswear from recycled cotton. "When clothing is made from new cotton," says Rick Hannah, owner and founder of the company, "30 per cent to 50 per cent of that material is wasted somewhere between the cotton field, the spinning mill, the weaver or the sewing machine. Eco Fibre is a patented process to spin new yarn from this waste" (Stipe 1995). The textile and apparel industries can also use recycled materials from other industries in their production. For example, used plastic soda bottles are sorted by color, melted, and pelletized. The remelted pellets are then spun into yarn which is woven into fabrics, including cotton blend denims (Morrissey 1997).

Post-Consumer Textile Waste

Every year in the U.S., more than 4 million tons of post-consumer textile waste is generated. Only 1.25 million tons of this waste is collected for reuse or recycling, mostly by charity organizations. These groups use about 0.5 million tons of the collected amount and sell the rest to rag traders and export companies (Riggle 1992).

According to Bernie Brill of the Council for Textile Recycling, about 200 companies in the U.S. sort and grade post-consumer textile waste. An additional 150 secondary processors, such as used clothing exporters and wiping cloth manufacturers, are part of the industry. This industry has been around for awhile, but many people, businesses, and municipalities are not aware of it. The Council is trying to increase this awareness by compiling a “yellow pages” directory of processors and brokers, many of whom have a Web site. Most of these companies specialize in trading specific products (Riggle 1992).

Opportunities and Challenges for Waste Exchanges

One of the main challenges for WEXes is how to become more efficient and more widely used. We asked this question in our survey, and the majority answered that they need more resources to publicize their services to industry, organizations, and others. Most of the WEXes work with very limited budgets and do not have enough personnel to perform their ongoing work *and* to market and promote their services. However, on-line WEXes will be able to increase their visibility through their Web sites, even though they still need resources to extend their services. See Appendix A for an example of the kind of information disseminated by a WEX on its Web site.

Because of a lack of resources, WEXes are limited in conducting activities that might increase their listings. This is evident from a telephone survey conducted by the Michigan Waste Exchange Demonstration project in 1994 in which existing waste exchanges provided information about their activities and funding. Results of this survey showed that a large number of exchanges did not perform a market analysis before starting their services. According to DiPietro (1994), “the services did not focus on the unique nature of their clients as either generators of waste materials, or as potential users of those materials. They did not recognize generators and users as separate and distinct groups of clients with different service needs, different priorities and different motivations for using the waste exchange service. Rather, the existing exchanges focused on the materials, and categorized materials as either “wanted” or “available.” By focusing on the materials instead of their clients, exchanges functioned as data banks that did not provide personal services tailored to client needs. The exchanges that were surveyed did not conduct follow-up activities or keep detailed records so it was possible to draw conclusions regarding the link up between particular methods and services and the number of listings or successful matches.”

Even though many companies are interested in using recycled materials or in recycling their own waste materials, their main concern is staying competitive. In order to decide whether to use recycled materials, they need information about the cost of recycled compared to virgin

materials; performance, quality, and availability of recycled materials; and consumer preferences. WEXes, by providing this information to companies or referring them to other information sources, will help companies in their decision-making process.

Other On-Line Waste or Material Traders

In addition to WEXes, brokers and large recyclers trade a major amount of waste on a consistent basis. In October 1995, the Chicago Board of Trade (CBOT) opened the first electronic market for wastes. According to *The Economist* (1995), “The CBOT thinks that the greater transparency of its market will make buying and selling rubbish easier and cheaper, especially for small companies.” CBOT’s waste exchange Web site is located at <<http://cbot-recycle.com/indexst.html>>. The home page states, “The CBOT Recyclables Exchange is dedicated to the trade of recyclable goods and is open to all **Registered Users** worldwide. Its goal is to allow easy and immediate contact between Buyers and Sellers of recyclable commodities, active on the market at any given time” (CBOT 1997). The registration is a \$10, one-time fee with a small charge for listings on a pay-as-you-go basis. The way the trade works is that sellers post their list and buyers can enter the material they need; the system then automatically creates a list of matches and sends an e-mail to the buyer. Following are a couple of examples of materials that can be traded:

“Organics—Includes but is not limited to: compost, topsoil, sand, yard waste, land clearing debris, grocery and restaurant food waste, processed/packaged food wastes, rendering and protein wastes, and other.

Textiles and Related—Includes but is not limited to: textiles or fibers of cotton, wool, burlap, jute, sisal, polyester, nylon (including nylon 6 textile fiber), other synthetic fibers, rags and wipers, fiber blends, used clothing, used footwear, leather and other related commodities.”

Policy Recommendations

Governmental policy and incentive measures can increase participation in material and waste exchanges by industry and others (Dioun 1997d). These measures can be summarized as:

- Provide sufficient funding to WEXes so they can conduct outreach and marketing activities in addition to their everyday activities.
- Create minimum recycled-content standards for more products.
- Provide tax credits or other subsidies for users and traders of recycled materials and eliminate existing subsidies to the extractors of virgin materials.

- Increase local, state, and federal government purchases of recycled content materials.

Conclusion

It is expected that the 21st century will be the environmental and information century. Assuming that most industries and companies will soon have access to the Internet, then materials/waste exchanges as a marketplace for trading waste and recycled materials will flourish. The system will be efficient because buyers can find the material they want and purchase it in a few minutes by accessing the Internet from anywhere in the world. With the same ease, sellers can post their waste on the Web site within a few minutes. The convenience and time efficiency will increase recycling and its attendant benefits.

Acknowledgments

The authors would like to thank the Bureau of Business Research for its support and the respondents to our survey for their prompt response. We are also grateful to Tammy Gómez for her valuable research assistance.

References

American Apparel Manufacturers Association (AAMA). 1996. *Environment and the Apparel Industry: TAC Environmental Survey 1995*. AAMA, Technical Advisory Committee. (Unpublished survey dated February 1996. Used with permission).

Cotton Digest International, The. 1993. "U.S. Textile Mills Recycle Almost Half of Waste." Volume 68, Number 5 (September).

Dioun, Mina M. et al. 1997a. *Market Opportunities for Recycling in Texas*. Volume I, "Analysis of Texas Manufacturers' Potential Demand for Recycled Materials." Bureau of Business Research, The University of Texas at Austin.

Dioun, Mina M. with Sajjad Ahmed. 1997b. *Market Opportunities for Recycling in Texas*. Volume III, "Texas Manufacturers' Use of Recycled Materials." Bureau of Business Research, The University of Texas at Austin.

Dioun, Mina M. with Jerry Olson. 1997c. *Market Opportunities for Recycling in Texas*. Volume IV, "Potential Supply of Recyclable Materials from Texas Manufacturers." Bureau of Business Research, The University of Texas at Austin.

Dioun, Mina, M. 1997d. *Market Opportunities for Recycling in Texas*. "Executive Summary." Bureau of Business Research, The University of Texas at Austin.

DiPietro, Robbie. 1994. "How Can Waste Exchanges Work Better?" *Biocycle* (January): 75-6.

Economist, The. 1995. "Garbage In, Business Out." (October): 94.

Fleming, Julie. 1997. American Textile Manufacturers Institute. Personal interview, December 12.

Maycumber, S. Gray 1997. "New Denim Has Many Faces and Lives." *Daily News Record* 27, 138 (November): 17.

Morrissey, James A. 1997. "Textile Firms Turn Trash to Treasure." *Textile World*. 147, 2 (February): 74-6.

National Materials Exchange Network. 1995. "About the Materials Exchange." <<http://www.earthcycle.com/g/p/-49dc412e/nmen/about.html>> (This site no longer exists.)

Riggle, David. 1992. "Trading in Textiles." *In Business* 14, 2 (March/April): 32.

Stipe, Mary. 1995. "In Style: Environmental Fashions Ltd." *Knitting Times* 64, 8 (August): 16.

Teichman, Pamela and Clarence Rogers. 1997. "An Investigation of the Effects of Clean Reworkable Waste on the Quality of a 37s 50/50 Polyester/Cotton Ring Spun Yarn." *Proceedings of the 1997 Beltwide Cotton Conference*. Memphis, TN: National Cotton Council.

Texas Natural Resources Conservation Commission (TNRCC). 1997. <<http://www.tnrcc.state.tx.us/admin/topdoc/pd/002/index.htm>>

Todd, Lee. 1994. "Gin Waste Utilization: Meeting State Requirements." *Proceedings of the 1994 Beltwide Cotton Conference*. Memphis, TN: National Cotton Council.

Truhett, Carton. 1994. "Developing Markets for Composted Gin Waste." *Proceedings of the 1994 Beltwide Cotton Conference*.

United States Department of Agriculture. 1997. *Monthly Cotton Linters Review* 68, 1 (September).

United States Dept. of Commerce. 1997. *Current Industrial Reports: Fats and Oils—Oilseed Crushings*. M20J(96)-13 (Summary 1996). <<http://www.census.gov/ftp/pub/econ/www/ip6100.html>>.

United States Environmental Protection Agency (EPA). 1994. *Review of Industrial Waste Exchanges*. Washington, DC: U.S. EPA.

Williams, Tony. 1997. Texas Cotton Ginners Association. Personal interview, December 3.

Appendix A: RENEW

Resource Exchange Network for Eliminating Waste (RENEW) was established in 1988 by the Texas Natural Resources Conservation Commission (TNRCC) to promote the reuse or recycling of industrial wastes. RENEW markets its waste exchange services through trade shows and through contact with companies referred to it by the Office of Pollution Prevention and Recycling after it has performed on-site assessments. RENEW targets companies with specific waste streams for receipt of its free catalogs and mailings. RENEW is now accessible through the Internet on TNRCC's Web site, located at <<http://www.tnrcc.state.tx.us/admin/topdoc/pd/002/>>.

Since RENEW began accepting listings in 1988, it has:

- assisted in the successful exchange of 695 million pounds of material
- saved participating firms more than \$2 million in avoided disposal costs
- helped them to earn almost \$1,600,000 from the sale of materials.

RENEW provides a free catalog that is published (in hard copy) quarterly and is on the World Wide Web. It lists and describes materials available for exchange, the quantity of materials on hand, how frequently they are produced, potential uses, and the lister's general geographic location. It also lists facilities that have materials to exchange or that need or will accept materials for reuse, reclamation, or recycling. Listings can be confidential. The RENEW catalog also provides information and schedules about other TNRCC programs available across the state, including air quality seminars, hazardous materials seminars, petroleum storage tank seminars, water resource management seminars, and pollution prevention workshops, as well as the latest information on recycling regulations. The RENEW catalog also includes TNRCC's Emissions Credit Bank section.

Currently, the RENEW program has 5,800 subscribers and 1,142 active material listings. RENEW allows companies to reduce the cost of disposal and possibly hazardous waste generation fees by allowing them to reclassify certain wastes. Furthermore, companies can increase profits by decreasing the amount of raw (virgin) materials purchased.

Source: Texas Natural Resources Conservation Commission (T N R C C) W e b s i t e : <http://www.tnrcc.state.tx.us/admin/topdoc/pd/002/>

Table 1. Names and Internet Addresses of Survey Respondents.

Alaska Materials Exchange

Via Alaska Department of Environmental Conservation.
<http://www.state.ak.us/dec/dsps/compass/ptrnshp.h>

Alberta Waste Materials Exchange
<http://www.gov.ab.ca/~env/camd/awme>

American Plastics Exchange, Inc.
Minneapolis, Minnesota
<http://www.apexq.com>

Arkansas Manufacturers Exchange
Via Arkansas Economic Development Commission.
<http://www.aide.state.ar.us/aidecnew/210e.htm>

British Columbia Materials Exchange
<http://www.rbc.bc.ca>

Business Material Exchange of Wisconsin
<http://www.wv.net/bmex/mdex.html>

California Materials Exchange (CALMAX)
<http://www.ciwmb.ca.gov/mrt/calmax/calmax.htm>

California Waste Exchange
<http://www.calepa.cahwnet.gov/discdocs/cawastex.txt>
Has been changed to:
<http://www.calepa.ca.gov/dtsc/dtsc.htm>

Hawaii Materials Exchange (HIMEX)
<http://www.himex.org>

Industrial Materials Exchange (IMEX)
Via Seattle-King County Department of Public Health
<http://www.metrokc.gov/hazwaste/imex>

Iowa Waste Exchange
<http://www.recycleiowa.org/tech/bawss.html>

LINK-UPS
Via Hauppauge Industrial Association (HIA). Joint project between HIA (Hauppauge, New York) and Association for Resource Conservation (ARC).
<http://www.hia-Li.org>

Montana Material Exchange
<http://www.montana.edu/~wwwated/mme.html>

New Hampshire Materials Exchange
<http://www.wastecapnh.org/nhme.htm>

Olmsted County Materials Exchange
Rochester, Minnesota
(Starting January 1998, this exchange will be featured as part of the Minnesota Materials Exchange Alliance network and Web site.)

Portland State University Chemical Consortium
No Web site available.

RENEW (Resource Exchange Network for Eliminating Waste)-Texas
Texas Natural Resource Conservation Commission, Austin, Texas
<http://www.tnrcc.state.tx.us/admin/topdoc/pd/002/>

RENEW (Resource Exchange Network for Eliminating Waste)-New Zealand
Auckland Regional Council, Auckland, New Zealand.
<http://arc.govt.nz/environ/waste/157.htm>

ScrapMatch
Via Arkansas Economic Development Commission.
<http://www.aide.state.ar.us/aidecnew/210e.htm>

Sonoma County Materials Exchange (SonoMax)
<http://users.ap.net/~sonomax/>

Tennessee Material Exchange
Center for Industrial Services, University of Tennessee

TSD Central

Golden, Colorado

http://www.tsdcentral.com/

http://www.tsdcentral.com/surplus

Vermont Business Materials Exchange

http://www.enviro-source.com/vt/vt1a.cfm

Source: Survey conducted by the Bureau of Business Research, The University of Texas at Austin, fall 1997.

Table 2. Funding Sources of Survey Respondents.

Name of Waste Exchange	Source of Funding				
	<i>Fed. gvt.</i>	<i>State/local gvt.</i>	<i>Industry</i>	<i>Subscription</i>	<i>Other</i>
Alaska Materials Exchange		•			
Alberta Waste Materials Exchange		•		•	
American Plastic Exchange				•	
Arkansas Manufacturers Exchange	•	•			
British Columbia Materials Exch.	•	•	•		
Business Mat. Exch. of Wisconsin		•			
California Waste Exchange		•			
California Material Exchange		•			
Hawaii Materials Exchange	•	•			
Industrial Material Exchange		•			
Iowa Waste Exchange					•
LINK-UPS		•			•
Montana Material Exchange	•				
New Hampshire Material Exchange	•	•	•		
Olmsted County Material Exchange		•			
Portland St. Univ. Chem. Consortium					•
RENEW*—Texas		•			•
RENEW*—New Zealand		•			
Scrap Match		•			
Sonoma County Material Exchange		•			
Tennessee Materials Exchange		•			
TSD Central					•
Vermont Business Materials Exch.		•	•		

Total respondents by category	5	19	3	2	5
% of respondents by category	22	83	13	9	22

*Resource Exchange Network for Eliminating Waste

Source: Survey conducted by the Bureau of Business Research, The University of Texas at Austin, fall 1997.

Table 3. Year of Establishment and Geographical Extent of Trade for Survey Respondents.

Name of waste exchange	Year est.	Extent of Trade		
		<i>Regionally only</i>	<i>Nation-wide</i>	<i>Globally</i>
Alaska Materials Exchange	1994	•	•	•
Alberta Waste Materials Exchange	1985	•	•	
American Plastic Exchange	1993	•	•	•
Arkansas Manufacturers Exchange	1982	•		
British Columbia Materials Exch.	1987	•	•	•
Business Material Exch. of Wisconsin	NA	•		
California Waste Exchange	1978	•		
California Material Exchange	1992	•	•	•
Hawaii Materials Exchange	1991	•		
Industrial Material Exchange	1984	•	•	•
Iowa Waste Exchange	1990	•	•	
LINK-UPS	1997	•		
Montana Material Exchange	1995	•	•	•
New Hampshire Material Exchange	1993	•	•	•
Olmsted County Material Exchange	1990	•	•	•
Portland St. Univ. Chem. Consortium	NA	•		
RENEW*--Texas	1987	•	•	•
RENEW*--New Zealand	NA	•		
Scrap Match	1993	•	•	
Sonoma County Material Exchange	1993	•		
Tennessee Materials Exchange	1995	•	•	•
TSD Central	1996	•	•	•
Vermont Business Materials Exch.	1993	•		

*Resource Exchange Network for Eliminating Waste
 NA = not available.

Source: Survey conducted by the Bureau of Business Research,
 The University of Texas at Austin, fall 1997.