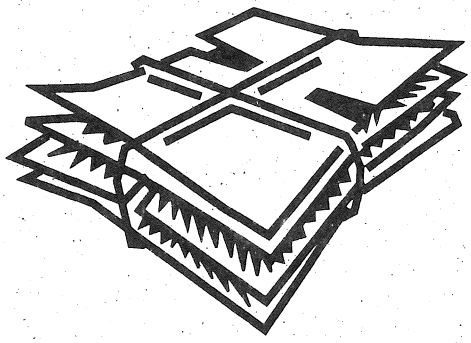
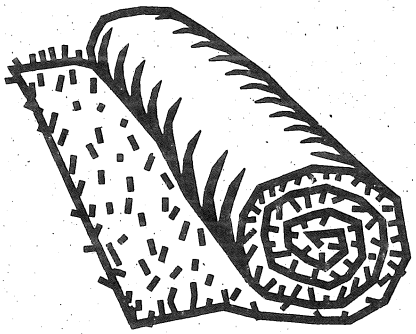
RRIERS TO RECYCLING



CORRUGATED CARDBOARD



AND CARPET

MINNESOTA OFFICE OF
Environmental Assistance

NOVEMBER 1995

Pursuant to 1995 Minn. Laws Chap. 247
~~Sec. 63~~ Art. 1 Sec. 63

Barriers to Recycling Corrugated Cardboard and Carpet

November 1995

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Cost of Report

The total cost of preparing the "Barriers to Recycling Corrugated Cardboard and Carpet" report was about $5,500 for staff time and production costs.

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Executive Summary

Background

In 1995, the Minnesota Legislature directed the Office of Environmental Assistance to "conduct an analysis and make recommendations to the Legislative Commission on Waste Management regarding measures to remove barriers that prevent increased recycling of corrugated paper products and used carpeting " (Minn. Laws 1995, Ch. 247, Sec. 63).

During the 1995 legislative session, legislation was proposed to ban corrugated paper products and used carpet from MSW. The initiative to ban the materials did not pass, but the OEA was required to conduct analysis and prepare this report to provide the Legislature with information on the topic.

This report will examine the current status of recycling for each material, identify the barriers to increased recycling, discuss options for increasing the collection of each material and recommend an approach for increasing recycling.

Corrugated paper products

The OEA estimates that about 680,000 tons of uncoated old corrugated cardboard (OCC) were generated in Minnesota in 1994.

The OEA estimates that about 66 percent of the OCC generated in the state was recovered in 1994.

The OEA estimates that about 230,000 tons of additional OCC may be available for recovery from the waste stream.

Nationally, about 63 percent of OCC is recovered, a relatively high recycling rate. The national recovery rate for steel cans is about 53 percent, for aluminum cans 65 percent, for glass containers 37 percent, and for old newspapers 59 percent.

OCC Generation and Recovery - 1994 (Estimated)
(In Tons)

	Statewide	Metropolitan Area	Greater Minnesota
Total Waste Generated[1]	4,773,000	2,895,000	1,878,000
Total Recycled[1]	2,011,000	1,355,000	656,000
Total MSW[1]	2,762,000	1,540,000	1,222,000
Total OCC Generated[2]	680,000		
OCC Recovered for Recycling[2]	450,000		
OCC Remaining in Waste Stream[2]	230,000		

1. Report on SCORE 1994 programs - Office of Environmental Assistance - July 1995
2. Calculated using packaging composition waste sorts from 1994 and spring 1995, conducted by R.W. Beck for the OEA and the Study of End Market Capacity, July 1994, conducted for the OEA by Rafferty and Bly.
3. These OCC totals do not account for contaminated or coated OCC.

Capacity to recycle OCC

The OEA estimates that about 450,000 tons of OCC were recycled in Minnesota in 1994.

Before 1985, Minnesota firms, such as the Waldorf Corporation in St. Paul and Certainteed in Shakopee, were responsible for nearly all of the OCC recycling in the state.

In the wake of the growth of municipal recycling programs in the late 1980s, other firms increased the capacity of paper mills to use OCC in their processes. Foreign markets have also played a greater role in the U.S. OCC market.

The capacity for using OCC has increased over the past five years and will continue to grow through 1997. The national expansion of capacity is expected to level off after 1997.

Market prices for OCC

The additional demand has resulted in increased prices for OCC. Recyclers of OCC have a strong national market for their product and have been able to take advantage of regional markets, rather than just Minnesota markets, for selling OCC.

In the early 1990s (and late 1980s), national prices for baled OCC averaged about $5 to $20 per ton processor prices, and about $25 to $45 per ton for end-user prices. Some regional markets had a negative price for loose OCC, meaning a recycler would have to pay a processor to take the load.

As new capacity at mills came on line and foreign markets increased their demand for U.S. OCC, the prices for OCC began to rise in 1994.

By the end of 1994, end-user prices in the east central region of the country were $50 to $110 per ton. By April 1995, end-user prices for OCC were $140 to $185 per ton in the east central region.

Prices have dropped in the third quarter of 1995. As of August, the processor price for baled OCC was $35 to $95 per ton and the end-user price was about $110 to $140 ton. By late September, the processor price was $40-$60 per ton and end-user price was $40-70 per ton. Projections about how long this price drop will last and whether prices will rise again are mixed.

Baled OCC consistently brings higher market prices than loose OCC.

As OCC demand and prices have increased, the traditional OCC buying and selling relationship in Minnesota has changed. There is now a much larger "market" with more players. The OEA believes that these business relationships have changed permanently and that the market will continue to have many players.

Improving recovery of OCC

The OEA estimates that about 230,000 tons of additional OCC may be available for recovery from the waste stream.

About half the OCC remaining in the waste stream, or about 117,000 tons, comes from small commercial and residential generators. A study commissioned by the OEA asserts that the remaining half of the OCC in the waste stream is generated by large commercial generators, but there was no agreement among those involved in OCC recycling about whether additional OCC could be recycled in the large commercial sector.

Barriers to increased recycling

Residential

Recyclers and local officials identified a number of key barriers that affect the amount of residential recycling.

- Availability.
- Promotion.
- Convenience.
- Type of residence (i.e., single-family or multi-unit).

Commercial

Commercial businesses that generate the most OCC are retail establishments: grocery and department stores, liquor stores, mini-markets and other similar establishments. It is clear that even with recent record-breaking market prices, there are still small businesses that are not recycling corrugated. The key barriers identified in commercial recycling are listed below:

- Cost.
- No requirement for "opportunity to recycle."
- Lack of management commitment.
- Need for staff time and training.
- Lack of awareness/need for education.
- Space or zoning issues.

Other barriers

- Contamination.
- Difficulty of recycling coated corrugated cardboard.
- Transportation difficulties, especially when markets are far away.
- Fluid prices.

Options for increasing OCC recycling

A number of options may be available for increasing recycling of OCC.

- No additional state government action.
- Increased education and targeted assistance for small businesses.
- Increased education for local government zoning offices and planners.
- Revise the "opportunity-to-recycle" provision in state statute.
- Encourage local recycling programs to reduce the requirements for recycling OCC for residents.
- Encourage increased use of drop-off centers, especially in the Metropolitan Area.
- Encourage partnerships to increase cooperation among end-markets, haulers and recyclers, and governments.
- Examine more effective variable-rate pricing.
- Examine the possibility of increasing recycling of wax-coated and contaminated OCC.
- Ban OCC from the waste stream.
- Ban OCC from the MSW but establish a price floor.

Recommendations

The OEA recommends that the Legislature not make any changes in state law regarding OCC recycling at this time. OCC has a high recycling rate and the infrastructure for recovering the material is well-established.

A number of barriers stand in the way of increased OCC recycling. While the OEA believes specific legislative action is not needed to address these barriers, state government, local governments, and most importantly the private sector should take action to improve recycling.

- The OEA will work to improve long-term relationships in the OCC recycling industry.

  One step involves encouraging long-term contracts with price floors and escalators that reduce the risks to all parties from fluctuations in price for OCC. Such contracts may remove some of the risk that results from constant price fluctuations and allow OCC recyclers to invest in activities that could increase the total amount of OCC recovered without some of the risk these investments would otherwise carry.

- The OEA will work directly with businesses to reduce the amount of waste they generate and to increase recycling.

- The OEA will provide direction and assistance to counties to improve recycling among commercial and service businesses.

- The OEA will work with local government groups such as the Association of Recycling Managers to promote the adoption of local zoning ordinances that encourage recycling.

- The OEA will consider funding activities to increase the amount of recycling in the business community.

- The industry should make direct investments in activities and equipment that will help reduce the barriers to recycling greater amounts of OCC. Industry should work with local governments to target activities.

  - Increase the use of drop-off centers for both residential and small commercial recycling.
  - Purchase balers to allow small businesses -- especially those that share retail space in strip malls -- to recycle their OCC even if space is limited.
  - Jointly finance construction of space expansion for recycling bins for small businesses or strip malls.
  - Where appropriate, convert waste collection to recycling collection, as BFI has done with a number of small commercial accounts. Instead of a waste dumpster, small commercial establishments could be provided with a recycling dumpster and a small waste container (or clearly marked and separated bags within a recycling dumpster) so that the focus of the collection is recycling, not waste.
  - Invest in more promotion for OCC recycling among residential and small commercial customers.

The OEA anticipates that these steps will lead to improved recovery of OCC. If these activities do not achieve the desired results, the OEA will provide additional recommendations to the Legislature. Such recommendations could be included in the *1997 Solid Waste Policy Report*. Some recommendations the OEA may consider are as follows.

- Consider a shift in focus in SCORE recycling programs to improve recycling in the business community.

- Analyze whether it would be appropriate to revise the "opportunity-to-recycle" statute to require that businesses, not just residents, have opportunities to recycle. Such a change would require careful consideration of who should be responsible for ensuring opportunities are provided.

- Assess whether the state should establish guidelines for local zoning requirements regarding recycling.

Carpet

For purposes of this report, the Legislature has defined "used carpeting " as carpet that "is no longer useful for its original intended purpose because of wear, damage, or defect." Accordingly, in this report the OEA will address only recycling of used carpet.

The OEA believes, however, that the state should focus not only on recycling carpet but also on those activities higher on the waste management hierarchy: reduction and reuse.

Carpet is considered a problem material for mass-burn, refuse-derived fuel and MSW composting facilities because it is an oversized and bulky waste. It is often too large for processing equipment in these facilities to handle. As a result, carpet is often directed to landfills (although it has a high BTU value when burned).

Current status of used carpet recycling

How much carpet is there?

About 880 million square yards, or 2 million tons, of carpet was replaced and potentially available for disposal in the U.S. in 1994. This represents about one percent by weight of MSW in the U.S.

Most of the carpet sold in the U.S. is sold for use in residential dwellings. About 25 percent of sales are for commercial use. An average 1,800 square foot house would use about 200 square yards of carpet.

The Office of Environmental Assistance estimates that carpet accounts for less than one percent of the MSW in Minnesota. The OEA estimates that about 16 million square yards, or 36,000 tons, of carpet are replaced in Minnesota annually.

The estimate of 36,000 tons represents an amount greater than what would be considered "used carpeting" as defined by the legislature, since some of the carpet may be suitable for reuse.

Current recycling efforts

There is relatively little post-consumer carpet recycling in the United States at this time.

Carpeting is a difficult material to recycle. Only about one half of the post-consumer carpet accepted at carpet recycling facilities can be recycled with current technologies.

Carpet is about 40 percent to 60 percent face fiber. This face fiber is almost always one of several nylon resins, but the nylon resins from different brands may not mix well and cannot be mixed in many recycling processes. The remainder of the carpet is polypropylene backing (about 10 percent) and latex adhesives composed of calcium carbonate and other materials (about 40 percent to 60 percent).

Notable efforts to develop recycling for post-consumer carpet have been initiated only in the last five years. Major carpet or fiber manufacturers have launched most of these efforts and they are all small-scale or pilot efforts.

In Minnesota, the principal carpet recycler is United Recycling, Inc. (URI), of St. Louis Park. URI has been in operation for about four years and has been accepting carpet for a fee from a variety of sources. Currently, the company produces plastic resin and polypropylene fluff for use in new plastic products.

URI managers estimate that they take in about 2.4 million pounds to 4.8 million pounds of carpet annually, or about 1,200 to 2,400 tons, and recycle about half of that.

Other firms collect used carpet, recut and repair the carpet for resale. They also ship the carpet pad to recyclers in Wisconsin. There are less than one half dozen of these firms and each is very small.

Current recycling processes

Current recycling efforts nationally can be broken into those that pursue reuse or mixed fiber use of carpet and those that separate resins in carpet.

In reuse or mixed fiber processes, firms simply grind carpet and use the ground material as a filler in concrete and other products, or recut and repair existing carpet for resale.

Resin separation processes break the carpet down and separate fibers for recycling. These processes generally separate the backing from the face fibers and then isolate the different fibers in the carpet. Some of these fibers are used to produce a resin for use in plastic products. Other fibers go through depolymerization to produce fibers that can be used in place of virgin plastics and fibers in carpet and other products.

URI in Minnesota employs a process that separates the components in carpet.

The OEA awarded URI a $77,000 research grant in 1992. In 1994, the OEA entered into a $500,000 loan agreement with URI. About $75,000 was issued to expand production capacity under the first phase of the loan. The second phase of the loan is under consideration at this time.

Current collection

At this time, there is no widespread collection of used carpet anywhere in the U.S.

In Minnesota, URI has used a number of collection methods for its operation, including drop-off, pick-up from homes or bins at installers, and removal of carpet for recycling.

Less than a half dozen small firms in Minnesota will remove used carpet and recycle it for a fee.

At this time, there is little or no collection of used carpet for recycling in Greater Minnesota. The Report on 1994 SCORE Programs shows that counties report recycling 259 tons of carpet in 1994. Metropolitan Area counties accounted for most of the recycling.

Improving recovery and recycling of used carpeting

Barriers to recycling

Carpet components

The nature of carpet makes it difficult to recycle. Most recycling programs take in at least twice as much used carpet as they are able to recycle.

Capacity to recycle carpet

Easy and relatively inexpensive technology to process large amounts of carpet does not exist on a widespread basis in the U.S. at this time.

Cost of carpet recycling vs. cost of disposal

Because of the high cost of recycling carpet, disposal is often less expensive than recycling in our region and in many parts of the country.

Collection

The carpet industry as a whole, and URI in Minnesota, identify lack of collection as the largest barrier to recycling.

Some municipalities collect carpet separately from regular MSW because it is too bulky for their regular loads, but very little of it is recycled because of the high cost of recycling.

Outlook for carpet recycling

Recycling used carpet should continue to grow over the next five to 10 years. The carpet industry seems committed to supporting new recycling technologies for post-consumer carpet and is starting to test new technologies in limited recycling efforts.

Options for increasing recycling

The OEA examined a number of options to increase recycling suggested by various parities involved in carpet recycling and disposal.

In determining which options to pursue, the state must weigh the cost of improving carpet recycling against the risk presented by carpet in the waste stream.

- Allow the carpet recycling system to develop on its own without providing more government support.

- Ensure that any state support goes to both mixed-resin or reuse, and resin-separation recycling efforts so that as much carpet as possible is recycled under current programs.

- Strengthen the current state requirement that enables public entities to include a

requirement for reuse or recycling in any bid for carpet replacement.

- Establish partnerships to encourage the national firms to locate collection points for their recycling efforts in Minnesota.

- Target carpet installers and retailers in the state with education about recycling so they can educate carpet consumers.

- Establish guidelines or requirements for collection.

- Require that all carpet sold in the state carry a content label starting in 2000.

- Ban carpet from MSW.

Recommendations

While carpet recovery continues to increase in Minnesota and across the country, recycling and reuse programs are still very limited. The OEA recommends a variety of approaches to try to increase recovery of carpet in Minnesota.

- The state should promote and encourage a full range of alternatives to disposal for carpet, from reduction to reuse to resin separation and recovery.

- The Legislature could strengthen the current state requirements regarding public entity purchase of carpet (Minn. Stat. §16B.122, Subd. 3b).

- The state, working with local governments and retailers, should encourage carpet retailers to provide customers with information on how to reuse or recycle their carpet with every new sale.

The Legislature should require that all new carpeting sold in the state carry a content label identifying the fibers in the carpet face and backing by 2000.

Chapter 1
Background

In 1995, the Minnesota Legislature directed the Office of Environmental Assistance to "conduct an analysis and make recommendations to the Legislative Commission on Waste Management regarding measures to remove barriers that prevent increased recycling of corrugated paper products and used carpeting " (Minn. Laws 1995, Ch. 247, Sec. 63).

During the 1995 legislative session, legislation was proposed to ban corrugated paper products and used carpet from MSW. The initiative to ban the materials did not pass, but the OEA was required to conduct analysis and prepare this report to provide the Legislature with information on the topic.

This report will examine the current status of recycling for each material, identify the barriers to increased recycling, discuss options for increasing the collection of each material and recommend an approach for increasing recycling.

Because the current level of recycling and the development of markets and other infrastructure are dramatically different for each material, the OEA will address them separately in this report.

In developing the report, the OEA has sought information and opinions from a wide range of people involved in corrugated paper and carpet recycling. The OEA used this input to develop the options for increasing the recycling of each material and the recommendations contained in the report.

Chapter 2

Corrugated Paper Products

For purposes of this report, the Legislature has defined corrugated paper products as "boxes, containers, liners, sheets or other products made from corrugated paper." In carrying out the charge to analyze and make recommendations regarding barriers to recycling corrugated paper products, the OEA has focused on the recycling of post-consumer old corrugated cardboard (OCC).

How much corrugated is there?

The OEA estimates that about 680,000 tons of OCC were generated in Minnesota in 1994. This estimate is based on several figures. The OEA estimates that about 4.8 million tons of MSW were generated in Minnesota in 1994 and about 2.7 million tons were delivered to facilities for processing and disposal.

The most recent packaging discard waste sorts conducted statewide for the OEA show that about nine percent of the MSW delivered to waste facilities in Minnesota was OCC. These sorts would indicate that about 230,000 tons of OCC were disposed of in 1994.

In 1994 a study of end-markets for old corrugated cardboard was conducted for the OEA ("end market studies") ("Assessment of Recycling Capacity for End Markets serving Minnesota" -- Prepared by Sure Green and Bly and Associates for the Minnesota OEA, June 7, 1994). Based on that study, the OEA estimates that about 450,000 tons of old corrugated cardboard from Minnesota were recovered in 1994. Accordingly, the OEA estimates that about 680,000 tons of OCC were generated in 1994.

None of the figures used in these estimates include coated corrugated cardboard, nor do they take into account the level of contamination of the OCC delivered to facilities. Recent packaging waste sorts show that about 0.1 percent to 2 percent of the waste disposed of at facilities may be coated OCC. Estimates from individuals involved in OCC recycling place the amount of contaminated OCC in the waste stream from five percent to 12 percent of the total OCC.

If these estimates are correct, contamination may reduce the amount of recoverable OCC to about 205,000 to 220,000 tons. Some mills report that they are able to process nearly all OCC, however, regardless of contamination. In addition, if technology exists to process coated OCC, an additional 2,500 to 50,000 tons may be available for processing.

Because these factors are so dependent on the equipment and processes at individual mills, the OEA will use the original 230,000 figure as the amount of OCC that may be available for recovery.

How much corrugated is recycled?

The OEA estimates that about 66 percent of the OCC generated in the state was recovered in 1994. End-market studies conducted for the OEA in 1994 showed that about 371,000 tons of OCC were recovered in 1993.

Capacity to recycle OCC increased when new mill projects came on line in the region in 1994. With the addition of this capacity, the OEA estimates that the recovery rate of OCC in 1994 was about 66 percent. New capacity has been added in 1995 with the opening of the Liberty Diversified, Inc., mill in Becker, Minnesota, and a new Cedar River Paper (a subsidiary of Weyerhaeuser) mill in Cedar Rapids, Iowa.

The OEA does not have waste data for 1995, so we have not included a 1995 recycling rate.

The OEA believes that the addition of capacity through these two mills has increased the amount of OCC recovered in the state.

Nationally, about 63 percent of OCC is recovered, a relatively high recycling rate. The national recovery rate for steel cans is about 53 percent, for aluminum cans 65 percent, for glass containers 37 percent, and for old newspapers 59 percent *(Resource Recycling*, July 1995).

OCC Generation and Recovery - 1994 (Estimated)
(In Tons)

	Statewide	Metropolitan Area	Greater Minnesota
Total Waste Generated[1]	4,773,000	2,895,000	1,878,000
Total Recycled[1]	2,011,000	1,355,000	656,000
Total MSW[1]	2,762,000	1,540,000	1,222,000
Total OCC Generated[2]	680,000		
OCC Recovered for Recycling[2]	450,000		
OCC Remaining in Waste Stream[2]	230,000		

1. Report on SCORE 1994 programs - Office of Environmental Assistance - July 1995
2. Calculated using packaging composition waste sorts from 1994 and spring 1995, conducted by R.W. Beck for the OEA and the Study of End Market Capacity, July 1994, conducted for the OEA by Rafferty and Bly.
3. These OCC totals do not account for contaminated or coated OCC.

A portion of the OCC remaining in the waste stream is contaminated and often not suitable for recycling. Estimates of the amount of contaminated OCC in the waste stream range from five percent to 12 percent, or about 12,000 tons to 28,000 tons of OCC.

Whether mills can recycle contaminated OCC depends on the degree of contamination and the technology available at a mill to process contaminated OCC. The degree of contamination and the resulting usefulness of the OCC vary from load to load. Haulers report that when OCC prices are very high, mills will often accept greater amounts of contaminated OCC than they do when prices are lower.

These estimates do not include waxed-coated OCC. Recent waste sort data indicates that coated corrugated may make up from 0.1 percent to two percent of the OCC in the waste stream, or about 230 tons to 4,600 tons annually. At this time waxed corrugated is not easily recyclable and generally is not collected in recycling activities.

Currently, an industry task force is working on developing methods to make recycling coated OCC easier. Because different coatings require different repulping methods, determining how mills could recycle coated OCC is more difficult than the industry expected. The industry will continue to work on the issue and should develop voluntary standards for

recycling that may increase the amount of coated OCC that could be recycled.

Recycling activities for OCC

Demand

Capacity to recycle OCC

OCC is used in the production of corrugated medium, boxboard liner medium, roofing felt, fiberboard, and molded paper products. Minnesota firms, such as the Waldorf Corporation in St. Paul and Certainteed in Shakopee, have been recycling OCC for more than 50 years. In fact, Minnesota has one of the most highly developed infrastructures for OCC recovery and reuse in the country (Pressure Points Analysis, Sure Green and Bly Associates, Draft, prepared for the OEA, August 1995).

Before 1985, Waldorf and Certainteed were responsible for nearly all OCC recycling in the state. The capacity for recycling OCC and the firms involved in recycling activities in Minnesota have grown in the last five years.

In the wake of the growth of municipal recycling programs in the late 1980s, other firms, both in Minnesota and around the country, increased the capacity of paper mills to use OCC in their processes. The capacity for using OCC has increased over the past five years. Capacity will continue to grow through 1997 as large national paper companies, such as Weyerhaeuser and International Paper, add capacity either through converting existing mills or building new mills. The national expansion of capacity is expected to level off after 1997.

Table 2: New Regional Recycled Containerboard Mill Projects

(1995 and beyond)

Company	Mill Site	Capacity (tons/yr)	Start-up Date
Liberty Paper, Inc.	Becker, Minn.	100,000	2Q/1995
Cedar River Paper (Weyerhaeuser)	Cedar Rapids, Iowa	270,000	2Q 1995
St. Laurent	Thunder Bay, Ontario	105,000	1Q/1996
Cedar River Paper (Weyerhaeuser)	Cedar Rapids, Iowa	324,000	3Q/1996

Source: Paper Recycler, August 1995, Vol. 6, No. 8, Miller Freeman.

The recent expansion of capacity to use OCC has changed the market dramatically. The increased demand has resulted in higher prices for OCC. Recyclers of OCC have a strong national market for their product and have been able to take advantage of regional markets, rather than just Minnesota markets.

In addition, foreign markets have played a larger role in the OCC market in the U.S. over the past 18 months. As the OCC from the east and west coasts of the U.S. is shipped overseas to foreign buyers, mostly from Asia, OCC users that relied on that supply have had to find OCC elsewhere in the U.S. This has driven the domestic prices higher.

Minnesota has seen an expansion of capacity to use OCC within the state over the past 18 months. New capacity for recycling OCC began to come on line in mid 1994. In 1994, the production capacity to use Minnesota OCC to produce new products increased about 80,000 tons annually (through expansions at Bildrite and Stone Container) and demand began to exceed supply.

Capacity for using OCC has been added in Minnesota in 1995, as well. Liberty Diversified Industries opened a new mill in Becker that is expected to use nearly 100,000 tons of OCC annually. In the first three months of operation, the mill is already using nearly 300 tons of OCC per day.

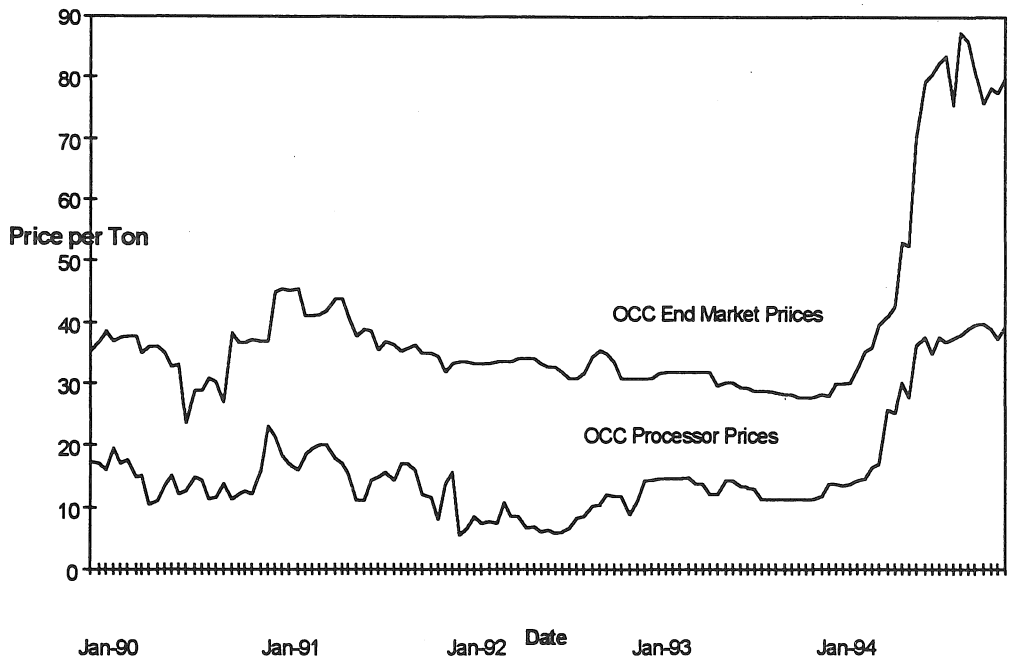
The end-market study conducted in 1994 for the OEA showed that OCC from Minnesota is sold to companies in several other states, including the Stone Container Corporation in Montana and the Green Bay Packaging Corporation in Wisconsin.

In addition, national players have aggressively entered the Minnesota market since the rise in OCC prices (primarily since the beginning of 1995), and have been competing for OCC supplies in Minnesota. The Weyerhaeuser Corporation, for example, opened a mill in Cedar Rapids, Iowa, in May 1995 and has been purchasing OCC from Minnesota.

Market prices for OCC

The increasing demand for OCC has resulted in dramatic price changes in the OCC market, especially in the past two years. Like all paper grades, OCC has seen significant price increases in both processor and end-market prices. The chart below shows the change in average OCC prices nationally from 1990 to 1994.

National Prices for OCC - 1990 through 1994



Source: Recycling Times Database

In the late 1980s and early 1990s, as municipal recycling collection programs were initiated, demand for OCC was lower than supply. As the chart indicates, national processor prices for baled OCC averaged about $5 to $20 per ton, and end-user prices were about $25 to $45 per ton. Some regional markets had a negative price for loose OCC, meaning a recycler would have to pay a processor to take the load.

The demand for OCC stayed nearly even with supply through early 1994 (Pressure Points

Study, draft). As new capacity at mills came on line in 1994, and foreign markets increased the demand for U.S. OCC, prices began to rise. Prices increased sharply in the middle of 1994 and continued to rise through the first half of 1995.

In its June 1995 issue, *Recycling Times* reported that end-user prices for OCC increased 237 percent between June 1994 and June 1995. Processor prices rose 185 percent over the same period.

Prices have fallen in the third quarter of 1995, but remain at levels close to historical high prices.

Baled OCC consistently brings higher market prices than loose OCC. The prices listed in the chart above are for baled corrugated. In the early 1990s, loose corrugated brought about $10 to $30 less per ton than baled OCC. As prices have skyrocketed in the last year, however, loose OCC has brought anywhere from $30 to nearly $80 less per ton than baled OCC.

According to *Recycling Times*, end-user prices in the east central region (Minnesota, Wisconsin, Iowa, Illinois, Indiana, Ohio and Missouri) ranged from $10 to $35 a ton in early 1993 and remained in that range through the year (about $15 to $35 per ton in December 1993).

Prices began to rise slightly in the beginning of 1994 (about $30 to $40 per ton end-user prices in June) and rose dramatically in July 1994 to about $30 to $100 per ton end-user prices. By the end of 1994, end-user prices were $50 to $110 per ton. By April 1995, end-user prices for OCC were $140 to $185 per ton in the east central region.

Prices have dropped in the past few months. In August the processor price for baled OCC was $35 to $95 per ton and the end-user price was about $110 to $140 per ton. By late September, the processor price was $40 to $60 per ton and the end-user price was $40 to $70 per ton in the East Central region. Projections about how long this price drop will last and whether prices will rise again are mixed. The next section of this report will discuss the outlook for prices.

Other

Source reduction and reuse

Many firms have initiated source-reduction activities and begun to substitute reusable packaging for corrugated paper containers. While these efforts are still in the early stages, the increased use of substitutes – such as reusable transport packaging – for single-use corrugated paper packaging could lead to the generation of less corrugated paper waste in the future. If source-reduction activities lead to a decline in OCC generation, OCC recyclers may have to find other sources of OCC to maintain the supply for their operations.

Most firms that have implemented source reduction have done so to decrease waste and save money. As a result, these activities will likely continue, especially if OCC prices remain high.

Containerboard market

Containerboard producers, who use OCC in making their products, experienced a nationwide decline in sales in the fall of 1995 (*Paper Recycler*, August 1995). In response, mills producing containerboard have been shut down longer than most in the OCC recycling industry predicted. As a result, they have been using less OCC.

The long-term implications of this decrease in demand are unclear. Containerboard demand is largely driven by the price of the product. As manufacturers see the price of packaging for their products rise, they often make changes to save money. Whether these changes are temporary -- through the use of different

material for packaging, for example -- or more permanent -- if certain packaging is eliminated entirely -- could determine whether this downturn in sales is permanent. If prices remain high, containerboard sales could continue to fall and thus the demand for OCC could decline.

Market outlook

Demand

There has been a significant expansion of capacity to use OCC in making new products in the past two years, and this expansion is projected to continue through 1997. As a result, those involved in the OCC industry expect demand to continue rising in the short term and stay stable after the capacity expansion.

Other factors, such as increased source-reduction activities or the decline in containerboard sales also could reduce the demand for OCC, but we do not expect these changes in demand to be as significant as the changes created through the recent capacity expansion.

Prices

OCC prices have historically been cyclical. Experts agree that OCC is a commodity and its price is affected sharply by shifts in supply and demand. As a result, it is unlikely that prices will return to the high levels seen in late 1994 and early 1995.

Most in the OCC industry expect prices to remain relatively high, however, and to stabilize well above prices seen in the late 1980s and early 1990s. The strong demand for OCC, combined with the well-established infrastructure for collecting OCC, should keep prices high.

Business relationships

As OCC demand and prices have increased, OCC business relationships in Minnesota have changed. The increased capacity and demand have resulted in more firms seeking to buy Minnesota OCC. High prices have meant that many marketers of OCC have sought out the best market prices for their commodity, whether in Minnesota or another region.

As a result, the traditional OCC buying and selling relationship in Minnesota has changed and there is a much larger "market" with more players. Firms have negotiated more contracts with floor prices that processors and end-users guarantee to pay.

The OEA believes that these business relationships have changed permanently and that the market will continue to have many players. It is likely that price will continue to drive behavior for some time, but the development of long-term relationships that rely on service and stability (in addition to price) will be beneficial to both OCC buyers and sellers and will be crucial to maintaining a solid market for OCC over the long term.

Many players are interested in recycling OCC in this strong market; it will be critical to establish long-term working relationships to ensure that strong OCC recycling will continue as prices rise and fall. OCC recyclers will need to work closely in order to get as much OCC as possible at all prices. Collectors, processors and end-users will need to establish relationships that reduce the risk involved in OCC price fluctuations and that involve moderate price and service flexibility on all sides.

Improving recovery of OCC

Because OCC has a relatively high rate of recovery, about 66 percent, and the infrastructure for recycling the material is well

established, increasing recovery will revolve around how to build on what already exists in the marketplace.

This makes concerns for increasing recycling of OCC quite different from those for carpet, where a recycling program needs to be developed almost from scratch if recycling is to be increased.

How much additional OCC is available?

The OEA estimates that about 230,000 tons of additional OCC may be available for recovery from the waste stream. This amount does not account for the 12,000 tons to 28,000 tons of contaminated or coated OCC that may not be available if mills do not have technology to recycle it.

In 1994, the Solid Waste Management Coordinating Board of the Metropolitan Area conducted an assessment of needs for the seven-county Metropolitan Area. The needs assessment targeted an additional 23,000 to 30,000 tons of OCC for recycling in the Metropolitan Area as part of the region's effort to achieve a 50-percent recycling goal over three years.

Where is the additional OCC?

In 1995, the OEA commissioned an analysis of the "pressure points" for recycling certain materials in the state, including OCC.

This study, conducted by Sure Green and currently in draft form, asserts that half the OCC remaining in the waste stream, or about 117,000 tons, comes from small commercial and residential generators.

The study asserts that the other half of the OCC in the waste stream is generated by large commercial generators (primarily grocery stores) who currently have active recycling programs but may not be recycling all of the corrugated they generate.

Discussion with those involved in the OCC industry support the theory that additional collection of OCC could be accomplished in the residential and small commercial sectors. There was no agreement on whether more OCC could be recycled in the large commercial sector. As a result, the OEA has focused our analysis and recommendations on those areas where all parties agree there is room for improvement in OCC recycling.

The most recent packaging composition sorts conducted across the state indicate that much of the OCC remaining in the waste stream is in commercial waste. Both in the Metropolitan Area and in Greater Minnesota, the percentage of OCC in commercial waste is greater than the amount in residential waste.

In Greater Minnesota, the percentage of uncoated OCC in commercial MSW in early 1995 was about 10.9 percent, nearly twice the 5.9 percent in residential waste.

The difference in the Metropolitan Area is not as pronounced. In spring 1995, uncoated OCC was about 10.1 percent of commercial MSW and about 7.4 percent of residential MSW.

In addition, facilities report receiving commercial loads that are more than 50 percent OCC, even with the high OCC market prices of late 1994 and early 1995. The OEA believes these loads indicate that there are some businesses who are not recycling OCC at all. However, the study provides no information on the condition of the OCC in the loads that are more than half OCC. It possible that these loads could contain OCC unsuitable for recycling.

The Solid Waste Management Coordinating Board identified an additional 8,000 to 10,000 tons of residential OCC and 15,000 to 20,000 tons of commercial OCC for increased recycling efforts in the Metropolitan Area.

Barriers to increased recycling

Residential

Availability

In 1994 SCORE reporting, 15 counties reported no residential recycling for OCC. While a number of these counties have small, widely dispersed populations that could make residential recycling of OCC difficult, several of the counties had larger populations and many also had a city with enough population density to make OCC recycling cost-effective and attractive.

Under the "opportunity-to-recycle" section of state law (Minn. Stat. 115A.552), counties are required to ensure that residents have the opportunity to recycle at least four broad material types. They are not specifically required to collect OCC.

Several counties, including Dakota, Hennepin and Washington, require municipalities receiving SCORE money from the county to provide OCC recycling to residents.

Promotion

Recyclers and local officials state that promotion and education about OCC recycling are critical steps in encouraging residents to recycle their OCC. They believe that if the OCC collection program is not promoted among residential generators, the amount of OCC recycled will be less than it otherwise could be. Supercycle, the firm that collects residential recycling in St. Paul, credits strong promotion as a critical factor in improving household OCC recycling rates.

Convenience

Firms and government officials involved in residential recycling programs stress that convenience may be a key factor in ensuring that residents recycle OCC. Recyclers and local officials believe that some requirements placed on residents for curbside OCC recycling, such as remembering which paper materials are recyclable ("my OCC boxes but not my paperboard boxes"), cutting the corrugated to a specific size or tying it, reduce the amount that residents recycle.

The differing convenience of recycling for residents of St. Paul and Minneapols may contribute to the difference in their collection rates for OCC. In St. Paul, recyclers report collecting a bit less than two pounds of OCC per month per household. Residents can recycle all household paper and do not have to bundle OCC.

In Minneapolis, about half a pound of OCC is collected monthly per household. Minneapolis residents can recycle limited types of paper and must cut and bundle their OCC.

On the other hand, the requirement that residents find inconvenient often are necessary to enable a hauler to collect OCC using current equipment.

Multi-unit

While the "opportunity-to-recycle" requirement applies to residents of multi-family units as well as single-family homes, it appears that the recycling of OCC is much less prevalent in multi-family units.

Supercycle reports that in single-family residential collection, 8.6 percent of the material recycled is OCC, while only 2.2 percent of the recycled materials from multi-family units is OCC (Resource Recycling, April 1995).

Clearly, there are barriers for multi-family units that do not exist in single-family dwellings. Space to keep bulky recyclable material such as OCC may be more limited; there may be no visible leader to take charge of recycling in a multi-family unit; education about the availability of recycling may not reach from the owner to the residents.

Commercial

Commercial businesses that generate the most OCC are retail establishments: grocery and department stores, liquor stores, mini-markets and other similar establishments. Retail establishments, particularly small retail stores and those located together in strip malls, have long been identified by OCC recyclers and government officials as critical in increasing OCC recycling. It is clear that even with recent record-breaking market prices, there are still small businesses that are not recycling corrugated.

Many barriers to OCC recycling confront both small and large business. In this section, the OEA will discuss those barriers that affect both large and small businesses first, and then highlight several issues that apply primarily to small businesses.

Cost

For owners of commercial establishments, cost is often the leading factor in determining whether to recycle OCC. If additional equipment, staff time, space or other resources are needed in order to recycle OCC, businesses will need to see a net cost savings before they are likely to begin recycling.

While recyclers and government officials often can show a business that it will save money on waste disposal and related fees if it diverts high-volume OCC to recycling, the return on investment may not be enough to make the business initiate a recycling program.

Parties interested in encouraging increased OCC recycling need to establish a method for recycling that will result in the greatest cost savings possible for businesses. This will vary depending on the business.

For example, a small business owner or manager may find savings on disposal costs if the business recycled OCC, but would no longer consider the savings worthwhile if it required investment in a baler. The business may go ahead with recycling, however, if it has the option of using a drop-off center that would accept loose OCC transported by an employee. Another business may have enough OCC and space to merit the investment in a baler for recycling.

Cost is also an issue for large commercial establishments. However, because most large retailers have already made the decision to recycle OCC, they may have already determined that the costs involved are worth the return the business will see in avoided waste disposal costs.

No requirement for "opportunity to recycle"

State statute requires counties to provide residents with the opportunity to recycle, but it does not require them to provide this opportunity to businesses. Accordingly, organized recycling programs for businesses do not exist, and the decision to recycle lies with each commercial establishment and its agreement with its waste hauler. This makes initiating a recycling program more arduous for businesses than it is for residents.

Management commitment

Recyclers, haulers and local government officials agree that there must be strong commitment from the management of a company before OCC recycling will occur. If this commitment does not exist, or is not

communicated to employees, it is unlikely that establishment will recycle.

Staff time and training

Businesses may be reluctant to devote additional staff time to breaking down OCC for recycling. They may not have the staff available, or may not see these costs offset by savings in waste disposal and thus view staff time as a cost they can't afford.

Staff training is needed to ensure that OCC is recycled to the greatest extent possible. Again, this may be a cost that businesses believe they can't afford. In larger commercial establishments that already have extensive OCC recycling, high turnover of staff and training requirements may mean that not all of the OCC that could be recycled is getting recycled.

However, in volume-based waste disposal systems, commercial establishments should have a cost incentive to break down their OCC to reduce the amount they pay for disposal and for state and local solid waste fees. If staff time is being used to reduce the volume of cardboard for disposal, recycling OCC should not require more staff time.

Small businesses

Education/lack of awareness

Among the small business community, owners and business managers are often not aware of the opportunities to recycle or the cost savings that they may be able to achieve in diverting material from their waste stream to recycling.

County recycling programs have focused on residential recycling in the past, either through their own education materials or through directing cities to provide residential recycling education. Educational materials and awareness campaigns have been aimed at residents, not at small businesses.

Some haulers report that they perform waste audits for their clients to determine what is recyclable, but this does not appear to be a widespread practice.

Space/zoning

Small commercial establishments often don't have the space to store their used cardboard until recycling pick-up. Multiple businesses in one commercial area (a strip mall, for example) often each have their own waste areas rather than a community area for joint waste disposal and recycling. This can often mean that the space for each business is quite small.

It is unusual for a small business to have a baler on site, so space can often be a greater concern for a small business than for a larger establishment.

In addition, the lack of a baler means recyclers will receive a lower price for their material than they would if it were baled.

In early 1995, the state building code was changed to adopt new standards for recycling space required within a building. The revisions to the code apply only to new or remodeled buildings.

Also, many municipalities require commercial establishments to construct screens around the space for waste disposal containers outside of their businesses. If screens are already constructed and do not include area for OCC collection and storage, it can be difficult for a business to absorb the expense of expanding the screened area to accommodate recycling storage.

In addition, some municipalities have aesthetic requirements that make building screens costly (requiring that they be made of brick, for example). This adds to the cost of OCC recycling for a small business and can

significantly increase the amount of time necessary for the investment in recycling to pay off.

Other barriers

Contamination

A certain percentage of the corrugated that is not recycled currently is contaminated and, at this point, cannot be recycled at all facilities. Different mills employ different technologies, and thus some can recycle contaminated OCC better than others.

Haulers report that mills are willing to take loads with more contamination in the current high-price market. The OEA has not been able to determine whether this indicates that mills in the area have improved their technology to recycle contaminated OCC, or whether they are willing to accept a load with contaminated OCC in order to use the non-contaminated portion.

Estimates of the amount of contamination in the OCC waste stream range from about five percent to 12 percent. These figures can be misleading, however, because a mill that has the technology could recycle some of this contaminated OCC.

OCC is often pulled from MSW loads at materials recovery facilities or at other points along hauling routes. This initial mixing of OCC with the MSW stream leads to a higher level of contaminated OCC than if the OCC had been separated at the source. Thus, a barrier to getting more usable, higher-priced OCC is the fact that not all collected OCC is source-separated.

Coated corrugated

Currently, the industry is working to make recycling of coated corrugated easier. This is proving to be somewhat of a challenge, as different heat levels and processing times are needed for different OCC coatings. At this time, it is difficult for mills to recycle coated OCC.

Transportation/distance to markets

This is an issue for areas of Greater Minnesota. While OCC in Minnesota is flowing to a number of firms outside of the state, the high cost of transportation and the difficulty of collecting enough OCC to make transportation costs less prohibitive can be difficult in some rural areas.

Increased use of local materials recovery facilities to separate OCC, institution of coordinated or cooperative hauling and end-user efforts to make wider use of existing transfer stations to get OCC to market, and development of cooperative marketing systems may help to reduce the current cost of transporting OCC from Greater Minnesota.

Fluid prices

The fact that prices for OCC are fluid and experience cyclical increases and decreases can pose a barrier to recycling additional OCC. Changing prices can make planning for future recycling difficult and can discourage some participants from making investments necessary to recycle.

Options for increasing OCC recycling

A number of options may be available for increasing recycling of OCC. The OEA has considered several factors in assessing the options. These factors include:

- The effect on prices for OCC.

- The potential increase in recovery of OCC for the investment required under the option.
- The appropriate role for the state, local governments, and industry (both haulers and end-users).
- The unique characteristics of different areas of the state.

No state government action

Under this scenario, the state would allow the system to continue without intervention, either on the supply or demand side, beyond existing SCORE programs. About 66 percent of the OCC generated in Minnesota is recycled – a high percentage – and current prices are high enough to encourage recycling. The OEA estimates that about 230,000 tons of OCC remain in MSW and could be recovered.

The market for corrugated is working as the state envisioned when support for recycling and for recycling market development programs started. This approach would not have an artificial effect on market prices now that the market is encouraging OCC recycling.

Increased education and targeted assistance for small businesses

- A strong education program could be targeted at small businesses. Counties and municipalities could initiate outreach to small commercial generators who are likely to be disposing of OCC in the trash. This effort could be state-led and funded, or it could be a cooperative effort between state, county and local governments, recyclers and OCC mills interested in obtaining more OCC.

- Counties could identify all small retail businesses operating in the county. This list could be provided to municipalities for use in informational mailings and to OCC recyclers and haulers to make them aware of businesses that may have OCC they are not recycling.

- Education materials could be developed to encourage small retail businesses to recycle OCC. These materials could let small businesses know about value in OCC and illustrate possible waste disposal costs savings resulting from recycling it. The object of these materials would be to provide small businesses with the information they need to negotiate contracts and prices for recycling OCC with their haulers.

- The state could consider requiring these education and outreach activities, along with information about opportunities to reduce or reuse OCC containers, as conditions for receiving education grants.

- Concurrent with the education efforts, the state could require (or require counties to mandate) that all haulers conduct waste audits for small businesses to ensure that owners and managers are aware of potential recyclable material in their waste streams.

This option would increase awareness of OCC recycling among a population that previously has not been targeted with education and information. It could bring about changed behavior and increased recycling among a new group of Minnesotans. An effective education program may be costly to launch, however.

Increased education for local government zoning offices and planners

- The state or counties could create materials to educate local government zoning and planning officials about the opportunity to increase OCC recycling when commercial establishments are applying for permits. Zoning offices can institute policy changes

requiring property managers to provide for recycling in the property they manage.

The city of Bloomington reports that when property owners apply to the city for building permits for are remodeling, the city requires them to provide centralized space for recycling and waste disposal for their tenants as a permit condition. Also, the city has an ordinance that requires all property owners to provide an opportunity for tenants to recycle.

Bloomington cites the Loehman's Plaza strip mall (on Normandale Boulevard) as an example of success in instituting a greater amount of recycling at a significant savings to tenants.

Before remodeling of the mall, individual businesses were responsible for their own waste disposal. As a result, not all businesses had recycling programs. Under the building permits for the remodeling, the property manager was required to establish enclosed, centralized waste and recycling services for the tenants.

Tenants now share the facilities and the cost of disposal and recycling as part of their tenant fee. The tenants have realized waste disposal savings, and the amount of materials recycled has increased. The state could work to encourage municipalities to adopt these policies.

- The state could promote the removal or revision of local zoning ordinances that

discourage recycling, such as screening requirements.

Revise the "opportunity-to-recycle" provision in state statute

- The state could expand the existing "opportunity-to-recycle" law to include all businesses.

- The state could amend the law to specify that residents must have the opportunity to recycle OCC. Currently, statute requires that residents have the opportunity to recycle four broad categories of materials.

The state could require property managers of multiple-business establishments to provide tenants with the opportunity to recycle. Alternatively, the state could amend statute to require municipalities to adopt zoning and planing ordinances that require property managers (for residential and business properties) to provide the opportunity to recycle.

Encourage local recycling programs to reduce the requirements for recycling OCC for residents.

The state could facilitate information exchange between cities to help more cities remove barriers to residential recycling. The state could work with haulers and assist cities by providing information about technology changes or improvements that could be shared in order to collect more OCC with fewer requirements.

Encourage increased use of drop-off facilities, especially in the Metropolitan Area.

Drop-off centers that allow both residents and small businesses to recycle OCC have proven effective in increasing OCC recycling in some municipalities in Greater Minnesota. Cities such as Moorhead allow both small businesses and residents to drop off OCC.

This allows small retail establishments to recycle OCC and save on waste hauling bills even if it does not have space to store OCC. Some residents may find it more convenient to

drop off loose OCC rather than cutting and binding it for curbside collection.

- The state could subsidize the cost of establishing more drop-off centers and preparing information about how to use them through grants from the landfill abatement account.

- End-users and processors of OCC could pay for the development of more drop-off centers, either on their own or in cooperation with local governments.

Encourage development of partnerships that would increase the cooperation among end-markets, haulers and recyclers, and governments.

The state could work to foster partnerships between the private sector and government. In doing so, the state could encourage cooperative activities that would result in increased OCC recycling or reuse.

- Governments and haulers could develop joint education campaigns to encourage more recycling.

- End-users could fund the purchase of equipment that would result in increased OCC recycling. They could work with governments and haulers to promote and facilitate use of this equipment. Possible equipment purchases could be:
  - Drop-off bins.
  - Balers for small businesses.
  - Balers for regional transfer stations in Greater Minnesota.

- The OEA could promote long-term relationships and contracts with price floors and escalators that would provide more stability to the OCC market and perhaps increase the investment in recovering additional OCC.

Examine more effective variable-rate pricing.

While the state requires that all municipalities implement variable-rate pricing systems, a number of these systems are not effective. OCC is a high-volume waste material and people could realize significant savings in a volume-based variable-rate system. The state could analyze the effectiveness of different variable-rate pricing systems in increasing recycling and assess whether the current state requirements are being enforced sufficiently.

After analysis, the state could set more stringent pricing structures that would increase the waste disposal costs avoided if OCC is recycled, if necessary.

Examine the possibility of increasing recycling of wax-coated and contaminated OCC.

The state could monitor industry efforts to develop technology for recycling waxed-coated and contaminated OCC. An industry working group is currently developing voluntary standards to assist in recycling coated OCC. While recycling OCC is proving to be difficult, the state could monitor the industry efforts and, if appropriate, fund development efforts in Minnesota.

Ban OCC from the waste stream.

In the 1995 Legislative session, legislation was introduced to ban OCC from MSW. The measure did not pass but remains an option for the state. Two end-users of corrugated in Minnesota testified in favor of the measure. Haulers, recyclers and county governments expressed their opposition to a ban.

Minnesota has banned a number of materials from MSW already, either to reduce the toxicity of MSW going to processing and disposal facilities or to encourage recovery of the material. In the past, the Legislature has reserved bans for materials that are a source of toxicity (such as batteries), represent a large share of the MSW stream (such as yard waste), or that present other problems in handling in MSW (such as telephone books).

While proponents argue that banning OCC would make more OCC available for recycling, the OEA is not certain that a ban would remove the remaining barriers to increased OCC recycling. The fact that current waste sorts show that OCC represents about nine percent of MSW, even during a period of record market prices, may indicate that the barriers are so strong that they need to be addressed directly in order to increase recycling.

OCC is already being recycled at a very high rate (about 65 percent) and the market for OCC is strong. In addition, OCC does not present a toxicity risk.

Opponents argue that even if a ban succeeded in raising the supply of OCC, the price of OCC may fall given market supply and demand behavior. If the price falls, the ban would eliminate some of the "natural" market incentive for recycling and could require additional government, hauler and recycler effort to bring in material that may have come in on its own because of the higher prices.

Given the global nature of the current OCC market, however, the OEA is not certain that the price would fall under a ban. Certainly, a ban by Minnesota would not affect national prices. There may be some price reduction in our region, however, and this may reduce incentives to recycle OCC.

Some counties argue that a ban may be difficult for county governments to enact or enforce, although other counties -- all in Greater Minnesota -- have imposed bans on OCC.

Ban OCC from MSW but establish a price floor.

If the ban succeeded in making more OCC available for recycling, this option would prevent prices from falling to a level that would be a disincentive to recycle.

A ban with a price floor would retain some of the price incentives that make generators recycle OCC if the prices were to fall under an OCC ban.

Recommendations

The OEA recommends that the Legislature not make any changes in state law regarding OCC recycling at this time. OCC has a high recycling rate and the infrastructure for recovering the material is well-established.

A number of barriers stand in the way of increased OCC recycling. These barriers will have to be addressed to recover additional OCC from the waste stream. The OEA believes the private sector will be better able to address many of these barriers than the public sector.

While the OEA believes specific legislative action is not needed to address these barriers, state government, local governments, and most importantly the private sector should take action to improve recycling.

The OEA will work to improve long-term relationships in the OCC recycling industry.

In working to improve long-term relationships, one step the OEA will encourage is the use of long-term contracts that reduce the risks to all

parties from fluctuations in price for OCC. The fluctuations lead to instability among OCC recyclers.

Stronger relationships and contracts with price floors or escalators remove some of the risk from price fluctuations and may allow the industry to focus resources on activities that will bring in more OCC rather than reacting to each price fluctuation. The OEA will encourage all parties involved in recycling -- governments, collectors, processors and end-market purchasers -- to think about activities that will be good for the recycling business in the long term.

The following example illustrates the potential benefits of better long-term relationships in a recycling industry.

In the plastic recycling business, Phoenix Plastics has contract customers and non-contract customers. Phoenix guarantees that it will take plastic for its long-term contract customers. Under this type of contract, Phoenix ensures its supply no matter what the price fluctuation, and sellers are assured of a buyer at all times. While this may mean sellers cannot take full advantage of extremely high spot prices, or that Phoenix sometimes has to pay more than it would on the open market, both sellers and buyers are assured of relative stability for supply and demand.

As a result, both buyer and seller do not have to constantly react to market demand and can focus on business operations. In the OCC industry, similar contracts may remove some of the risk that results from constant price fluctuations and allow OCC recyclers to invest in activities that could increase the total amount of OCC recovered without some of the risk these investments would otherwise carry.

The OEA will work directly with businesses to reduce the amount of waste they generate and to increase recycling.

The OEA will work with businesses through outreach, workshops, financial assistance for source reduction and recycling activities, and education. The OEA also will take a stronger role in the Waste Wise program. The OEA expects changes to the program, currently being planned by the OEA and the Chamber of Commerce, will lead to greater participation and results. Finally, the OEA will work with trade associations of businesses that may have additional OCC that they could be recycling (such as the Building Owners and Managers Association).

The OEA will provide direction and assistance to counties to improve recycling among commercial and service businesses.

Many Greater Minnesota counties have begun to increase their business recycling efforts to achieve the 1996 recycling goals. More opportunities exist throughout the state to promote business recycling efforts. For example, more visible and effective recycling efforts in the downtown areas of both Minneapolis and St. Paul would result from a concerted effort of the OEA, counties and cities, and the business communities to promote recycling.

The OEA will work with local government groups to promote the adoption of local zoning ordinances that encourage recycling.

The OEA will work with groups, such as the Association of Recycling Managers, to promote the adoption of local zoning ordinances that encourage recycling.

For example, these groups could encourage adoption of zoning ordinances requiring property-owners to provide more opportunity to recycle for tenants, and revising the existing requirements for space and screening of recycling areas that can often present a barrier to recycling.

The OEA will consider funding activities to increase the amount of recycling in the business community.

The OEA will consider funding activities to increase the amount of recycling in the business community through competitive SCORE and Local Recycling Development Grants in the future. The OEA is in the process of revising its grant programs, and will consider increased focus on business recycling as part of this effort.

In addition, the OEA believes members of the OCC recycling industry should take steps to improve recovery.

The industry should make direct investments in activities and equipment that will help reduce the barriers to recycling greater amounts of OCC.

Industry should work with local governments to target specific barriers to increase the amount of OCC recycled.

- Increase the use of drop-off centers for both residential and small commercial recycling, especially in the Metropolitan Area and population centers in Greater Minnesota. Processors and end-users could fund these centers and run them themselves, or work with local governments to run them.
- Purchase balers to allow small businesses -- especially those that share retail space in strip malls -- to recycle their OCC even if space is limited.
- Jointly finance construction of space expansion for recycling bins for small businesses or strip malls.
- Where appropriate, convert waste collection to recycling collection, as BFI has done with a number of small commercial accounts. Instead of a waste dumpster, small commercial establishments could be provided with a recycling dumpster and a small waste container (or clearly marked and separated bags within a recycling dumpster) so that the focus of the collection is recycling, not waste.
- Invest in more promotion for OCC recycling among residential and small commercial customers.

The OEA anticipates that these steps will lead to improved recovery of OCC. If these activities do not achieve the desired results, the OEA will provide additional recommendations to the Legislature. Such recommendations could be included in the *1997 Solid Waste*

Policy Report. As the OEA monitors progress on this issue, the following options will be considered:

- Consider a shift in focus in SCORE recycling programs to improve recycling in the business community. As mentioned above, a number of counties are already increasing the involvement of the commercial to meet the 1996 recycling goals.

- Analyze whether it would be appropriate to revise the "opportunity-to-recycle" statute to require that businesses, not just residents, have opportunities to recycle. Such a change would require careful consideration of who should be responsible for ensuring opportunities are provided.

- Assess whether the state should establish guidelines for local zoning requirements regarding recycling.

Chapter 3

Carpet

For purposes of this report, the Legislature has defined "used carpeting" as carpet that "is no longer useful for its original intended purpose because of wear, damage, or defect." Accordingly, in this report the OEA will address only carpet recycling.

The OEA believes, however, that the state should focus not only on recycling carpet but also on those activities higher on the waste management hierarchy: reduction and reuse. The state should encourage efforts to educate the public both about using carpet as long as possible before replacing it, and about reusing it through donating it to community groups who are in need of carpet. The average carpet lasts about 10 years; the state should encourage all citizens to use carpet for its entire life and reuse carpet as much as possible.

Carpet is considered a problem material for mass-burn, refuse-derived fuel and MSW composting facilities because it is an oversized and bulky waste. It is often too large for processing equipment in these facilities to handle. As a result, carpet often goes to landfills (although it has a high BTU value when burned). There are no reliable estimates of the amount of this waste diverted to landfills from processing facilities.

Current status of used carpet recycling

This chapter summarizes the current activity in carpet recycling, both in the nation and in Minnesota.

How much carpet is there?

Nationally

About 880 million square yards, or 2 million tons, of carpet was replaced and potentially available for disposal in the U.S. in 1994. This represents about one percent by weight of MSW in the U.S.

According to the most recent figures available from the Department of Commerce, the domestic carpet industry shipped approximately 1.6 billion square yards of carpet in 1994. About eight percent of this carpet, or about 125 million square yards, was exported. Another 90 million square yards, or five percent, was imported from other countries for use in the U.S.

The Carpet and Rug Institute, an industry association with headquarters in Dalton, Georgia, estimates that about 55 percent of all new shipments of carpet replace existing carpet. The remainder of the carpet is used in new construction and installation.

These figures include all tufted, woven, and all other carpet and rugs, so they represent an amount greater than what would be considered "used carpeting " as defined by the Legislature. Some of this carpet may not be recyclable at this time or may be suitable for reuse before disposal.

According to Carpet and Rug Institute estimates, about 61 percent of broadloom carpet sold nationally is bought by homeowners for use in residential dwellings

(broadloom is the largest category of carpeting). About 13 percent to14 percent is sold to parties other than homeowners, such as building contractors, for residential use, and about 25 percent of sales are for commercial use. An average 1,800-square-foot house would use about 200 square yards of carpeting.

Minnesota

The Office of Environmental Assistance estimates that carpet accounts for less than one percent of the MSW in Minnesota. Using national carpet shipment and demographic figures for the U.S., the OEA estimates that about 16 million square yards, or 36,000 tons, of carpet are replaced in Minnesota annually.

The estimate of 36,000 tons represents an amount greater than what would be considered "used" under the definition of the report, since some of the carpet being replaced is certainly suitable for reuse.

The OEA cannot estimate how much carpet is reused before it is ultimately disposed of in the state, but the OEA believes these aggregate figures are helpful in determining an estimate of the amount of carpet that may be available for recycling.

Current recycling efforts

There is relatively little post-consumer carpet recycling in the United States at this time.

Carpeting is a difficult material to recycle. Only about one-half of the post-consumer carpet accepted at facilities can be recycled with current technologies. The other half, carpet that recycling operations don't have the technology to recycle, is disposed of as regular MSW.

Carpet is about 40 percent to 60 percent face fiber. This face fiber is almost always one of several nylon resins. However, nylon fibers from different carpet brands may not mix well, so the fibers from different carpets cannot be mixed if a high-quality end-product is to be produced. The remainder of the carpet is polypropylene backing (about 10 percent) and latex adhesives composed of calcium carbonate and other materials (about 40 percent to 60 percent).

Some types of carpet backing, such as jute or rubber used on older carpet, present further recycling challenges. While some recyclers that recut and recondition carpet can use jute-backed carpet, most other recycling technologies cannot recycle this type of carpeting at this time.

Notable efforts to develop recycling for post-consumer carpet have been initiated only in the last five years. Major carpet or fiber manufacturers have launched most of these efforts and they are all small-scale or pilot efforts. None of the major manufacturers is currently operating recycling programs in Minnesota.

Carpet and fiber manufacturers have been recycling their industrial scrap for decades but have not initiated recycling for post-consumer carpet until recently. Post-consumer carpet recycling now occurs only in certain areas of the country – such as the Northeast, where waste disposal costs are high – and the existing efforts are small-scale.

The Carpet and Rug Institute has a working group on carpet recycling. Those involved in production and manufacture of carpet are involved in this group and in increasing the capacity for carpet recycling.

In Minnesota, the principal carpet recycler is United Recycling, Inc. (URI), of St. Louis Park. URI has been in operation for about four years and has been accepting carpet for a fee from a variety of sources. Currently, the company produces plastic resin and

polypropylene fluff for use in new plastic products.

URI managers estimate that they take in about 2.4 million to 4.8 million pounds of carpet annually (200,000 to 400,000 pounds monthly), or about 1,200 to 2,400 tons, and recycle less than half of that. The amount URI collects is about three percent to seven percent of the OEA's estimate of the amount of carpet disposed of in Minnesota annually.

Another firm, Carpet Recovery Innovation (CRI), collects used carpet, recuts and repairs the carpet for resale. The firm also ships the carpet pad to recyclers in Wisconsin. Other small firms, such as Nationwide Carpet Recycling, contract with homeowners or businesses to remove carpet for recycling and work with URI to recycle it.

The OEA does not have enough information to make an estimate of the amount of carpet recycled by these small firms.

Current recycling processes

Current recycling efforts nationally can be broken down into those that pursue reuse or mixed fiber use for carpet and those that reclaim resins from carpet.

Both of these processes are being developed primarily by the carpet and fiber industries in the U.S. While recent recycling activities have started to address recycling post-consumer carpet, most of the research and development and recycling activity to date has occurred because the carpet industry produces a large amount of pre-consumer carpet waste. In an effort to divert this pre-consumer waste from landfills, the industry began to work on recycling it. Some of the same technologies are being used in recycling post-consumer carpet.

Mixed resin or reuse

In mixed-resin or reuse processes, firms grind carpet and use the ground material as a filler in concrete and other products, or recut and repair existing carpet for resale.

The technology required for these processes is less sophisticated than that required to reclaim resins from carpet. Mixed-resin and or reuse processes can often recycle more carpet by weight, but the end-products are relatively low-priced and have a limited market at this time.

Examples of firms involved mixed resin activities:

- Collins and Aikman Floorcoverings in Dalton, Georgia, currently grinds carpet and uses the end-product for parking stops and synthetic timbers for industrial flooring. The company recently announced a new technology to use vinyl-backed carpet and carpet tile to create other new products. The U.S. Navy is the firm's first customer for parking stops from the new technology.

- Shaw Industries, Inc., in Dalton, Georgia, in coordination with Georgia Tech, is using carpet scraps to create carpet-reinforced concrete. Shaw is building a new building with the carpet-reinforced concrete. At this time, Shaw uses only industrial scrap for this process.

Resin separation

Resin-separation processes break the carpet down and separate fibers for recycling. These processes generally separate the backing from the face fibers and then isolate the different fibers in the carpet. Some of these fibers are used to produce a resin for plastic products. Other fibers go through depolymerization to produce fibers that can be used in place of virgin plastic resins and fibers in carpet and other products.

Examples of firms employing resin separation processes:

- DuPont sends carpet though a process that separates the pure nylon, polypropylene and other "filler" materials. Once the nylon is separated, the highest use for it is achieved through depolymerization. The nylon from the used carpet can then be made into virgin-quality nylon for use in new carpet. Because different types of carpet use different nylon fibers, the recycling process must be able to produce fiber that is extremely pure to be acceptable as a virgin substitute.

Other uses for nylon include manufacture into automobile parts and other products.

Some of the by-products from the separation process are used to create mixed-resin products such as concrete-like and wood-like products. DuPont has only recently launched this project, and it is not yet processing significant amounts of post-consumer carpet.

- BASF Corp. in the U.S. has patented a process that separates the nylon facing in carpet from the backing materials. BASF then depolymerizes the face fiber of the carpet to create recycled fibers that can be used in place of virgin fibers in new carpet. This program is still in the initial stages and is not collecting or processing a significant amount of carpet at this time.

Minnesota

URI in Minnesota employs a process that separates the components in carpet.

URI, Inc., was founded in 1990 by carpet dealers, distributors and installers in the Metropolitan Area. The company collected carpet, pad and shrink wrap. The pad and shrink wrap were baled and shipped out-of-state for processing. The company still collects, bales and sells pad to others for recycling.

Initially, the company worked to separate the carpet into its components to recover the fibers and produce plastic resin pellets and polypropylene fluff for use in new products. The company then shifted to producing new plastic products itself from the recycled carpet. These products include tack strips and cove sticks for carpeting installation. Recently, the firm again began pursuing the production of resins that can be sold to others to produce new products.

The OEA provided URI with a $77,000 grant in 1992 to research methods for removing jute backing from nylon and polypropylene carpet. Although the techniques explored were not successful, URI has found technology to separate jute. It is not financially feasible to use this process at this time, however.

The OEA is currently providing additinoal loan support to URI. URI originally used the state money for equipment to expand capacity for manufacturing tack strips and cove sticks from processed carpet. URI is no longer using the equipment to produce products itself. Instead, the firm is concentrating on developing a process to separate nylon resins for sales to others.

In late September 1995, URI announced that it will enter into an agreement with Fluor Daniel, Inc., a national engineering firm, to upgrade its process for recycling carpet through use of a patented technology. The company hopes that this new technology will enable it to produce a purer end-product for sale. Currently, URI has difficulty producing a product pure enough for sale. The new technology has been tested in the laboratory, but never used in wide-scale recycling efforts.

Current collection

At this time, there is no widespread collection of used carpet anywhere in the U.S. As a result, there is no good model for either

commercial or residential recycling for Minnesota to examine.

Carpet industry efforts have focused on collection from the commercial sector, but these efforts are limited. To OEA's knowledge, no industry efforts have addressed residential carpet collection.

DuPont's program, the most extensive of the manufacturer's recycled-carpet projects, accepts carpet only from commercial sources through a small network of contractors with whom the firm has an existing relationship. DuPont will accept any type of carpet if new DuPont carpet is being installed. DuPont initiated this program within the past year.

BASF will accept only a specific brand of its own carpet manufactured after February 1994. The generator of the used carpet must pay for shipping to BASF.

In Minnesota, URI has used a number of collection methods to for their operation. For varying fees (see cost section), the firm:

- Operates a drop-off program at its St. Louis Park facility.
- Runs a pick-up service from homes, dealerships and other generators.
- Works with local municipalities to hold drop-off days, at which residents can bring large items (such as appliances and carpet), pay a fee, and have them recycled.
- Operates a "take-up service" in which URI removes and takes away carpet for generators.

A few other firms in Minnesota will remove used carpet and recycle it for a fee. These firms work with residential and commercial generators and respond to requests from homeowners, carpet installers or haulers for removal service. The OEA is aware of fewer than a half-dozen of these firms, and all are small.

At this time, there is little or no collection of used carpet for recycling in Greater Minnesota. The 1994 SCORE report shows that counties reported recycling 259 tons of carpet in 1994. Metropolitan Area counties accounted for most of the recycling. Only two Greater Minnesota counties, Olmsted and Stearns, reported carpet recycling. Olmsted report collecting 20 tons and Stearns reported collecting 18 tons for recycling.

Improving recovery and recycling of used carpeting

Used carpet represents less than one percent of the MSW in Minnesota. It is considered a problem material for processing facilities because it is large and bulky. As part of landfill abatement and recycling efforts, the state has supported and encouraged carpet recycling in the past.

This section examines how to increase carpet recycling in Minnesota. The section presents:

- Barriers to recycling.
- Options for increasing recycling in Minnesota.
- Recommended approach.

Barriers to recycling

Carpet components

The nature of carpet makes it difficult to recycle. Recycling programs take in at least twice as much used carpet as they will be able to recycle. The amount that they are not able to recycle is disposed of as regular MSW, usually in a landfill.

Only about 50 percent of the total carpet by weight is the actual "face fiber" (although residential carpet has more face fiber than

commercial carpet). Carpet backing, which is made from several components such as polypropylene, calcium carbonate and adhesives, makes up the rest of the weight.

Carpet face fiber is primarily nylon, but may be one of several types of nylon. These different fiber types cannot be mixed in a resin-separating recycling process; if the fibers are mixed, the resulting product cannot be used in other plastic materials.

URI, for example, must have a staff person perform a chemical analysis on each load of carpet to determine whether it can be recycled using URI's process or discarded. This need for exactness in separating nylon fibers is costly and means that a great deal of carpet sent for recycling to any given facility cannot be recycled there.

In Europe, certain manufacturers have begun to substitute organic material that is more easily recyclable than the calcium carbonate used in the U.S. There has been no similar U.S. effort to date.

Capacity to recycle carpet

Easy and relatively inexpensive technology to process large amounts of carpet does not exist on a widespread basis in the U.S. at this time. None of the current technologies is available to process large amounts of post-consumer carpet; these technologies are either being used in small operations or have been developed in the laboratory but never applied in a large-scale carpet recycling effort.

In Minnesota, very few firms are reusing or recycling carpet at this time.

Cost of carpet recycling vs. cost of disposal

Because of the high cost of carpet recycling, disposal is often less expensive than recycling in our region and in many parts of the county.

In Minnesota, URI charges about 50 cents per square yard for carpet recycling drop-off, and $1 per square yard for pick-up. These fees result in a charge of nearly $250 to $500 per ton for carpet recycling in Minnesota. Other recyclers, such as CRI and Nationwide Carpet Recycling, charge a fee to remove carpet from a home or office and recycle it. They report that they try to keep their prices competitive with other non-recycling installers, but that they usually must charge a higher price to cover the cost of their recycling activities.

At this time, carpet recyclers use the tipping fee to cover most of their collection and processing costs. Sales from end-products do not make up a significant amount of revenue.

When tipping fees at solid waste disposal facilities are relatively high, it is attractive for generators to divert carpet from the waste stream.

With current solid waste disposal facility tip fees in the Metropolitan Area at about $45 to $65 per ton, it is impossible for carpet recycling as it exists today to compete with standard disposal.

DuPont has established its initial collection sites for post-consumer carpet in areas of the country where regional disposal fees are relatively high (the Northeast and Northwest, for example).

The cost of the technology, lack of collection infrastructure for recycling, and the fact that firms have to pay for disposal for over half of the carpet they collect for recycling (because it is not recyclable with their process) results in a relatively high cost for carpet recycling.

Some of the national firms engaged in carpet recycling activities acknowledge that the programs are losing money and have been operated at a loss for several years.

Collection

The carpet industry as a whole, and URI in Minnesota, identify lack of collection as the largest barrier to recycling.

Some municipalities collect carpet separately from regular MSW because it is too bulky for their regular loads, but very little of it is recycled because of the cost.

The city of Hopkins has entered into an agreement with URI to collect and recycle its residents' used carpet. The city will pay URI $20 per roll to collect and recycle the carpet. The city charges residents a flat $15 fee for special collections. Carpet will continue to be a special collection item and residents will see no change in their disposal rates. A roll is defined as about 20 square yards of carpet (six feet long and two feet in diameter).

Other cities include carpet in their "drop-off" days for problem materials. Plymouth, for example, charges residents to drop off carpet on a city recycling drop-off day and pays URI a fee to recycle the carpet. At this time, Plymouth subsidizes the cost of recycling carpet for residents who bring it to the drop-off days.

Outlook for carpet recycling

Recycling used carpet should continue to grow over the next five to 10 years. The carpet industry seems committed to supporting new recycling technologies for post-consumer carpet and is starting to test new technologies in limited recycling efforts. If the technologies lead to purer end-product, recylers should be able to produce more products that can be sold at a higher price and thus reduce the cost of carpet recycling that must be reflected in a tip fee for the generator.

Industry efforts are fragmented, however, and probably won't be sufficient to bring about widespread increases in carpet recycling. Most new technologies seem to concentrate on one type of process (usually designed to recycle one brand of carpet or type of fiber, such as the process designed for a particular BASF fiber).

There is little development of a comprehensive approach to recycling that would allow for greater flexibility in recycling programs by allowing recyclers to process the greatest amount of carpet possible. Without a unified industry effort, strong independent players outside of the industry, or government regulation, the development of large-scale recycling will be haphazard.

An industry working group on carpet recycling is working to establish a content-labeling system to identify the types of fiber in carpet. Labeling would eliminate the need to test each load and should reduce costs of recycling. This effort would make recycling of newer carpet easier, but would not address the identification issue for carpet made before the labeling requirement.

Although carpet recycling should continue to grow over the next five to 10 years, the growth will probably not be large enough to bring about a significant reduction in the amount of carpet landfilled in Minnesota. Increased source reduction activities and reuse of carpet will need to be encouraged and developed if carpet in the MSW stream is to be reduced.

Options for increasing recycling

The OEA examined a number of options suggested by various parities involved in

carpet recycling and disposal. Carpet makes up only about one percent of MSW in Minnesota. While it is considered a problem material for processing facilities, it does not contain hazardous materials and is not considered an environmental risk when it is burned or landfilled.

In determining which options to pursue, the state must weigh the cost of improving carpet recycling against the risk presented by carpet in the waste stream.

While the Legislative charge for this report required that the OEA make recommendations for increasing carpet recycling, the OEA believes it is critical to consider options to increase source reduction and reuse for carpet, as well as options to increase recycling.

Several options are presented below.

Allow the carpet recycling system to develop on its own without additional government support.

This option would provide time for the current, limited industry efforts to grow and expand, and current state-funded efforts to mature.

To date, the OEA has provided nearly $100,000 in grants and loans for research into carpet recycling technology and has entered into a loan agreement with URI for a total of $500,000. About $75,000 has been issued under the under the first phase of the loan. The second phase of the loan is under consideration at this time.

Ensure that any state support goes to both "mixed-resin and reuse" and "resin-separation" recovery efforts so that as much carpet as possible is recovered under current programs.

The state has provided most of its current financial support to resin-separation carpet recycling technology.

The state could ensure that businesses that collect, recut and reclaim carpet for resale get support from the state as well. This support does not have to be through grants and loans but could be through efforts to educate both the public and the carpet industry in Minnesota. For example, the state could include information about all carpet collection and recycling programs in recycling information and encourage local governments to do the same.

The state could promote information that would make mixed-resin and reuse programs more successful, as well. For example, Carpet Recovery Innovation (CRI) and Nationwide Carpet Recycling stress that they must be notified and involved before carpet is removed if their recycling efforts are to be effective. Once a homeowner has had carpet removed and cut for disposal, CRI cannot recut and reuse it as effectively. The state could help make sure this information is spread to homeowners, carpet installers and carpet retailers.

Strengthen the current state requirement that enables public entities to include a requirement for reuse or recycling in any bid for carpet replacement.

Current state requirements regarding public entity purchase of carpet (Minn. Stat.

§16B.122, Subd. 3b) give public entities the option of requiring all bidders on a carpet replacement project to identify a carpet recycler but do not require that they do so. The law could require public entities to institute a requirement that any bidder for carpet replacement must investigate options to repair and reuse existing carpet, sell to a firm that would reuse the carpet, or identify a recycler.

Establish partnerships to encourage national firms to locate collection points for their recycling efforts in Minnesota.

Under this option, the state would actively work with the national carpet associations and firms to encourage them to promote and establish collection centers for their developing recycling programs in Minnesota.

This would be especially helpful in Greater Minnesota, where there are no recycling programs and local officials report that transportation costs (and the generally high cost of recycling carpet) make it impossible to recycle carpet effectively. Placing collection sites in key population centers would aid Greater Minnesota's recycling efforts.

Target carpet installers and retailers in the state with education about recycling so they can educate carpet customers.

Initiate a public education program encouraging these businesses to recycle carpet. The program could include information aimed at the companies, to educate them about the existing recycling options in the state, as well as information they could use to educate their customers.

The state could require carpet retailers to provide information on reuse and recycling to their customers at the time of sale so consumers are aware of alternatives to disposal.

Establish guidelines or requirements for collection.

The state could establish guidelines or requirements for carpet collection requiring all generators planning to remove carpet to contact a recycler before removing it. The guidelines could also require all retailers to notify their customers of this recycling requirement.

The state could take a more aggressive approach and require certain sectors that generate a significant amount of carpet to increase collection for recycling. For example, the state could require construction and demolition facilities to separate used carpet or require installers to recycle carpet.

While these options may increase the amount of carpet collected for recycling, they do not address the issue of the high cost of carpet recycling. These options are dependent upon successful efforts to reduce the current cost of carpet recycling. Accordingly, if they are chosen, they should be phased in over a three- to five-year period.

Require that all carpet sold in the state carry a content label starting in 2000.

This option could help firms recycle new carpet more easily and cost-effectively, but recyclers would still have to process a large amount of carpet produced before 2000 that would require extensive testing before recycling.

Ban carpet from MSW.

Minnesota has banned a number of materials from MSW already, either to encourage recovery of materials that comprise a large percentage of the waste stream (such as yard waste) or to remove materials that contibute to the toxicity of MSW (such as batteries). While a disposal ban would certainly make more carpet available for recycling, it would be difficult to enforce and expensive to administer.

Currently the technology to recover the large amount of carpet that would be collected for recycling under a ban does not exist in the U.S. No technology employed by any recycler could recycle the volume of carpet produced under a ban. A ban date would have to be established at least five years in the future to ensure that the technology to recycle would be in place.

Recommendations

While carpet recovery continues to increase in Minnesota and across the country, recycling and reuse programs are still very limited. The OEA recommends a variety of approaches to try to increase recovery of carpet in Minnesota.

The state should promote and encourage a full range of alternatives to disposal for carpet, from reduction to reuse to resin separation and recovery.

The state should work to stimulate demand and supply through promotion and encouragement of businesses that provide a range of carpet recycling and reuse services.

The Legislature could strengthen the current state requirements regarding public entity purchase of carpet (Minn. Stat. §16B.122, Subd. 3b).

Currently, the statute gives public entities the option of requiring all bidders on a carpet replacement project to identify a carpet recycler, but does not require that they do so.

The Legislature could require that public entities require bidders to investigate options to repair and reuse existing carpet, sell to a firm that would reuse the carpet, or identify a recycler for any new carpet installation.

The state, working with local governments and retailers, should encourage carpet retailers to provide customers with information on how to reuse or recycle their carpet with every new sale.

The OEA will work with retailers to create informational material and provide them with copy-ready samples of information they could provide to their customers about carpet recovery.

The Legislature should require that all new carpeting sold in the state carry a content label identifying the fibers in the carpet face and backing by 2000.

This would help carpet recyclers identify the type of carpet without costly and time-consuming chemical analysis of each load of carpet delivered for recycling.