DAKOTA COUNTY RECYCLING EVALUATION

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The mission of the Dakota County Office of Planning, Evaluation, and Development is to help our partners achieve County goals by providing information, analysis, and assistance in setting direction, framing policy discussions, and measuring progress.

EXECUTIVE SUMMARY

PROBLEM STATEMENT

A *principal service/program activity* of the Environmental Management Department in Dakota County is to ensure that *solid waste generated in the County is recycled*. Based upon hauler reports and inventories from drop-off sites, *results are measured* in terms of *the percentage of the total municipal solid waste stream that is recycled* and the *total tonnage of waste recycled* (*Dakota County Environmental Management Outcome Measurement Plan*, 1998). The benefits of recycling include natural resource conservation, solid waste reduction, environmental protection, energy conservation, and social and economic development.

Due to both the leveling of recycling rates and diminishing landfill capacity in Dakota County, reassessment of the current recycling program in the County and complementary efforts to encourage residential, commercial, institutional, and in-house recycling is timely. State legislation set a goal for metropolitan area counties to recycle at least 50% of total municipal solid waste generated by weight. Regionally, the metropolitan area's recycling rate peaked in 1994 and 1995, and despite a slight improvement in the recycling rate in 2000, the region as a whole has continued to fall short of the mandated recycling rate of 50% from 1997 to the present.

Although Dakota County reached the 50% goal and was slightly exceeding the performance of the region as a whole by 1996, the recycling rate has remained relatively steady between 48% and 50% since 1997. Given that the rate of waste generation has plateaued in recent years, the apparent leveling in the recycling rate implies that new opportunities may exist to improve the effectiveness of recycling in Dakota County. The County's recycling initiatives have been successful in reaching and generally maintaining the legislative goal for recycling among metropolitan area counties, and the total tonnage of material recycled has increased. However, the evident plateau in recycling rates and tonnage of materials collected per person -- coupled with diminished landfill capacity, continued County growth, restrictions in directing waste streams, and industry changes -- give rise to the following *evaluation questions*:

1. ***How effective is Dakota County in providing that solid waste generated in Dakota County is recycled? What opportunities exist to increase the recycling of waste generated in Dakota County, and what issues should be considered in weighing alternatives?***

2. ***How might the County significantly influence and improve recycling in the following sectors?***
   - Residential
   - Commercial
   - Institutional
   - In-house

The Recycling Evaluation addresses these questions and identifies recommendations for continued improvement of residential, commercial, institutional, and in-house recycling in Dakota County.

BACKGROUND

State legislation adopted in 1989 set a goal for metropolitan area counties to *recycle at least 50% of the total tonnage of municipal solid waste (MSW) generated*, to be achieved every year from 1996 through 2003. Dakota County's implementation strategy for recycling was initiated in 1988, at which time the County was deeply involved in developing the program. In 1990, Dakota County recycled approximately

19% of all waste generated and was achieving less than the region's average recycling rate of 30%. In 1990, some 0.18 tons of municipal solid waste were recycled per capita. By the following year, the per capita volume had more than doubled to 0.40 tons of MSW recycled per person. From 1991 to the present, the tonnage of recyclables has ranged between 0.38 and 0.45 tons collected per person.

The *total amount of waste recycled has continued to increase*, from some 51,000 tons recycled in 1990 to nearly 158,000 tons in 2001. However, the number of tons of waste recycled per person has largely remained steady over much of the past decade. *By 1996, Dakota had reached the goal* for metropolitan area counties at 50% and was slightly exceeding the performance of the region as a whole. *Since 1997*, however, *the recycling rate has remained relatively steady* (between 48% and 50%). In 2001, the recycling rate fell from a rate of 50% in 2000, to approximately 48% of the total municipal solid waste generated in the County.

Currently, the recycling program in Dakota County consists primarily of the following four activities:

- Distribution of community funding and recycling containers to municipalities and rural areas for curbside collection;
- Implementation of environmental education campaigns to residents and businesses;
- Regulation of private waste hauling firms, and responsibility for reporting County progress towards achievement of environmental outcomes to the state and region; and
- Provision of leadership through the County's promotion of in-house recycling activities.

GENERAL PROGRAM FINDINGS AND RECOMMENDATIONS

While Dakota County has largely maintained the state mandated rate of 50% of mixed municipal solid waste recycled by weight, opportunities exist to improve ongoing collection of recycling data and collaborative partnerships with best practice jurisdictions, private industry, local communities and Solid Waste Management Coordinating Board member counties. Additionally, over the past decade, the County has dedicated a smaller overall proportion of resources to support local recycling programs -- targeting a growing number of households, businesses, organizations, and County staff -- than comparable SWMCB counties.

Specifically,

GENERAL PROGRAM FINDINGS

- **Recycling rates increased between 1990 and 1997.** A goal of the Environmental Management Department is protection and enhancement of the environment of Dakota County (*Dakota County Environmental Management Outcome Measurement Plan*, 1998). Recycling contributes to this goal by reducing waste that would otherwise be landfilled or require processing (e.g., by incineration), and by assuring that problem materials are properly managed. The increase in the recycling rate in Dakota County in the 1990s (from 26% in 1990 to 48% in 2001, with a high of 52% in 1997), and the growth in the number of tons recycled (from 51,000 tons in 1990 to 158,000 tons in 2001), indicates important movement towards achievement of this County goal.

- **Recycling and waste generation rates have remained steady since 1997.** In recent years, the apparent leveling of recycling rates (between 48% and 50% since 1997) and tonnage recycled per capita (between 0.43 tons and 0.45 tons collected per capita since 1997), coupled with the relatively steady rate of waste generated in Dakota County (from a low amount of 0.93 tons generated per capita in 1995 to 1.08 tons generated per capita in 2001), has resulted in a net increase in the tonnage of waste landfilled and an associated decline in landfill capacity.

While recycling should not, and cannot, be expected to shoulder the entire responsibility for adequate solid waste management (for example, federal, state, and local waste reduction initiatives have failed to curb the growth in the generation of waste), reversing the level recycling rates of the past five years can contribute significantly to continued landfill abatement in the metropolitan area. The Minnesota Office of Environmental Assistance noted in a recent policy report (2002) that 72% of the waste currently being landfilled or incinerated consists of materials that could be put to higher and better use through recycling or composting activities.

- **Best practice comparisons with local jurisdictions suggest that the best recycling rates nationwide range between 50% and 60%.** Although recycling programs across jurisdictions may not be strictly comparable, it seems clear that the potential for recycling programs to excel beyond this level of performance becomes increasingly more difficult with diminishing returns on improvement. Similarly, Dakota County should expect continued progress above this level of recycling at a much slower rate with greater investment of resources.

- **Environmental education is a primary Dakota County activity in support of recycling, although the impacts and overall effectiveness of these educational initiatives within the County and larger region are largely unknown.** Because public awareness is critical to stimulating interest and promoting support, a major goal of the Environmental Management Department is to "create an environmentally aware community" (*Dakota County Environmental Management Department Outcome Measurement Plan*, 1998). To this end, the Department dedicates a significant share of its resources to public education activities and participates with the Solid Waste Management Coordinating Board to develop and distribute environmental education materials to residents and businesses to encourage recycling. Regional focus currently centers on collaborating with existing organization to spread environmental messages (e.g., Community Power initiative).

  Participation in recycling depends primarily upon individual motivation. In all sectors, individual initiative prompts participation in recycling activities. Further, recycling behavior learned and practiced in the home generally carries across to other sectors, including work. Assuming equal opportunity and access to education, resources, and technical assistance, the propensity of a resident or an organization to recycle depends largely upon individual interest and motivation. Therefore, a principal strategy has been -- and should continue to be -- increasing interest and motivating individual action.

- **Dakota County cooperates with metropolitan area counties through the Solid Waste Management Coordinating Board.** Dakota County has been an active participant in the Solid Waste Management Coordinating Board since its inception in 1990. The Solid Waste Management Coordinating Board is a joint powers board comprised of two county commissioners from Anoka, Carver, Dakota, Hennepin, Ramsey, and Washington Counties whose mission is to increase the efficiency and environmental effectiveness of the region's solid waste management system. Inter-county initiatives have convinced a number of counties that joint efforts can help to save money and improve service delivery (Minnesota Office of the Legislative Auditor: *Recycling and Waste Reduction*, January 2002). The Solid Waste Management Coordinating Board works with County staff to create annual work plans towards achieving regional and County environmental outcomes identified in the Regional/County Solid Waste Master Plan. Regular and constructive forums for exploring waste management strategies with state agencies, municipal recycling coordinators and rural representatives, and local waste management firms similarly provide additional opportunities for ongoing cooperation and program assessment.

- **Dakota County's ongoing collection and organization of data remains an important concern.** Counties are required to report recycling data to the Minnesota Office of

Environmental Assistance as part of the SCORE and LRDG funding programs. In addition, counties must report solid waste fee information to the Office of the State Auditor. Due to the inherent difficulties in collecting actual recycling tonnages, available data is most appropriately used for making broad comparisons of gross metropolitan area trends over time. The absence of reasonably sound, quantitative data is particularly problematic given that recycling program success is determined by mandated recycling rates. The County's Environmental Management Department is to compile and regularly evaluate recycling data by sector and material type, in order to identify components of the recycling system that may be improved. Specifically:

- Residential tonnages are estimated based upon "the percentage of each material type recorded in previously documented collections", and the proportion of accounts held in each local community (*Dakota County Ordinance No. 110*, Section 15.05 Recyclable Materials Reporting). This process of estimation relies upon private waste hauling firms to accurately assess the relative weight of collected materials, associate collected volumes of recyclables with specific geographic jurisdictions and accounts, and report these estimates to the County.

- Commercial data is particularly difficult to collect and confirm. Private hauling firms provide commercial data based primarily upon actual hauler weights (e.g., a hauler with commercial accounts only) or percentage amounts (e.g., estimates of commercial versus residential accounts). The Dakota County business environment has changed dramatically through the 1990s, with the County adding over 2,400 new businesses over the decade. Accurate estimates of commercial and industrial recycling tonnages remain largely undocumented, however, since current estimates are based upon a 1991 survey of County businesses. (Current estimates of commercial recycling vary by a factor of three, or the difference between 16,000 tons and 50,000 tons.)

- No information is available to determine the degree to which institutions in the County participate in recycling. Institutional data is currently subsumed within commercial recycling data (i.e., the commercial-industrial-institutional sector) in private hauler reports to the County. (To date, minimal County effort has been directed towards institutional recycling.)

- Similarly, no systematic data is presently available to describe apparent trends in in-house recycling, though collection of these data would help to guide the County's programmatic activities in this area. Contracted waste haulers report in-house recycling tonnages as one component of commercial recycling data. In-house tonnages are not collected or maintained by County staff.

- **Market forces drive the collection and processing of recyclable materials.** The evolution of the solid waste management industry from public to greater private sector control is particularly evident in recycling programs, as local jurisdictions have increasingly delegated management and operation of collection and processing activities to private waste hauling firms. Improving competitive advantage, the dual effects of greater consolidation among private hauling firms in the marketplace, and vertical integration of haulers expanding waste management services, lead to greater reliance on fewer hauling companies.

- **Public collection of recyclable materials increases direct public control over recycling collection and processing, and facilitates compilation of more accurate recycling data.** Additionally, public collection supports pay-as-you-throw pricing structures, which represent important opportunities for increasing the tonnage of materials recycled by offering households financial incentives for recycling over waste disposal. Exclusive contracting relationships for the

collection of recyclables may further include opportunities for greater education, monitoring, and enforcement of recycling practices by private waste hauling firms.

The experience of other cities and counties in the region suggests that stringent contracting for collection of waste and recyclable materials is one way to increase recycling rates and to provide access to more accurate and consistent trend data. Ramsey and Washington Counties recently completed a detailed analysis of public collection, in which they determined that public collection was the optimum solution to controlling municipal solid waste. Public collection has not been implemented at this time, however, due to uniform opposition by private waste haulers, reluctance by some residents to terminate existing household collection contracts, and agreement by private haulers to dedicate a minimum tonnage of waste for processing at the Ramsey/Washington County Resource Recovery Facility in Newport, Minnesota.

- Given that program performance has remained relatively steady, as the recycling program has matured, **Dakota County staffing and funding levels have shifted to support other solid waste management priorities over time.** State SCORE data reported for Dakota County suggests that County staffing levels for SCORE programs have fallen significantly over the past decade, particularly given Dakota County's population growth. Further, when population is held constant, the amount of SCORE funding expended per capita fell from a high of $8.88 in 1991, at the initiation of the County's recycling program, to $3.84 in 2001. In comparison with the six metropolitan area counties, Dakota County expends the least amount of funding per capita to support recycling and other SCORE-related activities, and commits a small number of County staff to support SCORE programs overall. Dakota County staffing for recycling decreased by more than 56% (from a high of 2.75 FTEs to 1.20 FTEs) between 1991 and 2001.

- **The gap between state and local financing for recycling programs continues to grow.** Since the establishment of the solid waste management tax in 1989, the Legislature has appropriated $14 million for SCORE grants to counties. In real dollars, the state's commitment to recycling, as financed by the solid waste management tax, has declined over time. The current Legislature has reduced the contribution to SCORE by 10% as part of its budget balancing initiatives and proposes to reduce the statewide base amount for SCORE funding from $14 million to $5 million in future fiscal years.

  The solid waste management tax generated about $53.9 million of revenue in fiscal year 2001. Of this amount, $47 million was appropriated for environmental activities in the Minnesota Pollution Control Agency and the Office of Environmental Assistance (including the $14 million for SCORE grants to counties). However, $7 million was not appropriated for environmental purposes and remained in the State's General Fund. The 2002 Legislature reduced the $14 million for SCORE grants in the FY 2002-03 biennium by 10%, or $1.4 million for purposes of balancing the state budget.

  Dakota County received $1.2 million in state funding ($934,292 in SCORE and $208,664 in LRDG funds) and other revenues to support recycling and other waste abatement activities in 2001, expending approximately $1.7 million for SCORE-related programming during the same year. In 2002, Dakota County expects to receive $940,284 from SCORE and $199,650 from the Local Recycling Development Grant (LRDG).

- **Recycling exists within a larger solid waste management context characterized by a demonstrated lack of economic incentive for private industry and citizens to participate in recycling, a strong environmental ethic held by many individuals that occasionally runs counter to economic priorities, and governmental decision making that must be sensitive to both economics and ethics.** These three factors coincide to strongly impact recycling activity in Dakota County, the Solid Waste Management Coordinating

Board region, and the nation at large. The gradual shift from public to greater private decision-making highlights the changing role of local and state government, from regulation of the marketplace to leadership, education, provision of incentives, and market participation. These three factors provide a context for solid waste management that has helped to establish recycling as a successful waste abatement strategy, despite a lack of strong economic incentives for private waste management firms, and poses important considerations for future and continuous improvement. The County should be aware of the pay-as-you-throw pricing, and should further consider supporting policy initiatives that establish economic incentives for recycling and source reduction activities.

- **Critical internal processes, including strategic planning and measurement efforts, and external opportunities, including the impacts of changing technology, shape the direction of future recycling improvements in Dakota County.** Important internal processes include continued refinements to collection and maintenance of comparable data, systematic and strategic goal setting, promoting program partnerships, and encouraging program comparison for the benefit of ongoing evaluation. Based upon best practice comparisons with local jurisdictions (including the Cities of San Jose, California; Seattle, Washington; and Portland, Oregon), external opportunities include the impact of shifting technologies to support greater commingling of recyclables, household collection of additional material categories (including organics, construction and demolition debris, and electronics), and increasing emphasis on source reduction.

  In particular, single-stream and two-stream recycling are prominent national trends that appear to increase the amount of recyclable materials collected, though the amount actually recycled may not reflect this increase. The effects of greater materials commingling have strong implications for the recycling rate, and require detailed analyses to determine the benefits and costs of single and multiple-stream collection systems. In Dakota County, the Hastings City Council recently approved implementation of single-stream collection of recyclable materials for all households in the community.

GENERAL PROGRAM RECOMMENDATIONS

- **The Environmental Management Department's Outcome Measurement Plan should be updated to reflect strategic opportunities and challenges, in keeping with the Master Plan.** The Environmental Management Department should re-evaluate its Outcome Measurement Plan, considering opportunities to combine regional goals and County activity measures, and regularly report progress to County Administration and the Board of Commissioners on the outcomes achieved, as outlined in the Plan. The opportunity to reconsider the Department's activities systematically within a demonstrated County and regional framework will be useful, particularly as the Metropolitan Solid Waste Management Policy Plan is updated in 2003. Specifically:

  - In a concerted effort to facilitate strategic, long range planning, the Dakota County Environmental Management Department Outcome Measurement Plan should be consistent with the Metropolitan Solid Waste Management Policy Plan (to be updated in 2003), and the Regional/Dakota County Solid Waste Master Plan (1998).

  - The current Outcome Measurement Plan lacks an outcome statement (i.e., the "if/then" statement), a key component for evaluation of progress towards expected program outcomes.

  - Significant gaps exist in the measurement data available for ongoing program administration. Data identified in the current Outcome Measurement Plan is not readily

available for management use. The updated plan should address outcomes for the major areas of County activity, including the Community Funding Program and targeted environmental education initiatives.

- **Dakota County should continue coordination efforts with the Solid Waste Management Coordinating Board, strengthening opportunities to collaborate with the waste management industry, local municipalities, and best practice partners.** Dakota County should continue to explore and take advantage of regional, private waste hauler, local community, and inter-county initiatives that have the potential to save money and improve service delivery through demonstrated partnerships.

  Closer association with private waste management firms and local communities is conducive to improving the County's recycling efforts. Because solid waste management decisions are driven largely by private sector priorities, greater collaboration -- with local haulers, landfill and materials recovery facility operators -- offers the County a significant resource for promoting landfill abatement. Additionally, open and ongoing discussion with private sector waste management firms affords the County greater opportunity to close data gaps, initiate and implement targeted case studies, improve educational efforts to residents and businesses, and investigate new strategies for landfill abatement. Similarly, productive interaction between the Environmental Management Department and local municipalities will help to communicate best practice and improve program effectiveness at the local level.

  - Dakota County should combine efforts with other Solid Waste Management Coordinating Board member counties to achieve economies of scale and meet common goals to the broadest extent feasible. Continued active participation in the SWMCB will contribute to this recommendation.

  - Forging more productive partnership with the private waste management community strengthens the County's recycling efforts by inviting private sector participation and feedback regarding local recycling programs. Similarly, engaging local solid waste staff serves to identify gaps in service provision, and focus resources to address program priorities. Best practice comparisons with local jurisdictions nationwide present ongoing opportunities for program evaluation, particularly as the impacts of changing technology and other recycling developments become better known. Cooperation with private sector firms and local municipalities may include periodic roundtable discussions, tracking and confirming reported recycling tonnages, and exploring public collection of recyclables and other exclusive contracting arrangements.

  - In cooperation with local municipalities, private waste hauling firms, the SWMCB region, and other County Department staff, Environmental Management Department staff should design and implement targeted case studies to gather additional information regarding specific recycling practices and residential and commercial preferences. Jurisdictions nationwide cite the importance of designing localized case studies for targeting particular materials and/or underrepresented audiences for the benefit of improved recycling.

    Although many aspects of residential recycling are well-established, multifamily recycling, household purchasing preferences, the implications of single-stream recycling, collection of source-separated organic materials, and the effect of demographics on participation rates remain largely unknown. For example, the impact of changing demographics on local recycling programs is not well understood, though growing racial and ethnic diversity in the County may have strong implications for ongoing education of residents. Examining these, and other, related program issues, will assist in informing future program design and implementation.

- Because recycling exists within a larger hierarchy of integrated waste management that depends upon the collaboration of state, regional, local, and private stakeholders, Dakota County should continue to assess the relative effectiveness of specific County strategies and priorities within this network of stakeholder interests. Benchmarking against comparable jurisdictions may guide development and implementation of new strategies. Similarly, by capitalizing upon best practice partnerships that influence recycling policies within the region and nationwide, the County is better informed to improve existing performance. The County's communication and participation with industry representatives and professional organizations (e.g., the National Recycling Coalition) should be expanded to evaluate additional opportunities for recycling improvement, including evaluation of single-stream recycling, public collection of recyclables, and the effects of demographics on household participation in recycling.

- **Dakota County should report progress towards achievement of Master Plan goals and negotiated outcomes to the Board of Commissioners on a regular basis.** In the *Regional/County Solid Waste Master Plan* (1998), Dakota County identified several priorities, including the following:

  - The Master Plan specifically states that Dakota County will focus its efforts on food waste recycling to assist the region in maintaining the 50% recycling goal, and add a material to the list of collected materials when collection is show to be technically and economically feasible. The Environmental Management Department should regularly report to County Administration and the Board of Commissioners on progress towards achieving these, and other identified outcomes, including interim steps being taken to accomplish them.

  - Although residential recycling volumes are consistently collected and reported annually to the region and the state, no County mechanism presently exists for periodic review of recycling data. Time series residential recycling data is not compiled and readily accessible for analysis within the County, or broadly available to share among other local jurisdictions.

- **The County should continue to improve the ongoing collection and maintenance of recycling data.** While comparative recycling data is inherently difficult to acquire, the County should consider dedicating more resources into systematic collection and regular maintenance of quantitative information, particularly in the following areas:

  - In order to strengthen overall reliability of hauler estimates, Environmental Management Department staff should periodically verify hauler reported volumes of recyclable materials collected against weight slips from materials recovery facilities, as authorized by *Dakota County Ordinance No. 110*. (The County, in conjunction with the region, should consider alternative reporting relationships to complement estimated tonnages of recyclable materials collected. Alternative reporting arrangements might include materials recovery and other processing facilities as sources of independent data to corroborate estimated recycling tonnages.)

  - Given that recycling data currently best identifies metropolitan area trends over time, and is less indicative of specific comparisons among local jurisdictions, the County and the region should investigate the possibility of summarizing and reporting recycling data on a regional basis. A single regional reporting framework serves to establish reasonable parameters and consistent definitions for hauler reported estimates, and streamlines metropolitan area reporting to state and regional agencies.

- Given continued business growth and the potential of commercial volumes to increase the recycling rate substantially, the Environmental Management Department should regularly assess commercial participation rates and recycling volumes collected. More comprehensive and frequent surveying of businesses in the County is necessary to determine recycling activity within the commercial-industrial-institutional sector. Similarly, a representative sample of large institutions should be surveyed on a regular basis in order to provide more information regarding recycling activity over time.

- With regards to Dakota County's in-house recycling efforts, the Environmental Management Department, in collaboration with the Dakota Environmental Review Team, County Administration, and associated Departments, should require contracted waste haulers to supply service volumes of in-house materials recycled on a regular basis. Complementary strategies that will further strengthen future analyses of in-house recycling and source reduction trends include regular waste composition studies, and staff and visitor waste disposal and recycling surveys.

- **The County should continue to examine relative educational program effectiveness, considering appropriate message, media, frequency, jurisdictional level, and target audiences.** If Dakota County continues to utilize education as a key strategy for supporting recycling rates, then the Environmental Management Department, with cooperation from the Office of Planning and SWMCB member counties, should undertake efforts to determine the relative effectiveness of educational campaigns. The Department should continue to conduct surveys and focus groups as one method for gauging the effectiveness of public awareness initiatives. Best practice comparisons with respect to several components of environmental educational programs should be examined, including the following educational factors:

  - Message -- What are the most important aspects of recycling and waste abatement to communicate to the public? What opportunities exist, as sponsored by the state, region, and other partners, to present environmental education messages? What existing messages may be adapted for use in campaigns in Dakota County and the region (e.g., should coordinate with industry contacts to assure public messages represent current recycling practices)?

  - Media -- What are the best methods for communicating information to individuals and organizations inundated with information?

  - Frequency -- How frequently should residents, businesses, and institutions receive messages related to recycling?

  - Jurisdictional level -- Currently, local, regional, and state agencies invest in educational activities for broadening awareness of waste management issues, including recycling. Which level is most effective at outlining recycling program guidelines, and encouraging greater participation? How might educational campaigns reflect messages from private industry, and local and regional governments?

  - Audience -- The Environmental Management Department should identify audiences currently underserved by existing recycling messages, in order to target awareness campaigns. Given changing demographic patterns, how should recycling messages be tailored to appropriately target households? Is there a significant need to translate educational materials to, and offer assistance in, other languages?

- In collaboration with local communities and the region, **Dakota County should promote local ordinances that support recycling.** The Environmental Management Department should work with local community representatives to promote model ordinances for increased recycling of excess materials and for building/site designs that encourage recycling. For example, haulers have indicated that some commercial establishments and multifamily dwellings do not include space for both garbage and recycling carts.

- **Dakota County's legislative platform should support strengthening state fiscal support of local recycling programs.** In real dollars, the State of Minnesota's commitment to recycling financed with the solid waste management tax has declined. The State of Minnesota has not dedicated the full proceeds of the solid waste management tax to environmental activities. Further, the current Legislature has reduced the contribution to SCORE by 10% as part of its budget balancing initiatives. The Dakota County legislative program should reflect the importance of a strengthened state commitment to support recycling initiatives and restore base funding for SCORE in future fiscal years.

RESIDENTIAL RECYCLING: FINDINGS AND RECOMMENDATIONS

Similar to many mature curbside recycling programs established in the early 1990s, residential recycling in Dakota County is relatively well established. County households receive educational materials on a regular basis and track estimated tonnages from licensed waste haulers. Nevertheless, with the support of best practice research, one improvement to residential recycling in the County includes exploring opportunities to increase participation by multifamily residences.

RESIDENTIAL RECYCLING FINDINGS

- **Residential, curbside recycling in Dakota County is well established and effective.** Overall, because curbside recycling programs have been in operation in many metropolitan communities nationwide since the early 1990s, residential recycling is largely well established. Similarly, following a decade of programmatic emphasis, residential recycling in the County is mature and effectively administered within municipalities and rural communities. The key elements of residential recycling programs include program consistency, stability, and household convenience.

  Although residential recycling is voluntary in the County, private waste hauling firms must provide all households the opportunity to recycle, per Dakota County Ordinance No. 110. The County's partnership with local cities and townships through the Community Funding Program strongly supports curbside recycling in local communities. A majority of County recycling activities support residential recycling, including distributing funds to local communities to implement curbside recycling programs, developing educational materials disseminated primarily through newsletters and other mailings, and provision of recycling containers to new residents through community programs.

- **Many aspects of residential recycling in Dakota County compare favorably with best practice jurisdictions around the country**, including the existence of pay-as-you-throw variable pricing structures and collection of many material types. Best practice comparisons further indicate that continued improvements in residential recycling may yield fewer gains in the recycling rate over time, at greater program expense, due to diminishing returns. Additionally, although recycling is widely practiced by households in local communities throughout the County, region, and nation, it has been difficult to continue to improve waste management practices to develop a stronger focus on waste reduction and materials reuse (both more favorable strategies than recycling within the waste management hierarchy).

- **Including multifamily units in residential recycling collection requires dedicated effort to maintain participation rates.** Multifamily units are difficult residences to incorporate within local curbside recycling programs because they require targeted effort to improve participation rates and quality of recyclable materials collected. Particularly in more urbanized areas, multifamily residences comprise a significant percentage of total housing in some communities, and may represent a substantial number of households in the County potentially underserved by local recycling programs.

  Best practice research suggest that improving multifamily recycling requires development of dedicated strategies, such as pilot programs implemented by Seattle, Washington (e.g., Friends of Recycling recruited volunteers in multifamily buildings to provide information and assistance to other building tenants regarding recycling practices). Within the City of St. Paul, Eureka Recycling dedicates staff specifically to tracking multifamily recycling trends and working with property managers and landlords to assure that residents have opportunities to recycle.

RESIDENTIAL RECYCLING RECOMMENDATIONS

- **The County should evaluate opportunities to improve multifamily residential recycling**, including opportunities for collaborative efforts with municipalities. Given the inherent difficulties of facilitating multifamily recycling, the Environmental Management Department should invest resources to encourage greater participation by multifamily households in curbside recycling. The Environmental Management Department should consider the applicability of educational and other programs geared principally towards promoting multifamily participation in local programs. The experience of best practice jurisdictions suggest practical comparisons for Dakota County and regional recycling programs to consider, including Seattle, Washington's Friends of Recycling multifamily program.

- **The County should examine and assess the work of jurisdictions in the region and nationwide to maintain and improve residential recycling rates on an ongoing basis.** While curbside recycling in Dakota County is well established, current efforts by comparable jurisdiction in the metropolitan area and across the nation may help to further identify factors that impact participation in residential recycling programs and household awareness of related waste management issues.

  The Environmental Management Department should specifically consider recent analyses, such as those conducted by Eureka Recycling (to test recycling collection strategies in St. Paul), and the Cities of Burnsville and Eagan (to improve the collection, processing, and marketing of residential mixed paper). The current evaluation efforts of best practice jurisdictions suggest areas Dakota County and the Solid Waste Management Coordinating Board region should consider for developing local case studies and pilot projects, including specific collection methods, waste streams, and education strategies.

COMMERCIAL RECYCLING: FINDINGS AND RECOMMENDATIONS

Businesses, industries, and institutions generate the majority of mixed municipal solid waste, and additionally represent substantial potential for improving the recycling rate. Recycling programs in the metropolitan area and nationwide note that improvements in commercial recycling offer one of the most substantial strategies for mitigating waste disposal and lengthening the life of area landfills. Little data is available, however, to rigorously assess the degree to which additional recycling within the commercial sector will potentially increase recycling rates and minimize the amount of waste disposed.

Commercial recycling nevertheless represents a new area for local program emphasis, particularly given the lack of economic incentives in place to support commercial recycling. Dakota County currently directs few resources towards supporting commercial recycling. Recommendations for improvement include gathering more updated data regarding business participation in recycling programs, and developing more targeted education and assistance activities to businesses in the County.

In addition:

COMMERCIAL RECYCLING FINDINGS

- **The commercial sector faces financial disincentives by recycling over waste disposal.** Due largely to the low cost of landfilling waste, the costs for businesses to recycle frequently outweigh any demonstrated economic benefits, which suggests that incentive programs may have to offer substantial benefits in order to be meaningful to companies to participate. Disincentives are particularly formidable for smaller firms over larger firms, who are often better able to leverage economies of scale and publicity as added benefits to recycling. While many larger firms participate in recycling and have established in-house recycling programs (e.g., West Publishing), it is considerably more difficult for smaller companies to allocate resources to support recycling activities, particularly given that recycling frequently implies equal or larger costs than waste disposal. Economies of scale work to the benefit of larger businesses, which are better able to take advantage of waste and recycling collection efficiencies.

- **At present, there exists minimal program focus on commercial recycling in Dakota County.** Hennepin and Anoka Counties provide examples of counties statewide that are proactive in working with businesses to document and improve commercial and industrial recycling efforts. Cities including San Jose, California, and Seattle, Washington provide economic incentives to encourage participation in commercial recycling. Additionally, Seattle's Small Business Curbside Recycling Program allows businesses that generate a small amount of waste (90 gallons or less) to participate in city-sponsored curbside or alley recycling service at no charge to the firm.

  Because commercial recycling is largely dependent on its cost to businesses and the relative value of materials collected, Dakota County currently has only a limited role in increasing commercial recycling rates directly. There exists, however, potential for some businesses in the County to recycle more:

  - Some businesses do not recycle because they do not realize that recycling may prove economical for them. The County should maintain a stronger outreach and educational presence for the benefit of the commercial sector.

  - A number of obstacles exist that hamper recycling by businesses, including city ordinances requiring screening of containers, and one-time expenses for recycling equipment (i.e., baler) that may not demonstrate a timely return on investment. The County should explore providing direct financial assistance in addressing and alleviating these and other barriers to commercial recycling.

  - Dakota County should explore the possibility of enacting a selective mandatory or volunteer program that requires all generators of certain quantities of cost-effective materials (e.g., corrugated cardboard, office paper) participate in recycling.

  - According to Seattle, Washington, including small businesses with residences for the purposes of solid waste management can shift commercial recycling from operating as a cost burden to a cost savings. This shift would extend pay-as-you-throw pricing for

waste collection to small businesses and consequently provide them with an economic incentive to recycle. The County should explore the effect of extending residential curbside recycling collection to small businesses.

- **Current estimates regarding the amount of materials recycled by the commercial-industrial-institutional sector in Dakota County is lacking.** Although businesses contribute an estimated majority (73%) of the volume of waste recycled in Dakota County, the metropolitan area, and the state as a whole, Dakota County recycling programs have focused most heavily on encouraging residential recycling. Between 1990 and 2000, there has been a 36% increase in the number of businesses located in Dakota County, or a growth of about 2,400 businesses. This growth has exceeded the rate of business growth for the metropolitan region as a whole, with the proportion of businesses located in Dakota County increasing from approximately 9.0% of those in the region in 1990 to 11.2% in 2000.

  Recycling data indicates that commercial businesses generate more than one-half of the recycling rate by weight. However, no data describes the potential amount of waste that is not being captured. County inspectors have noted the existence of more recyclable materials from businesses present at landfill inspections, suggesting potentially untapped capacity for additional commercial recycling.

COMMERCIAL RECYCLING RECOMMENDATIONS

- **The County should dedicate greater recycling program emphasis towards the commercial and industrial sectors, providing resources to support commercial sector outreach and technical assistance.** Commercial recycling offers additional capacity for improving the County's recycling rate, though results are inherently difficult to credit to particular levels of programmatic effort. The Environmental Management Department, in conjunction with the Office of Planning and the SWMCB region, should create a more targeted commercial-industrial recycling program, based upon information exchange and dedicated technical assistance.

  Dakota County should consider working with specific expertise to develop and implement a targeted commercial recycling campaign. Minnesota Waste Wise maintains a unique mission to support commercial recycling and waste reduction practices. Targeted commercial recycling programming will further support achievement of the County's commitment to "implement a phased business recognition program" (*Regional/Dakota County Solid Waste Management Plan*, 1998 to 2017).

- **Dakota County should regularly update its business survey in order to improve current estimates of commercial recycling in the County**, and collaborate with the Solid Waste Management Coordinating Board region to establish practical commercial data standards. Given that commercial recycling data is inherently problematic, the Environmental Management Department should establish solid estimates of commercial recycling activity each year in order to more effectively track the potential of this sector to influence countywide recycling rates. The Department should focus on the largest firms located in the County (employing 500 individuals or more), and collect haulers' estimates of total waste generation and commercial service volumes. Dakota County, in conjunction with the SWMCB member counties and the Minnesota Office of Environmental Assistance, should review commercial estimation practices, and formulate applicable standards for estimation across the region.

- **Dakota County should study and adapt best practice comparisons for improved commercial recycling** from Anoka, Hennepin, Ramsey, other counties and municipalities. The growth in businesses and the best practice of other counties provide both a reason and an

opportunity for Dakota County to emphasize and adapt best commercial-industrial recycling practices to continue to increase the tonnage of material recycled in Dakota County. Seattle, Washington's Small Business Curbside Recycling Program represents one practice that potentially alleviates a disincentive for smaller businesses to participate in local recycling. With cooperation from the Dakota County Office of Planning, the Office of Planning, Evaluation, and Development, and the SWMCB, best practice research will further the achievement of identified County outcomes.

- **The County, with assistance from the state, region, and local communities, should identify and address obstacles to commercial recycling**, including but not limited to:
  - The impact of grants, loans, and other financial incentives to encourage commercial recycling,
  - Identification of local ordinances and other statutes that potentially hamper recycling activity among businesses in Dakota County, and
  - The practicality and implications of including small businesses within current residential curbside collection programs.

INSTITUTIONAL RECYCLING: FINDINGS AND RECOMMENDATIONS

Although Dakota County dedicates few resources specifically towards supporting recycling within institutions in the County, school districts, colleges, hospital clinics, houses of worship, and other organizations located in the County are committed to internal waste abatement practices. The County's role in providing recycling support to institutions is limited; nevertheless, the County should direct educational materials and technical assistance as needed to interested organizations.

INSTITUTIONAL RECYCLING FINDINGS

- **Dakota County directs minimal program resources towards supporting institutional recycling in the County.** Dakota County encompasses nine school districts, all of which are located at least partly within the County, and numerous nonprofit organizations, medical clinics, and houses of worship. The state mandates that all institutional waste must be delivered to processing facilities. For the purposes of waste and recyclables collection, however, these institutions are considered within the commercial-industrial-institutional sector, and little County emphasis is specifically directed towards improving recycling participation and tonnages among institutions. While local government is not responsible for ensuring institutional recycling, other metropolitan area counties (e.g., Anoka, Hennepin, and Ramsey Counties) note limited outreach to large institutions as one component of their commercial sector technical assistance programs.

  Minnesota Waste Wise is currently working with Independent School District 196 on a waste reduction and recycling effort. Because the district is large (33 buildings housing 28,000 students), greater economic incentives to recycle exist. Minnesota Waste Wise is providing technical skills and economic analysis to justify waste abatement practices, while the County is exploring future applications of the analysis in other school districts in the County. While significant opportunities exist to support and improve recycling within Dakota County schools, few opportunities exist to incorporate recycling and source reduction messages into current school curricula, due to tight class schedules.

- **Many large institutions in Dakota County are committed to recycling and have established internal recycling programs.** Based upon the motivation of individual staff,

many organizations are interested in recycling and commit resources to implement recycling programs. Ongoing education and technical assistance, however, would help to build awareness and support recycling efforts within this sector.

INSTITUTIONAL RECYCLING RECOMMENDATIONS

- **While the County's role in encouraging institutional recycling is notably small, institutions should be targeted by existing educational and technical assistance programs.** Institutions offer one opportunity for improving recycling rates. The Environmental Management Department should provide education and technical assistance as needed to encourage waste reduction and recycling practices, and to further develop public awareness of environmental and associated waste management issues.

  In addition to measures of recycling activity, a major goal of the Environmental Management Department is to "create an environmentally aware community" (*Environmental Management Department Outcome Measurement Plan*, 1998). The Department contributes a significant share of its resources to public education. While the Department does address residents and businesses through periodic educational mailings, public awareness campaigns do not specifically target schools and other institutions in the County.

- **Best practice comparisons suggest several opportunities for Dakota County to pursue special recycling initiatives with institutions.** Metropolitan area counties, including Hennepin and Anoka Counties, largely address institutions as one component of the commercial sector, providing technical assistance and education to interested organizations as requested. The City of Seattle, Washington sponsors a Medical Industry Waste Prevention Roundtable to exchange ideas regarding waste reduction and recycling for those involved in medical institutions. Seattle additionally offers special technical assistance to large event venues, campuses, and other institutions to help improve environmental performance.

  The Dakota County Environmental Management Department -- in conjunction with the Dakota Environmental Review Team, Minnesota Office of Environmental Assistance, SWMCB counties, and local municipalities -- should consider convening industry roundtables to share recycling and waste reduction practices. Dakota County should additionally promote sound waste management strategies and practices at all local events, civic venues, and other large public gatherings taking place within the County.

IN-HOUSE RECYCLING: FINDINGS AND RECOMMENDATIONS

While County policies have been established to guide recycling and related environmental activities in Dakota County, lack of systematic administration and ongoing support for the in-house program has resulted in inconsistent observance of demonstrated priorities. In-house recycling in Dakota County requires centralized management and program promotion, with assistance from County Departments, the cross-County Dakota Environmental Review Team, and individual County managers and staff.

IN-HOUSE RECYCLING FINDINGS

- The County has established an internal recycling policy (County Policy 4301 In-House Waste Reduction and Recycling, 1992) and related in-house program that produces significant benefits. **There is, however, inconsistent compliance with County policy and irregular participation in recycling by County staff, depending largely upon individual motivation.** The County administers a complementary environmentally responsible

procurement program (County Policy County Policy 2742 Procurement of Recycled Products) with limited success. County policy requires Departments and employees to recycle, copy documents double-sided, establish central filing systems, reuse file folders, use routing slips and bulletin boards to exchange information, remove individual names from mailing lists, use reusable cups and recyclable containers, and create documents using soy-based ink.

The Master Plan requires Dakota County to "increase recycling efforts and adjust purchasing decisions to reduce the amount of municipal solid waste generated in its county-operated buildings by 5% by 2003" (Regional/County Solid Waste Master Plan, 1998). Specifically, as part of the Master Plan, Dakota County identified the following commitments:

- Determine the feasibility of implementing a food waste recycling or reduction program at County facilities,
- Evaluate and, where feasible, incorporate aspects from the Environmentally Responsible Purchasing Guide into the decision making process and contract specifications for purchasing products for County use,
- Promote the use of eco-printing techniques and practices by all County Divisions/Departments through the existing County Communications Liaison Committee; the Environmental Management Department staff will provide assistance to other County Departments,
- Conduct one waste sort in one County building each year to determine the composition of the waste materials being discarded, and work with the employees in the building to recycle and reduce appropriate materials, and
- Work to purchase products with higher post consumer content (e.g., copy and printer paper, office letterhead).

- **To build consistency of practice among staff, in-house recycling requires systematic attention and continuing commitment.** Dakota County's in-house recycling program will benefit from continuing attention from managers and staff at all levels of the organization, and coordination across Departments and facilities.

  Presently, the Environmental Management Department, in collaboration with other County Departments, promotes in-house recycling and waste abatement -- developing the Eco-10 Challenge, conducting periodic waste and recycling sorts, and facilitating the Dakota Environmental Review Team (DERT) to support environmental outcomes. The Departmental Services Unit of the Operations Management Department supports environmentally preferable purchasing and related initiatives (e.g., central duplication and mailing). An environmentally friendly, sustainable building initiative has been implemented in the County. However, emphasis on these efforts has proven difficult to sustain over time. For example, DERT currently meets only once or twice each year to exchange information and to discuss improvements to County processes. Many County staff do not recognize that there are options on printers linked to their computers to prepare two-sided documents. Support from County managers at every level of the organization and a renewed commitment of staff can and should reinforce County in-house recycling results. With leadership at all levels within the County and individual participation in recycling and environmental purchasing, consistency of practice among staff in pursuing recycling and waste abatement goals can be attained within County Departments and Divisions.

- **Stringent contracts for collection of recyclable materials are one effective method for improving management of in-house recycling programs.** The experience of other counties in the region suggests that stringent contracting for collection of waste and recyclable materials is one way to ensure access to more accurate and consistent trend data for in-house volumes. Based upon the best practice of comparable counties, other strategies, including

periodic facility waste composition studies and surveys, may similarly be effective in providing regular estimates of volumes recycled and disposed of within County facilities and buildings.

IN-HOUSE RECYCLING RECOMMENDATIONS

- **Dakota County should rededicate efforts towards consistent and regular promotion of in-house recycling and waste abatement activities, to promote broad awareness and participation among County staff.** Dakota County government leverages a direct impact on recycling through efforts in County buildings and facilities. With involvement and leadership at all levels of the organization, individual participation and consistency in maintaining recycling practices and waste abatement can be attained.

  Renewed efforts within the organization should include consideration of:

  - Clear responsibility and expectations for the implementation of internal recycling and waste abatement efforts,
  - Standards for building maintenance that support the recycling of wastes produced in County facilities,
  - Ongoing education for County staff and visitors, presented in a variety of formats (e.g., posted signage, presentations to new employees during scheduled orientations, etc.),
  - Assistance and technical support targeted to Departments and staff regarding opportunities to purchase environmentally preferable office supplies, and
  - The experience of comparable best practice jurisdictions and organizations for adaptation to Dakota County's in-house efforts.

CONCLUSIONS

Dakota County is largely achieving the state-mandated recycling goal of 50% of all municipal solid waste generated. In keeping with the Solid Waste Management Coordinating Board area, Dakota County recycling rates have remained steady between 48% and 50% since achieving its high recycling rate of 52% in 1997. In the *Dakota County/Regional Solid Waste Master Plan*, Dakota County committed to striving to maintain recycling rates at 1997 levels (52%). Additionally, residential recycling in Dakota County compares favorably with programs established in best practice jurisdictions. While opportunities for recycling improvement exist, the cost of incremental improvements must be considered.

As this Recycling Evaluation demonstrates, opportunities exist to expand current activities, in each of the four sectors studied. Multifamily residences represent one group that may be underserved by existing curbside collection services. Dakota County currently places minimal program emphasis on commercial-industrial and institutional recycling (including schools and colleges, medical clinics, and churches), both of which afford significant opportunities for increasing the tonnage of recycled materials collected. Finally, in the area of in-house recycling, the County should capitalize on its leadership position to more strongly and systematically reinforce recycling messages among staff and visitors to County buildings and facilities. Future actions to strengthen the County's recycling program depend upon an assessment of program stability, identification of primary areas of emphasis to effectively maintain or increase recycling rates, and determination of the degree to which the current level of recycling satisfies Dakota County's long-term goals of maintaining a healthy and sustainable environment.

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INTRODUCTION

Recycling is the process of collecting and preparing recyclable materials and reusing the materials in their original form or using them in manufacturing processes that do not cause destruction of recyclable materials in the manner that precludes further use.[1] The State of Minnesota maintains the second highest recycling rate in the nation, at a statewide rate of 48%. Over 20% of waste in Minnesota is sent to resource recovery facilities, one of the highest percentages in the nation, and large volumes of yard waste are composted.[2]

The benefits of recycling include natural resource conservation, solid waste reduction, environmental protection, energy conservation, and social and economic development. Recycling serves as one critical strategy for minimizing the amount of municipal solid waste disposed of in area landfills.

A *principal service/program activity* of the Environmental Management Department in Dakota County is to ensure that *solid waste generated in the County is recycled*. Based upon hauler reports and inventories from drop-off sites, *results are measured* in terms of *the percentage of the total municipal solid waste*[3] *stream that is recycled* and the *total tonnage of waste recycled* (*Dakota County Environmental Management Outcome Measurement Plan*, 1998). Due to both leveling recycling rates and diminishing landfill capacity in Dakota County, reassessment of the current recycling program in the County and complementary efforts to encourage residential, commercial, institutional, and in-house recycling is timely.

During the early 1980's, Dakota County began investigating recycling policy, with an emphasis on residential recycling. The County's recycling program was initiated in 1988 with adoption of the *Dakota County Recycling Implementation Strategy*, at a time when other metropolitan area counties similarly undertook efforts to implement recycling programs. State legislation set a goal for metropolitan area counties to recycle at least 50% of total municipal solid waste generated by December 1996. Across the region, recycling rates peaked in 1994 and 1995, and despite a slight improvement in the recycling rate in 2000, the metropolitan area has generally fallen slightly short of the mandated recycling rate from 1997 to the present.[4]

Currently, households throughout the County have the opportunity to recycle regularly at curbside in both urban and rural areas: the County mandates that waste haulers offer recycling services to all residences. The County, in conjunction with other metropolitan area counties through the Solid Waste Management Coordinating Board, utilizes education, pilot programs, and other initiatives to encourage recycling among Dakota County residents and businesses.

PROBLEM STATEMENT

Although Dakota County reached the 50% goal and was slightly exceeding the performance of the region as a whole by 1996, the recycling rate has remained relatively steady between 48% and 50% since 1997. At the same time, rate of waste generation has plateaued in recent years. The apparent plateau in the recycling rate implies that new opportunities may exist to improve the effectiveness of recycling in Dakota

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1 Minnesota Statute §115A.03, Subdivision 25b

2 Minnesota Office of Environmental Assistance: *Solid Waste Policy Report: Waste as a Resource*, April 2002

3 Mixed municipal solid waste (MSW) is defined as refuse materials generated by residential, commercial, industrial, and community activities that are aggregated for collection. *MSW specifically does not include*: automobile hulks, street sweepings, ash, construction and demolition debris, mining waste, sludges, tree and agricultural wastes, tires, lead acid batteries, motor or vehicle fluids and filters, and other materials collected, processed, and disposed of as separate waste streams. Dakota County Ordinance No. 110, Section 2.52

4 Solid Waste Management Coordinating Board, *Annual Progress Report 2000*: Recycling. Page 17

County. While the recycling initiatives of the Environmental Management Department have been successful in reaching and generally maintaining the legislative goal for recycling among metropolitan area counties and the total volume recycled has increased, the leveling of rates and tonnage of materials collected per person give rise to the following *evaluation questions*:

1. ***How effective is Dakota County in providing that solid waste generated in Dakota County is recycled? What opportunities exist to increase the recycling of waste generated in Dakota County, and what issues should be considered in weighing alternatives?***

2. ***How might the County significantly influence and improve recycling in the following sectors?***

    - Residential
    - Commercial
    - Institutional
    - In-house

Appendix I presents detailed program questions that frame recycling program effectiveness. This evaluation of recycling in Dakota County is an attempt to identify the key aspects of recycling that may be influenced by County initiatives. Difficulties in obtaining comparable data and the effects of multiple stakeholders resulted, however, in a broad review of recycling challenges and opportunities apparent in Dakota County. Additional and ongoing research, targeted case studies, and regional pilot projects will bring to light associations between recycling and demographic characteristics, individual motivation and participation, and economic costs and benefits within a local context. In turn, ongoing evaluation will serve to build program effectiveness and guide strategic planning around waste abatement efforts over the long-term.

PROJECT PURPOSE AND EXPECTED OUTCOMES

The purpose of the project is to clearly define the impact of recycling, and to determine how Dakota County may administer the program more effectively and efficiently across all sectors. Dakota County's efforts to achieve recycling objectives depend upon the whole County organization, including: the Physical Development Division, Environmental Management and Facilities Management Departments, Departmental Services Unit of the Operations Management Department, the County's planning units, and individual staff and managers from across the County to support ongoing monitoring and evaluation of current initiatives.

This study evaluates factors that affect recycling rates, identifies those factors that the County can significantly influence, and develops recommendations for improving the effectiveness of recycling services in Dakota County. Further, the evaluation analyzes options for improving the efficiency and effectiveness of the recycling program in minimizing waste and conserving natural resources. Anticipated outcomes include:

1. Understanding the role that recycling plays in landfill abatement, as well as the policies, programs, and economics that impact recycling rates both in Dakota County and across the larger metropolitan region,
2. Identification of successful recycling programs in existence nationwide, and determination of how their respective strategies might improve recycling rates in the County,
3. Identification of challenges and opportunities for improving the County's existing recycling program, specifically regarding residential, commercial, institutional, and in-house sectors, and
4. Formulation of recommendations for the Dakota County Board of Commissioners to improve the effectiveness, efficiency, and/or responsiveness of the existing recycling program.

ASSUMPTIONS

The issues of waste, disposal, and recycling are overlapping and complex. Many important issues relate to recycling, but are beyond the scope of the current study. The following assumptions and parameters, however, are used to guide the scope of this evaluation:

- The Dakota County Board of Commissioners has set a goal of maintaining a Healthy, Sustainable Environment. The County has a leadership role in encouraging environmental sustainability -- including the conservation of resources, protection of public health and the environment. The County is committed to landfill abatement as one priority within solid waste management activities, including recycling as one specific initiative that supports landfill abatement.

- All existing mandates, statutes, and related policies will continue to be upheld. The County Board supports the Regional Solid Waste Master Plan, including all policies, goals, and stated objectives.

- It is understood that recycling is only one piece of a complex issue including source reduction and pollution prevention. However, in order to be manageable in scope, the study will not include analysis of complementary alternatives to waste disposal such as waste reduction, household hazardous waste, or waste processing programs.

- The study assumes that current constraints on local government regarding recycling will continue to exist in the near future. (For example, restrictions on government's control of the flow of waste as a commodity.)

RECYCLING BACKGROUND

SOLID WASTE MANAGEMENT CONTEXT

INCREASING WASTE GENERATION

The increasing tonnage of waste managed in the region is shaped by two critical factors: 1.) an annual increase in the rate of waste generated per capita, and 2.) continued population growth. Total waste generation includes residential, commercial and institutional waste that is landfilled, processed (by incineration or source-separated organic composting), and recycled. According to the Minnesota Office of Environmental Assistance, generation of municipal solid waste in Minnesota has grown steadily over the past nine years, at an average annual rate of over 4% per year between 1992 and 2000. Evidence suggests that the majority of this increase in waste stems from the commercial sector, rather than the residential sector.

The total weight of municipal solid waste generated in Dakota County has increased by some 43% between 1991 and 2001. Early in the decade (1991 to 1994), waste generation rates increased between 3% and 7% annually. County waste generation demonstrated greater variability mid-decade, with generation actually falling some 9% between 1994 and 1995, reaching a high generation rate of nearly 17% between 1997 and 1998. Since 1998, however, waste generation rates have stabilized, increasing between 1% and 3% annually in 1999, 2000, and 2001 -- below comparable statewide generation rates. The current rate of population growth in the County has strong implications for the rate of waste generation in Dakota County, and the metropolitan region at large. Both residential and business growth in the County have increased steadily over the past twenty years, and the trends are likely to continue into the foreseeable future. Even when controlled for population growth, the rise in Dakota County waste generation remains substantial -- per capita generation increases at an average rate of 2.9% per year. Further, despite a statutory goal of reducing per capita waste generation by a minimum of 10% of 1993 levels by 2000[5], per capita waste generation statewide has instead increased by 25% between 1993 and 2000 (*Solid Waste Policy Report*, April 2002).

According to the Solid Waste Management Coordinating Board, the increase in the per capita waste generation rate has slowed significantly in the six-county region since 1998, but is still increasing. In 2000, the per capita tonnage in the region equaled some 1.29 tons, an increase of less than 1% from 1.28 tons in 1999.[6] When population growth is taken into account, the rate of per capita waste generation increased by an even smaller increment, by comparison, in Dakota County: 1% or less per year between 1998 and 2001. The annual tonnage of total waste generated in Dakota County per person has remained relatively unchanged during the last decade. Between 1990 and 2001, per capita waste generated in Dakota County has oscillated between 0.9 and 1.1 tons. However, this represents an overall increase in waste generation of some 14% over the period. As the total tonnage of waste increased, the total amount of waste landfilled has risen proportionally. The percentage of waste landfilled in 2001 (55%) represents a slight, but continuous, increase from the low rate of 50% waste landfilled in 1997. On a per capita basis, the weight of waste landfilled has remained steady, fluctuating between 0.5 and 0.6 pounds per person landfilled over the decade. Table AA.3, located in Appendix IV on page 149, presents annual percentage changes for the County's rates of waste generation, recycling, and population growth between 1991 and 2001.

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[5] Minnesota Statute §115A.55, Subdivision 4

[6] While the volume of waste generated in 2000 exceeded projections documented in the Solid Waste Master Plan, population estimates from the Master Plan do not accurately capture the true rate of growth of population (and associated municipal solid waste) in the region. The Master Plan underestimates population in the six-county region by some 25,000 individuals in 2000 when compared against Census 2000 data. Solid Waste Management Coordinating Board: *Annual Progress Report 2000*. Page 1

SHRINKING LANDFILL CAPACITY

Recycling programs were established in the metropolitan region during the late 1980s in part, as a response to concerns that sanitary landfills posed significant dangers to the environment and public health. While promising, however, the limited success of alternative waste management strategies -- including source reduction, organic composting, and processing -- has reinforced reliance on landfills for waste disposal. The Minnesota Office of Environmental Assistance notes that landfilling has surpassed resource recovery as the primary method of waste disposal in the state. Despite the preference for resource recovery stated in Minnesota's solid waste policy, 50% more waste is now landfilled than incinerated. Fewer than ten years ago, resource recovery tonnages exceeded landfill tonnages by a factor of two.

Additionally, solid waste continues to be exported to other states for land disposal, including the neighboring states of Iowa, Wisconsin, and South Dakota. Exported tonnages have tripled since 1993, increasing potential liability to Minnesota residents, as well as bypassing established state solid waste policy. Additionally, recyclable and compostable materials continue to be landfilled or incinerated -- most of this material is paper, cardboard, non-recyclable paper, and organic food waste. Approximately 72% of the waste currently being landfilled or incinerated consists of materials that could be put to higher and better use through recycling or composting.[7]

As a result of greater reliance on area landfills for disposal of a growing volume of waste annually, landfill capacity is severely limited. Further, although pre-disposal processing extends the life of area landfills, there is currently not enough capacity at existing waste processing facilities to treat the amount of solid waste generated, and no additional large-scale processing facilities are planned. The volume of landfill capacity, or airspace, remaining for the two sanitary landfills operating in the Twin Cities metropolitan area -- Pine Bend and Burnsville Sanitary Landfills, both located in Dakota County -- has been diminishing at a steady rate over the past several years. In 2001, assuming continued filling at a constant rate, remaining capacity at Burnsville Landfill is projected to total 4.2 years; Pine Bend Landfill reported 5.3 years of remaining capacity during the same year. Because disposal of waste in area landfills is less expensive than disposal at waste-to-energy and energy recovery facilities, continued disposal in sanitary landfills is likely. Despite difficulties siting new landfills in the Twin Cities region, landfills are considerably cheaper to build and operate than other methods of waste disposal. The ongoing need to landfill some volume of solid waste necessitates the continued existence of landfills within the metropolitan area, and supports continued expansion of existing landfill capacity.

LEGAL FRAMEWORK

The goal of the Minnesota Waste Management Act[8] is to protect the state's land, air, water, and other natural resources, and public health, by improving waste management in the state to reduce the amount and toxicity of waste generated, increase the separation and recovery of materials and energy from waste, coordinate the statewide management of solid waste and development and financial security of waste management facilities, including disposal facilities. The waste management goal of the state is to foster an integrated waste management system in a manner appropriate to the characteristics of the waste stream, and thereby protect the environment and public health.

State law establishes parameters for recycling in Minnesota. State legislation requires counties to ensure that residents, including residents of single and multifamily dwellings, have an opportunity to recycle.[9] State requirements of counties for providing information, education, promotions, and encouraging nonresidential

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[7] Minnesota Office of Environmental Assistance: *Solid Waste Policy Report: Waste as a Resource*, April 2002

[8] Minnesota Statute §115A.02a

[9] Minnesota Statute §115A.552, Subdivision 1

recycling are similarly described in statute.[10] State policies reinforce the importance of recycling within the hierarchy of waste management activities, known as the waste management hierarchy, as second only to waste reduction and reuse:

1. Waste reduction and reuse,
2. Waste recycling,
3. Composting of yard waste and food waste,
4. Resource recovery through mixed municipal solid waste composting or incineration,
5. Land disposal which produces no measurable methane gas or which involves the retrieval of methane gas as a fuel for the production of energy to be used on-site or for sale, and
6. Land disposal that produces measurable methane and which does not involve the retrieval of methane gas as a fuel for the production of energy to be used on-site or for sale.[11]

Minnesota is one of the few states that imposes a weight-based "pay-as-you-throw" pricing principle, which dictates that it is illegal to charge the same or less for disposal of a large container of waste than for a smaller container.

Targets for recycling programs are also provided in legislation. In metropolitan counties, 50% by weight (including 5% yard waste and 3% source reduction credits added to the tonnage percentage if respective programs are established) of total municipal solid waste generated is expected to be recycled.[12] The goal was to be achieved by December 31, 1996. (The recycling rate based upon gross tonnage alone is 42% by weight.)

State mandates require a higher level of responsibility within the seven metropolitan area counties than the remaining eighty counties. The eighty greater Minnesota counties are held to lower recycling goals -- 35% recycling by weight of total solid waste generation -- than the metropolitan area counties[13], and offered direct state assistance for compliance.

Ordinances enacted by local jurisdictions may require mandatory recycling by residential and commercial properties. Dakota County Ordinance No. 110 stipulates that recycling may become mandatory for residential and/or commercial properties in the County given additional action by the Board of Commissioners.[14] While the Board has not strengthened the Ordinance to mandate recycling, the condition was originally intended to target improved commercial recycling. Two dilemmas for mandating recycling in the County, however, include monitoring and enforcement of the ordinance. The potential costs of monitoring and enforcement of the ordinance may be high: the financial impact of monitoring and enforcement activities is a critical issue for the County to consider. The City of St. Paul, which has similarly mandated recycling for both residential and commercial properties, does not closely monitor or enforce the city's ordinance.

RECYCLING AGENCIES AND ORGANIZATIONS

The public sector is responsible for ensuring that the state's solid waste goals are implemented, such that public health, natural resources, and the environment are adequately protected. This includes the development of solid waste policy consistent with state law. Many different government organizations and jurisdictions -- at both state and local levels -- and the private sector have roles in implementing state solid waste policy within a legislative framework.

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[10] Minnesota Statute §115A.552, Subdivisions 3 and 4
[11] Minnesota Statute §115A.02
[12] Minnesota Statute §115A.551, Subdivision 2a (2)
[13] Minnesota Statute §115A.551, Subdivision 2a (1)
[14] Dakota County Ordinance No. 110, Sections 16.04 Mandatory Residential Recycling, and 16.05 Mandatory Commercial Recycling. Pages 115, 116

- **State: Minnesota Office of Environmental Assistance (OEA)**
  The Minnesota Office of Environmental Assistance (OEA) distributes state funding for local recycling development grant funds to the regional Solid Waste Management Coordinating Board, which distributes funds to counties. OEA gathers information (SCORE, LRDG and Waste Certification Reports) from counties and reports annually to the Minnesota State Legislature. OEA also conducts statewide educational efforts and coordinates studies and research. According to the Minnesota Office of Environmental Assistance's recent policy report (*Solid Waste Policy Report: Waste as a Resource*, April 2002), the OEA will utilize research and policy initiatives to target waste reduction, business and multifamily recycling (including commercial, industrial, and institutional sector recycling), organics composting, risk assessment and benefit cost analysis, and further evaluation of designated problem materials to improve environmental performance in the state.

- **Regional: Solid Waste Management Coordinating Board (SWMCB)**
  Formed in 1990, the Solid Waste Management Coordinating Board (SWMCB) is a joint powers board comprised of two county commissioners each from Anoka, Carver, Dakota, Hennepin, Ramsey, and Washington Counties.[15] To enhance intergovernmental coordination, the Board additionally includes the Director of the Minnesota Office of Environmental Assistance (OEA) and the Minnesota Pollution Control Agency (MPCA) Metro Division Manager as ex-officio members. The mission of the SWMCB is to increase the efficiency and environmental effectiveness of the region's solid waste management system. From Dakota County, Commissioner Don Maher, currently SWMCB Treasurer, and Commissioner Joseph Harris presently serve on the SWMCB.

  The SWMCB maintains four implementation groups led by commissioners and supported by key managerial and technical staff from its member counties, the Minnesota Office of Environmental Assistance, and the Minnesota Pollution Control Agency. These four implementation groups include Reduction and Recycling, nonMSW Management, Waste Processing, and Toxicity Reduction. Since 1990, the SWMCB has provided a forum for metropolitan counties to collaborate on the development of policies and programs that further the region's goal of managing MSW in an environmentally safe and economic manner consistent with the preferred waste management practices identified in the Waste Management Act.

- **County Governments**
  Minnesota counties play the primary role in planning, implementing, and maintaining solid waste management programs that ensure the proper management of solid waste generated within their respective jurisdictions. County activities may include all parts of an integrated waste management program, including solid waste and toxicity reduction, recycling, resource recovery, and proper disposal of municipal solid waste. Since the mid-1980s, many counties have chosen to form collaborative partnerships, either through joint powers agreements or contracts, to manage their solid wastes. Fifteen inter-county solid waste groups exist in the state. The most common reasons for cooperating to manage components of the waste stream are to achieve economies of scale and reduce staffing needs.

  In the Twin Cities metropolitan area, the Solid Waste Management Coordinating Board (SWMCB) guides the activities of its six member counties through the Regional Solid Waste Management Policy Plan, developed jointly by the SWMCB and the Minnesota Office of Environmental Assistance and adopted in 1997. Based upon the Regional Solid Waste Management Policy Plan, the six participating regional counties developed Regional/County Solid Waste Master Plans, which identify specific outcomes for solid waste management in the metropolitan area.

[15] Scott County was originally a member of the joint powers agreement establishing the Solid Waste Management Coordinating Board (SWMCB) in 1990, but withdrew from the SWMCB in 1998. The members of the SWMCB include: Anoka, Carver, Dakota, Hennepin, Ramsey, and Washington Counties.

- **Municipal Governments**
  Cities and towns throughout the state play a major role in implementing County Solid Waste Management Plans, and frequently undertake curbside collection of recyclables. Local jurisdictions also play a role in the collection of municipal solid waste and yard wastes, and have authority to collect fees to pay for solid waste services and may impose fees on operators of solid waste facilities. In Dakota County, each of the County's fifteen municipalities and nineteen rural communities administer residential curbside recycling programs for the benefit of their residents.

- **Rural Solid Waste Commission (RSWC) -- Dakota County**
  Established as result of the County's Recycling Implementation Strategy in 1988, the Rural Solid Waste Commission (RSWC) was formed through a joint powers agreement between the thirteen townships and six rural cities of the County to develop and manage solid waste abatement programs in rural Dakota County. The thirteen townships include Castle Rock, Douglas, Empire, Eureka, Greenvale, Hampton, Marshan, Nininger, Randolph, Ravenna, Sciota, Vermillion, and Waterford Townships. The six rural cities include Coates, Hampton, Miesville, New Trier, Randolph and Vermillion. The RSWC is governed by five members chosen by the Town Board Chairs or Mayors of each rural district, and is staffed by the County. Townships receive community funding grants from the County to administer and promote residential recycling in rural communities.

  On April 1, 1989, all residents in the RSWC area were provided with curbside recycling service by existing waste haulers through agreements with Dakota County. The RSWC was the first rural area in Minnesota to provide all residents with curbside residential recycling service. The RSWC also sponsored a recycling drop-off location at Ray's Station, although the drop off was discontinued during the late 1990s. Over the past thirteen years, the RSWC has been successful developing and implementing the curbside recycling program, and distributing curbside recycling containers to all residents. The Commission additionally coordinated collection of unwanted pesticides and empty pesticide containers, provided public education outreach to rural households (e.g., publicity to reduce the use of burn barrels in rural areas), and sponsored programs in area schools.

- **Private Industry**
  Collection of recyclable materials and municipal solid waste is largely accomplished by the private sector. However, the public sector frequently contracts with private companies for the collection of either or both recyclables and municipal solid waste on a city or countywide basis. Dakota County licenses waste haulers and related facilities to collect, process, and market recyclable materials. Thirty-three private hauling firms are licensed to collect and transport mixed municipal solid waste in Dakota County in 2002.

  Given the important role of private sector firms, it is important to note that the public and private sectors have overlapping functions in the larger solid waste arena, including the areas of waste collection, recycling, resource recovery, and land disposal. Resource recovery facilities are owned and operated as joint enterprises between both the public and private sectors, where public sector ownership may include both county and city jurisdictions.

  Landfills are similarly owned by both public and private sectors. Of the 22 landfills currently accepting municipal solid waste in Minnesota, counties operate 16 and the private sector operates the remaining six landfills. The six private landfills located in the state accept a substantially higher proportion of total waste than public landfills. Approximately 67% of all waste landfilled in Minnesota is landfilled at private facilities, while the vast majority of waste exported out-of-state is similarly disposed of at privately owned locations (*Solid Waste Policy Report: Waste as a Resource*, April 2002).

PROGRAM DESCRIPTION

HISTORY OF RECYCLING IN DAKOTA COUNTY

Beginning in the early 1980's, the problem of declining landfill space and increasing waste generation came to the forefront of public concern. As a partial solution, Dakota County, and other metropolitan area counties, began examining opportunities to initiate recycling programs. The initial emphasis was on residential recycling. The County's recycling program was established in 1988, with adoption of the *Dakota County Recycling Implementation Strategy.* From 1989 and 1991, municipalities arranged for collection of residential recycling directly with private hauling firms. Haulers were required to submit tonnages collected to municipal recycling coordinators, and annual reports were compiled and submitted to the Metropolitan Council based upon these hauler data. The Solid Waste Management Coordinating Board was created during this period in order to establish regional decision-making authority among the seven metropolitan area counties, and to assist in the development of end markets for recycled materials collected.

From the early to mid-1990s, the County played a very significant role in the collection, processing, and marketing of recyclable materials by directly organizing and managing the recycling program. First, from 1989 to 1997, the County rented space and contracted a business to operate a materials recovery facility to receive and market recycled materials collected. Second, in 1992, the responsibility for direct administration of residential collection shifted from municipalities to the County. Private haulers were subsidized by the County at an initial rate of $25 per ton in 1992, diminishing at a rate of $5 per ton per year, until payments were terminated in 1997. (The subsidy for private hauling firms correlates roughly with the increasing recycling rate apparent in Dakota County between 1991 and 1997. Further, the incentive for private waste haulers to report recycling tonnages data may not be comprehensive or strictly comparable, particularly since Dakota County ended its recycling subsidy program to haulers in 1996.) Haulers were required to submit recycling weights collected on a monthly basis to County staff. A majority of haulers willingly participated in the subsidy program, submitting recycling volumes that showed steadily increasing tonnages from year to year. The expectation was that ongoing management of curbside collection would shift to the private sector.

In 1996, responsibility for residential collection reverted back to municipalities. In 1999, the Solid Waste Management Coordinating Board and six metropolitan area counties (Anoka, Carver, Dakota, Hennepin, Ramsey, Washington) adopted a regional-county plan to manage solid waste through the year 2017. The principal outcome of the plan states that *collectively, the region will achieve at least a 50% recycling rate each year, through 2003*. Appendix II presents the history of the County's recycling program in greater depth.

CURRENT SYSTEM

While Dakota County, and the metropolitan area at large, does not mandate residential or commercial recycling, the County does mandate that private waste haulers offer the opportunity to recycle to all residents of the County[16], in keeping with state statute. Current work in Dakota County includes:

- *Management and reporting of state grant funds* for city and township administration of local residential recycling programs. Currently, Dakota County distributes state funding to municipalities to implement curbside recycling programs for city and township residents. County program requirements are established in the annual Community Funding Guidelines, including the following materials that must be collected on a countywide basis: metal food and beverage cans, three colors of glass, plastic bottles with a neck, corrugated cardboard, newsprint, magazines,

[16] Dakota County Ordinance No. 110, Section 15.08 K

and mixed mail. In order to receive funding, cities must ensure that multifamily housing residents have the same opportunity to recycle as single family residents, and ensure public facilities comply with the public entities waste processing law.[17] Dakota County additionally purchases recycling bins for cities and townships to distribute to new County residents. Approximately 7,000 recycling bins are distributed annually via cities and waste haulers to households countywide (approximately 300 bins are distributed to rural areas directly by waste haulers who service rural residents).

Dakota County reports annual waste and recycling tonnages by type of material and community, program related revenues and expenditures, and recycling activities to the Minnesota Office of Environmental Assistance. Progress towards completion of Regional/Dakota County Solid Waste Master Plan Negotiated County Outcomes is reported to the Solid Waste Management Coordinating Board on a biannual basis.

- *Licensing, regulation, enforcement, and collection of waste and recycling data from waste hauling companies operating in the County.* Firms who collect or dispose of solid waste, including recyclable materials, are mandated to obtain a Dakota County license.[18] Under the auspices of the Regional Hauler Licensing Program, haulers must maintain a valid Base License from their county of origin, and a valid Dakota County Operating License in order to collect or transport mixed municipal solid waste in Dakota County. (County Ordinance No. 110, Section 15.08) In addition to licensing and regulation of private haulers, and overall enforcement of County policies as stated in County Ordinance No. 110, Dakota County is additionally responsible for compiling waste and recycling tonnages, by type of material and community, from hauling firms.

  Additionally, Dakota County regulates and establishes regulation for operation of solid waste facilities and activities under the auspices of County Ordinance No. 110, which requires licensure of all solid waste facilities.[19] Dakota County staff routinely inspect licensed, operating facilities in the County, and take appropriate action as necessary to ensure compliance. All Dakota County communities with populations over 5,000 license solid waste haulers that operate within their boundaries, and require volume or weight-based collection services in accordance with state mandates. Dakota County regulates the acceptance of non-hazardous industrial waste at landfills in the County, and imposes specific requirements regarding such acceptance. This regulation is unique to the County because there are three landfills in the County approved to accept non-hazardous industrial waste.

- *Waste management education through distribution of educational materials, and other public awareness campaigns targeting interested audiences.* Environmental education in Dakota County has led the County's public awareness of reuse and recycling, and contributed to the region's responsiveness to local recycling programs. The emphasis of educational activities in the County has largely relied upon educational initiatives directed towards residents (see the discussion of education in the Residential Recycling section).

  Dakota County has assumed the lead for developing the *Green Guide*, published by the SWMCB every other year and distributed to every household in the region. Additionally, the County publishes educational messages regularly in the *Dakota County Update*, a newsletter about County government programs and services published three times per year and forwarded to all County residents. Other mailings and issue/topic-specific brochures sponsored by the County's

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[17] Minnesota Statute §115A.46, Subdivision 5 and Minnesota Statute §115A.471

[18] Dakota County Ordinance No. 110, Section 15.01 *Collection and Transportation of Solid Waste and Recyclable Materials*

[19] These facilities include: sanitary landfills; demolition landfills; transfer stations; special waste facilities; processing facilities (including composting); infectious waste, inactive/closed landfills; solid waste storage; and waste haulers that collect and/or dispose of waste in Dakota County.

Environmental Management Department serve to educate residents of the environmental benefits of waste reduction and recycling. These materials include Eco-Site information, the Rural Solid Waste Commission newsletter, and information describing alternative household cleansers, warm composting, and other topics of interest.

- *Maintain visible leadership and commitment to recycling through establishment and encouragement of in-house recycling and procurement of recycled products in County buildings and facilities.* Dakota County policy supports the County's goal of maintaining a healthy and sustainable environment: "The County shows its commitment to landfill abatement by practicing environmentally safe waste management programs, such as reduction and recycling."[20]

  The majority of employees currently have the opportunity to recycle at least four materials, including office and mixed paper, beverage containers, and corrugated cardboard.[21] Collection containers are located desk side, in shared work spaces (e.g., copier and work rooms), and in public areas in all County-owned buildings. Additionally, the County demonstrates its commitment to recycling through purchase of recycled-content office paper, recycled toner cartridges, and other environmentally supportive products.[22] (A more detailed description of the county's in-house recycling initiatives may be found in the In-House Recycling section, beginning on page 117.)

The schematic presented in Figure 1 following identifies the current components of recycling within the Dakota County recycling system, including participants, major County activities, and anticipated results of the system. Contributors, or *system participants*, are identified on the left-hand side of the schematic. These participants include: County residents, businesses, and institutions who participate in local recycling programs; state and regional governmental agencies who dedicate funding and coordinate waste management planning and programming in the metropolitan area; and waste hauling firms who provide collection services to area residents and organizations.

From these contributions, or inputs, Dakota County distributes funding to local communities, licenses and regulates private haulers, provides public outreach to citizens, and encourages recycling within County buildings and facilities, as discussed above. Together, these *four primary areas of County activity underlie residential, commercial, institutional, and in-house recycling efforts* -- identified as major areas of County responsibility, in the central box in Figure 1.

The subsequent *results* of Dakota County's activities are that County residents, businesses, and other institutions have an opportunity to recycle, while public entities in the County are mandated to recycle. Waste haulers collect recyclable materials via either open or organized collection and forward materials to end markets. The anticipated outcome of the overall recycling system is achievement of the state's mandated recycling rate of 50% of all mixed municipal solid waste generated in the County, as presented on the right-hand side of the schematic.

Quarterly hauler reports of recycling tonnages collected serve as a feedback loop to the County that stated outcomes are met. The County's reports to state and regional agencies of recycling program achievements serve as an indication to the state and the metropolitan area of relative system effectiveness. Similarly, state mandates and regional priorities serve as feed forward loops by impacting County programmatic decisions, while Dakota County's outreach initiatives inform citizens of recycling goals and objectives, with the expectation that awareness results in improved recycling behavior.

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[20] Dakota County Policy 4301 *In-House Waste Reduction and Recycling*, May 1992

[21] Employees who work in buildings that are rented (e.g., Public Health Department staff formerly located at 161 North Concord Exchange, South St. Paul) were not always given the opportunity to recycle, depending upon the preferences of building management.

[22] Dakota County Policy 2742 *Procurement of Recycled Products*

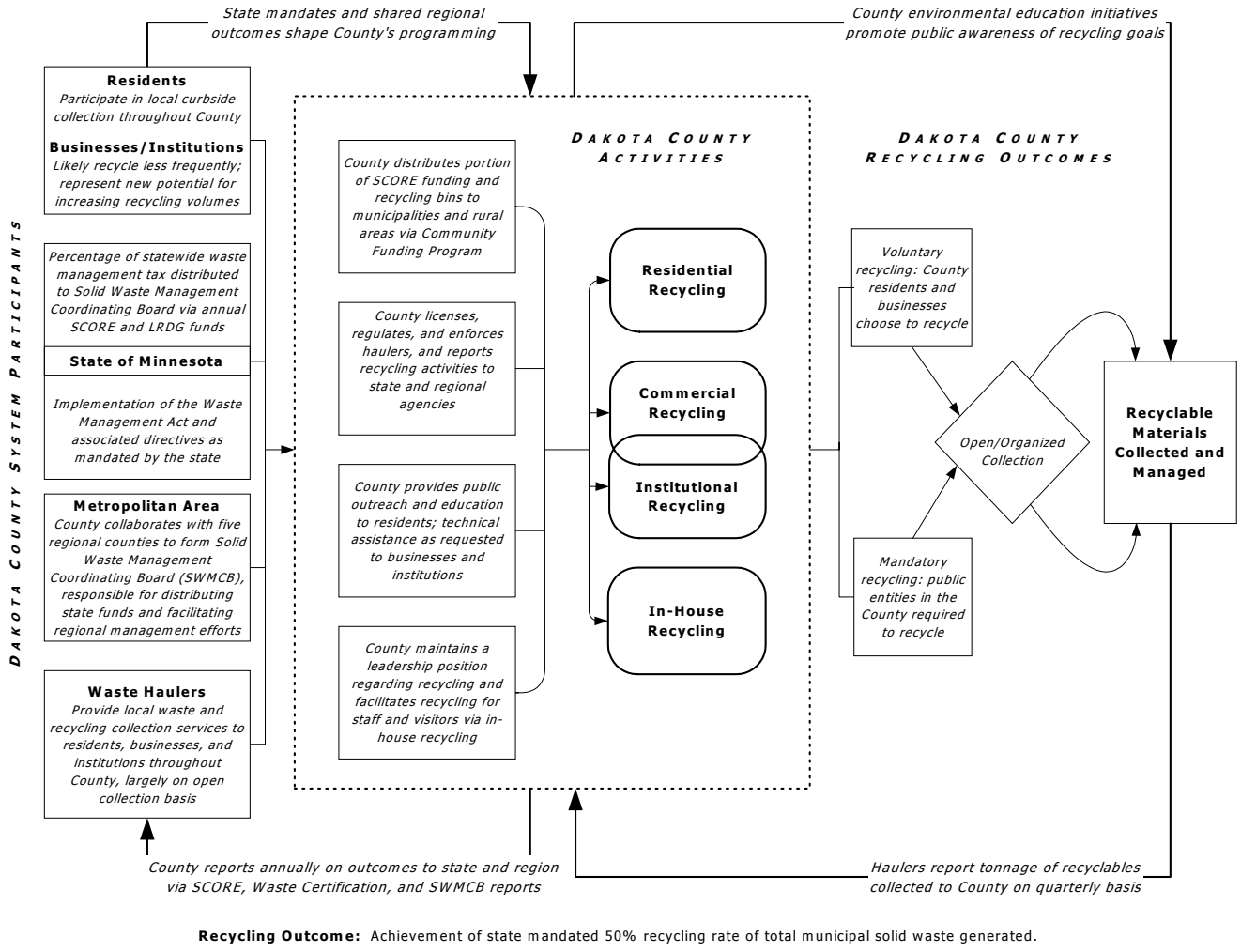

Figure 1. Dakota County Recycling System

RECYCLING PROGRAM FUNDING

RECYCLING PROGRAM REVENUES

Funding for Dakota County's Environmental Management Department and its programs comes from host fees paid by landfills, license fees, generator fees, and state grants and appropriations. Dakota County does not rely upon property taxes to supplement solid waste disposal infrastructure. No County levy is used to fund Environmental Management Department programs or staff. Two landfills located in the County, Burnsville and Pine Bend Sanitary Landfills, pay host fees directly to the County, amounting to approximately $3 million received each year. Table A, below, describes major sources of revenue that support the County's recycling program.

Table A. Major Dakota County Recycling Revenues, 1996 to 2001

Revenue:	*1996*	*1997*	*1998*	*1999**	*2000*	*2001*	*1996-2001 Change*
Local Recycling Development Grant (LRDG)	$102,797	$66,414	$153,281	$55,859	$184,508	$208,664	103.0%
	Annual % Change	-35.4%	130.8%	-63.6%	230.3%	13.1%	
Select Committee on Recycling & the Environment (SCORE)	$887,170	$899,949	$911,590	$458,291	$924,651	$934,292	5.3%
	Annual % Change	1.4%	1.3%	-49.7%	101.8%	1.0%	
Total Revenues for County Environmental Initiatives Unit	$1,046,895	$1,093,907	$1,126,529	$587,250	$1,213,795	$1,231,429	17.6%
	Annual % Change	4.5%	3.0%	-47.9%	106.7%	1.5%	

* Revenues received in 1999 reflect a shift in the way funds were posted as revenue, from two state allocations received per year to one allocation received per year, in order to align with the state fiscal year.

Source: Dakota County Financial Services Department

- *Solid Waste Management Tax*
  The Solid Waste Management Tax is a percentage tax collected by the state for management services on MSW and nonMSW (specifically, construction, infectious, and industrial wastes) streams. Approximately $54 million is generated annually through the Solid Waste Management Tax, with a percentage diverted to fund the Minnesota Office of Environmental Assistance, the Minnesota Pollution Control Agency, and the state's general fund. Services subject to tax include collection, transportation, processing, and disposal of waste materials. Service providers (haulers and landfill operators) who directly bill generators or customers are responsible for collecting and remitting the tax. The 1998 tax rate was 9.75% for residences and 17.00% for commercial generators.

  Named after the governor-appointed, state task force commissioned to recommend strategies to support recycling in Minnesota during the 1980s, SCORE represents local source reduction and recycling program grant funding to counties statewide. Of the approximately $54 million collected each year through the Solid Waste Management Tax, $14 million is converted into Select Committee on Recycling and the Environment, or SCORE, funding for counties to use in support of state mandated source reduction, recycling, and other landfill abatement activities.[23] Approximately $7 million is shared collectively by the seven counties of the Twin Cities metropolitan area and $7 million distributed to outstate counties, at a base minimum amount of $55,000 per county: see Table A. (The remaining funds are distributed to the state agencies -- $33 million -- and to the state's general fund -- $7 million.)

  Minnesota counties are responsible for reporting on SCORE program activities and expenses annually to the Minnesota Office of Environmental Assistance (OEA). Although recycling

[23] The remainder of the proceeds from the Solid Waste Management Tax is placed into the state's General Fund.

outcomes for metropolitan and outstate Minnesota counties are established by state statute, SCORE funding is withheld from counties only in the event that a solid waste master plan is not approved by the OEA. In addition to SCORE reports, Minnesota counties are additionally required to submit Waste Certification reports to the state on an annual basis.

- *Metropolitan Landfill Abatement Account*
  The Metropolitan Landfill Abatement Account was created to fund projects that result in landfill abatement in the metropolitan area. Paid by facilities, three-quarters of the proceeds from a state landfill surcharge on waste tipped at metropolitan area landfills are deposited into the Metropolitan Landfill Abatement Account. The remaining one-quarter of the collected surcharge are distributed to landfills to help fund ongoing abatement work. Distributed from the Metropolitan Landfill Abatement Account, Local Recycling Development Grant (LRDG) funds are administered by the OEA and allocated to metropolitan counties for the planning, development, and operation of recycling and yard waste composting programs. A predecessor to SCORE in the metropolitan area, LRDG requires an equal County match and largely complements SCORE funding. In 2001, Dakota County received approximately $210,000 in LRDG for support of local recycling programs and County staffing.

  The Minnesota Office of the Legislative Auditor notes that local matches for state SCORE and LRDG funding have largely exceeded the minimum amounts required by law for receipt of these state funds to support recycling and related waste abatement initiatives. While LRDG and SCORE require 100% and 25% matches, respectively, county-provided revenues have consistently accounted for more than 50% of total funding for SCORE-related activities.[24]

- *Negotiated Host Fees*
  In late 1997 and early 1998, negotiated host fees replaced the landfill surcharge as fees paid directly to Dakota County for location of the only two landfills in existence in the metropolitan area.[25] Originally, a landfill surcharge was collected as an additional charge for waste tipped at landfills at the rate of $3.33 per cubic yard. According to state mandate, the surcharge may include state, county, and local surcharges. Because landfills strongly disapproved of the imposed landfill surcharge, Dakota County switched to negotiated host agreements with landfill owners between 1997 and 1998. Currently, negotiated host fees total close to $3 million annually, a percentage of which is used to fulfill the County's required match for LRDG and SCORE funding at the rate of 100% and 25%, respectively.

As the figures in Table A suggest, total revenues for Dakota County's Environmental Initiatives Unit increased by nearly 18% between 1996 and 2001. However, the amount of revenues received from the state in support of recycling activities between 1996 and 2001, particularly SCORE funding, has not kept pace with inflation. The total revenues presented include both Local Recycling Development Grant (LRDG) and Select Committee on Recycling and the Environment (SCORE) funds, in addition to other, smaller grants and funding received to support recycling and related activities. (A more detailed discussion of Dakota County funding and staffing trends over time is presented in Recycling Outcomes, beginning on page 45.)

RECYCLING PROGRAM EXPENSES

Of the approximately $1.2 million received from LRDG, SCORE, and County funds dedicated for recycling and related program services in 2001, the largest area of expenditure was the County's targeted Community Funding Program, distributing more than $300,000 of SCORE funding to 14 cities, 13

[24] Minnesota Office of the Legislative Auditor: *Recycling and Waste Reduction*, January 2002, Revenues. Pages 14, 15

[25] Pine Bend Sanitary Landfill is located in Inver Grove Heights; Burnsville Sanitary Landfill is located in Burnsville.

townships, and six rural cities to operate curbside recycling programs within local communities. (The Community Funding Program is discussed in detail in the Residential Recycling section, beginning on page 90.) Support for County personnel represented the second largest expenditure made in 2001: staff salaries, wages, and benefits totaled nearly $270,000 in 2001. Of the total amount received, environmental education activities and promotion utilized a significant portion of revenues, more than $180,000 in 2001. Support for the *Dakota County Update* newsletter (distributed to every household quarterly) and the County's in-house recycling program (including desk bins, newsletters, document destruction, special events and promotions), totaled an additional $60,000 and $47,000, respectively. Table B describes major categories of Dakota County expenditure for recycling and related activities, over the past five years.

Table B. Major Dakota County Recycling Expenditures, 1996 to 2001

Expenses:	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*	*1996-2001 Change*
Salaries, Wages, and Benefits	$200,391	$237,667	$234,610	$228,695	$252,412	$266,610	33.0%
	Annual % Change	18.6%	-1.3%	-2.5%	10.4%	5.6%	
Community Funding Program (to Cities)	$250,533	$269,014	$279,424	$279,592	$283,012	$303,538	21.2%
	Annual % Change	7.4%	3.9%	0.1%	1.2%	7.3%	
Environmental Education	$77,659	$196,280	$170,946	$206,913	$182,612	$212,315	173.4%
	Annual % Change	152.7%	-12.9%	21.0%	-11.7%	16.3%	
Update Newsletter	—	—	—	$60,000	—	$60,000	—
	Annual % Change	—	—	—	—	—	
In-House Recycling	$1,490	$16,897	$15,146	$5,201	$2,790	$46,641	3,030.3%
	Annual % Change	1034.0%	-10.4%	-65.7%	-46.4%	1,571.7%	
Total Expenses for County Environmental Initiatives Unit	$925,949	$1,252,781	$1,298,374	$1,383,655	$1,357,582	$1,677,964	81.2%
	Annual % Change	35.3%	3.6%	6.6%	-1.9%	23.6%	

Source: Dakota County Financial Services Department

Although separate from recycling, implementation and maintenance of the County's household hazardous waste program requires a large portion of SCORE and LRDG funding ($620,000 budgeted in 2002), including all site and associated disposal costs. Similarly, processing subsidies for interested haulers utilizes some $70,000 of related funding annually, though more funding ($1,300,000 budgeted in 2002) is

dedicated to supporting processing subsidies than is actually utilized.[26] In sum, program expenditures have risen over the past five years, due to increased spending for most program categories in recent years. Environmental Initiatives Unit expenditures have risen by approximately 81% between 1996 and 2001, in large part to support recycling and related waste abatement activities (including establishment and ongoing maintenance of the County's household hazardous waste program). Corresponding revenues, however, including all state and other funding, have grown by only 18% over the same period.

REGIONAL SOLID WASTE PLANNING AND MANAGEMENT

Several regional planning documents and reporting requirements serve to guide solid waste management in the six county metropolitan area that constitutes the Solid Waste Management Coordinating Board (SWMCB), including Dakota County. Further, the County maintains planning and reporting structures that additionally shape and support recycling initiatives. These planning documents and management activities are as follows:

In conjunction with the Minnesota Office of Environmental Assistance, the Solid Waste Management Coordinating Board (SWMCB) is responsible for preparation of a long-range plan, the *Metropolitan Solid Waste Management Policy Plan* (Policy Plan). In turn, the Policy Plan provides the foundation for the outcomes and implementation strategies outlined in the *Regional/County Solid Waste Master Plan* (Master Plan), prepared jointly and implemented by the six member counties of the SWMCB. The SWMCB additionally prepares short-range work plans and completes performance measurement reports annually.

- *Policy Plan*
  The purpose of the *Metropolitan Solid Waste Management Policy Plan* (Policy Plan) is to provide guidance to regional policymakers in managing solid waste in the seven county metropolitan area, through the year 2017. Strict limitations on the use of flow control[27], together with an increasing stream of municipal solid waste, highlight the role of local and state government if the goals established in the 1980 Waste Management Act are to be accomplished. The Policy Plan and its associated policies assume that government has responsibility for ensuring that waste is managed in a manner that protects the environment and public health, and conserves resources. Policies identified in the Policy Plan reflect a substantial shift in the tools used by government: from regulation of the marketplace to leadership, education, provision of incentives, and market participation. Specifically, the Policy Plan steers the region's solid waste management system towards a vision of sustainability:

  > ***To achieve a sustainable environment, the region must manage its waste in a manner that will not compromise future generations' ability to meet their own needs. A sustainable environment conserves resources, protects public health and the environment, and bears the associated costs.***

  According to the Policy Plan, government serves as a leader in recycling: "state, county, local governmental units, and school districts will … implement strategies to aggressively: maximize internal recycling efforts through continuous improvement and performance reporting; make purchasing decisions for commodities and construction materials that promote resource

[26] To encourage landfill abatement, the County provides $12 per ton as an incentive to haulers delivering waste to processing facilities in the region. Despite approximately $1,300,000 budgeted each year to subsidize processing of waste over disposal in landfills, fewer than twenty haulers participate in the program, with total annual subsidies equaling approximately $70,000.

[27] Flow control, or waste flow designation, is a requirement by a county that all or any portion of the solid waste generated within its jurisdiction be delivered to a processing or disposal facility identified by the county. Minnesota Statute §115A.81, Subdivision 2

conservation and environmental protection; and maximize the recycling of nonMSW (non-municipal solid) wastes." The Policy Plan affirms that "recycling will be integrated into all relevant aspects of regional, county, and local government decision making including … local land use comprehensive plans, and zoning and building ordinances." Five specific goals have been established as key components that support the vision of regional sustainability. The goals for the region are described below in Table C:

Table C. Regional Goals

Regional Goals

1. To manage waste generated in the metropolitan area in a manner that will protect the environment and public health and that will conserve resources.
2. To manage the region's waste in an integrated waste management system, in accordance with the hierarchy[28], in order to minimize landfilling.
3. To manage the region's waste in a cost-effective manner and will strive to minimize the potential liability of the citizens, businesses, and taxpayers in the region.
4. To encourage generators to take responsibility for the environmentally sound management of their waste.
5. To allocate solid waste management system costs equitably among those who use or benefit from the system.

Source: *Metropolitan Solid Waste Management Policy Plan, 1997 to 2017*: Section 2.2 The Goals

- *Master Plan*

As stipulated in state statute[29], the *Regional/County Solid Waste Master Plan* (Master Plan) was developed to guide the management of municipal solid waste from 1998 through the year 2017 within the six-county metropolitan area (Anoka, Carver, Dakota, Hennepin, Ramsey, and Washington Counties). Updated every six years, the Master Plan identifies outcomes and strategies to meet Policy Plan goals for management of the area's municipal solid waste. The Master Plan is due for revision in 2003.

Negotiated outcomes specific to each SWMCB county, and to the region as a whole, are identified in the Master Plan. Principal regional outcomes are established for six primary areas of county activity. These include source reduction, toxicity reduction, recycling, municipal solid waste processing, municipal solid waste landfilling, and non-municipal solid waste management. Principal outcomes are supported, in turn, by several regional intermediate outcomes and negotiated county outcomes. In turn, progress towards achievement of the negotiated county outcomes are reported biannually by each member county to the Solid Waste Management Coordinating Board.

With regards to recycling, the Master Plan specifically defines the Principal Regional Outcome for recycling as a minimum of 50% by weight of municipal solid waste generated every year, through 2003. This recycling rate includes a 3% source reduction and a 5% yard waste credit. This regional outcome requires that SWMCB counties must maintain a recycling rate of at least 42% of all municipal solid waste discarded by tonnage. The principal recycling outcomes for the region and Dakota County are presented following in Table D.

[28] Waste management hierarchy, described above on page 27.

[29] Minnesota Statutes §115A.46 and §473.803

Table D. Principal Recycling Outcome for the Region and County

Principal Recycling Outcome

Collectively, the region will achieve at least a 50% MSW recycling rate (including a 3% source reduction and a 5% yard waste credit) every year, through 2003.

Regional Implementation Strategies

1. The region will undertake the following education strategies:
   - Update and distribute the "Resourceful Waste Management Guide".
   - Develop a SWMCB web page.
   - Coordinate county residential and multi-family housing recycling messages.
   - Work with the OEA to develop educational and promotional materials for each targeted material.
2. The region will provide government leadership and promote responsible procurement by exploring the expansion of cooperative purchasing so that public entities can procure recycled products at the least possible cost, and by updating and distributing the "Environmentally Responsible Government Procurement Guide".
3. The region will research zoning and design barriers to commercial and multi-family recycling and develop model planning, zoning and building ordinances or guidelines that will minimize recycling barriers.

Dakota County Negotiated County Outcomes

- Work with the public and private sectors to maintain household recycling rates at 1997 levels.
- Add a material to the list of County-wide materials required for collection when the collection is shown to be technically and economically feasible.
- Focus its efforts on food waste recycling (e.g., Endres Processing and animal farmers).

Negotiated County Outcomes for the Region

- Increase recycling efforts and adjust purchasing decisions to reduce the amount of MSW generated in its county-operated buildings by 5% by 2003.(*Strategies 1g, 1o, 1p, 2, and 4*)
- Assure that, in accordance with State law, all facilities under its control have recycling programs in place by 2000 to collect and recycle at least four materials, including office paper and cardboard when they each comprise a portion of a facility's waste stream.(*Strategies 1h, and 1q*)
- Gather information about the level and type of service, price of service, quality of service, and service performance by 2000 for use in analysis of local recycling efforts. (*Strategy 1n*)

Source: Regional/Dakota County Solid Waste Master Plan, 1998 to 2017: Section VII.B Regional Outcomes, Implementation Strategies, and County Negotiated Outcomes, and Section VII.C Dakota County Recycling Strategies

The Master Plan identifies Intermediate Recycling Outcomes for the region that target reduction and recycling of paper, ongoing evaluation of current residential recycling programs for innovation and cost effectiveness, and support of associated markets through governmental purchasing of recycled-content materials. Further, the Master Plan identifies materials that offer the greatest potential for recycling; office paper, food waste, and transport packaging are highlighted. The Master Plan supports targeting generators that may have a significant impact

on the amount of materials collected, specifically the commercial sector, "where significant increases in tonnage can be expected"[30].

Dakota County must have a Master Plan approved by the Minnesota Office of Environmental Assistance, in order to receive state SCORE funding[31]. The County is responsible for implementing programs and engaging in activities that achieve principal regional and negotiated county outcomes. The result of an intensive visioning process for solid waste management in the County, Dakota County's Master Plan articulates goals and outcomes that represent "stretch" targets towards which the County directs its efforts.[32]

As discussed earlier, the County reports progress on negotiated county outcomes biannually to the SWMCB. (See Appendix III for a summary of the County's solid waste management objectives, and specific excerpts from the Regional/County Solid Waste Master Plan.) The first update to the Regional/County Solid Waste Master Plan is due for submission to the state in 2003.

DAKOTA COUNTY SOLID WASTE PLANNING AND MANAGEMENT

As discussed above, Dakota County works closely with Anoka, Carver, Hennepin, Ramsey, and Washington Counties, as the Solid Waste Management Coordinating Board, to achieve regional and County-specific outcomes in six solid waste management areas including recycling. SWMCB planning initiatives considered on a regional basis are complemented by outcome measurement efforts implemented as part of Dakota County's commitment to ongoing countywide improvement and governmental accountability.[33]

Dakota County Department outcome measurement plans identify key program activities and their anticipated outcomes in order to establish accountability to the County's mission of *effective, efficient, responsive government* for the results of County programs. One of the first outcome measurement plans created in the County, the Environmental Management Department Outcome Measurement Plan was developed to help assess the County's effectiveness in reaching identified environmental outcomes.

- *Master Plan*
  In the Negotiated County Outcomes for recycling developed through the Solid Waste Management Coordinating Board, Dakota County specifically committed to "work with the public and private sectors to *maintain household recycling rates at 1997 levels*." As identified in the *Regional/Dakota County Solid Waste Master Plan*, 1998 to 2017, Dakota County additionally agreed to "add a material to the list of County-wide materials required for collection when the collection is shown to be technically and economically feasible", and to "focus its efforts on food waste recycling".

  To achieve the regional and County recycling outcomes articulated in the Master Plan, Dakota County developed a list of specific strategies to help to better define programmatic activities. These strategies are summarized from the County's Master Plan and listed in Table E below:

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30 Regional/Dakota County Solid Waste Master Plan. Section VII.B Regional Recycling

31 The Minnesota Office of Environmental Assistance may withhold funding from counties that do not meet recycling outcomes, although this penalty has never been exercised for any county in the state. (Recycling outcomes are 50% and 35% by weight for metropolitan area and outstate counties, respectively: refer to page 23.)

32 Conversation with former Environmental Management Department staff who participated in development of the Master Plan.

33 More information regarding Dakota County's outcome measurement program is available from the County's web site at http://www.co.dakota.mn.us/oped/outcome_system.htm.

Table E. Dakota County Strategies

- Exhibit strong environmental education focus, promote management alternatives for food waste, develop an annual press release addressing these alternatives, and continue Green Guide and appropriate updates.
- Request input from hauler reps, SWMAC, and communities, relative to adding another material to the Countywide materials required for collection.
- Support phased business recognition program through provision of approved $6,000 innovation grant funds.
- Evaluate and incorporate aspects of Environmentally Responsible Purchasing Guide and contract for purchasing products for County use.
- Promote eco-printing techniques through County Communications Liaison Committee: EM staff will assist other County departments.
- Work with other five SWMCB counties to develop a protocol and criteria for gathering recycling service info for use in analysis of local recycling efforts.
- Conduct one waste sort in one County building each year.
- Ensure recycling programs are established in all facilities under its control by 2000.
- Purchase products with higher post consumer content.

Source: *Regional/Dakota County Solid Waste Master Plan, 1998 to 2017*: Section VII.C Dakota County Recycling Strategies

- *Environmental Management Department Outcome Measurement Plan*
  The Environmental Management Department authored an Outcome Measurement Plan in 1998 that identifies specific measurements for tracking and evaluating program-related data and information. According to the outcome measurement plan, the second goal of the Department is to "Create and environmentally aware community", an outcome of which is that "County residents and businesses behave in an environmentally responsible manner".[34] Performance indicators relating to recycling which support this outcome are identified as follows:

  Effectiveness: Percent of residents and businesses that recycle their wastes.
  Efficiency: Cost of recycling program per County resident.
  Responsiveness: Satisfaction of residents and businesses with County recycling program.

  Regular analysis of performance indicators assists the County in managing recycling activities and assessing the relative effectiveness of the program. Recycling program achievements, future opportunities, and challenges may be presented regularly in the Department's annual plan and budget document to the County Administrator.

SUMMARY

Dakota County manages solid waste issues, including recycling initiatives, within the overarching context of the Solid Waste Management Coordinating Board region, collaborating with SWMCB member counties to achieve regional and County outcomes. Dakota County's main recycling activities are four-fold, including: management and reporting for state grant funds; regulation of haulers and collection of hauler data; waste management education; and leadership in promoting recycling to County staff and the broader County community. Dakota County's Environmental Initiatives Unit, responsible for administering

[34] *Dakota County Environmental Management Department Outcome Measurement Plan*, 1998. Page 10

recycling in the County, received more than $1.2 million in total revenues in 2001, and expended approximately $1.7 million in expenses during the same year, to support recycling and related activities.

Recycling initiatives in Dakota County are largely guided by outcomes identified in Solid Waste Management Coordinating Board (SWMCB) planning and management documents, and regularly assessed by both SWMCB reporting requirements and the County's own outcome measurement process. The section following, Recycling Outcomes, details the current state of recycling in Dakota County, in terms of specific program performance, budgeting, and staffing.

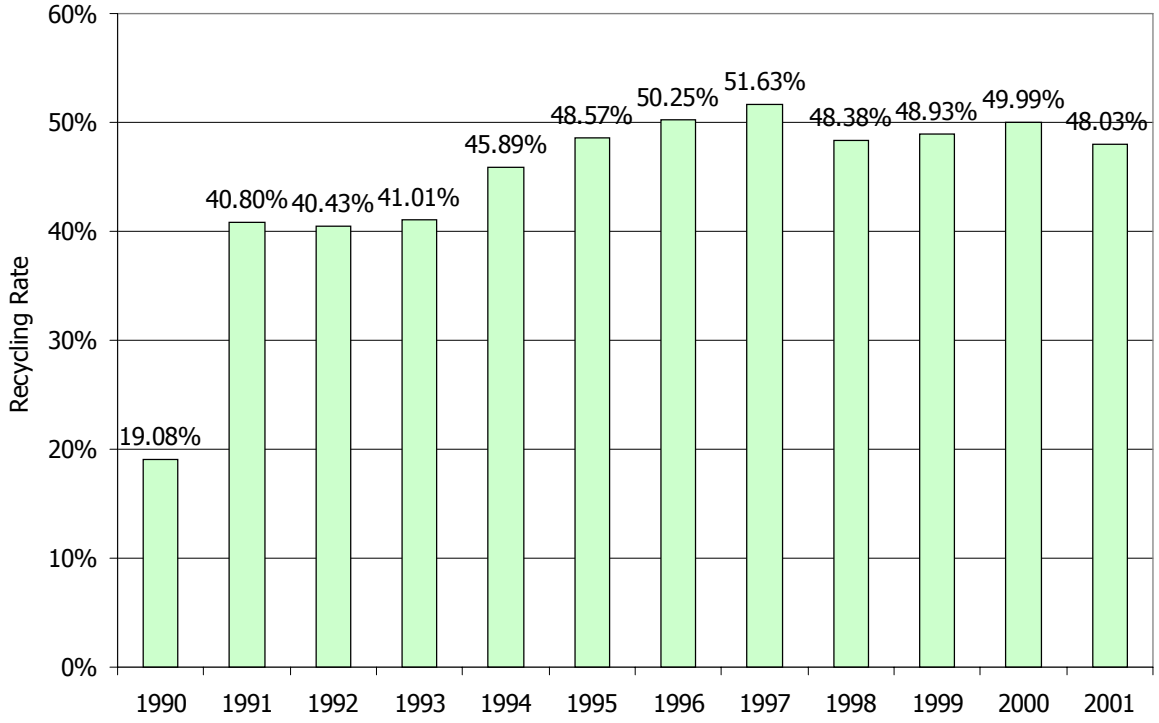
RECYCLING OUTCOMES

PROGRAM PERFORMANCE

In many jurisdictions across the nation, recycling rates have leveled in recent years. Minnesota state legislation adopted in 1989 set a goal for metropolitan area counties to *recycle at least 50% of the total volume of municipal solid waste (MSW) generated*, to be achieved every year from 1996 through 2003. In 1990, Dakota County recycled approximately 19% of all waste generated and was achieving less than the region's average recycling rate of 30%. *By 1996, Dakota County had reached the goal* for metropolitan area counties at 50% and was slightly exceeding the performance of the region as a whole. (The County's hauler subsidy program was initiated in 1992, and gradually decreased by $5 increments until 1997, when private hauling firms received no subsidy for collection of recyclable materials. The increasing rates of recycling observed during the first years of the program correlate with the County's short-term policy of offering economic incentives for collection.)

Since 1997, however, *the recycling rate has remained relatively steady* (between 48% and 50%). In 2001, the recycling rate fell from a rate of 50% in 2000, to approximately 48% of the total municipal solid waste generated in the County. Chart 1, below, highlights Dakota County's recycling rate (as defined by the total tonnage of MSW recycled divided by the total tonnage of MSW generated, plus applicable source reduction and yard waste credits) between 1990 and 2001. (Appendix IV presents additional recycling data for comparison, including metropolitan area and municipal-level data.)

Chart 1. Dakota County Recycling Rate, 1990 to 2001



Source: Minnesota Office of Environmental Assistance: Dakota County *SCORE* and *Waste Certification Reports*, 1991 to 2000; Dakota County Environmental Management Department: recycling and waste generation tonnages, 1990 and 2001

In the negotiated county outcomes for recycling developed through the Solid Waste Management Coordinating Board, Dakota County specifically committed to "work with the public and private sectors to *maintain household recycling rates at 1997 levels*." As identified in the County's Master Plan, Dakota County additionally agreed to "add a material to the list of County-wide materials required for collection when the collection is shown to be technically and economically feasible", and to "focus its efforts on food waste recycling".[35] In 1997, Dakota County recycled approximately 138,000 of 315,000 tons of total municipal solid waste generated, resulting in a high recycling rate of nearly 52% when both source reduction and yard waste credits are included. Table F presents rates of waste generation, recycling activity, and population growth in Dakota County between 1991 and 2001.

Table F. County Rates of Waste Generation, Recycling, and Population Growth, 1991 to 2001

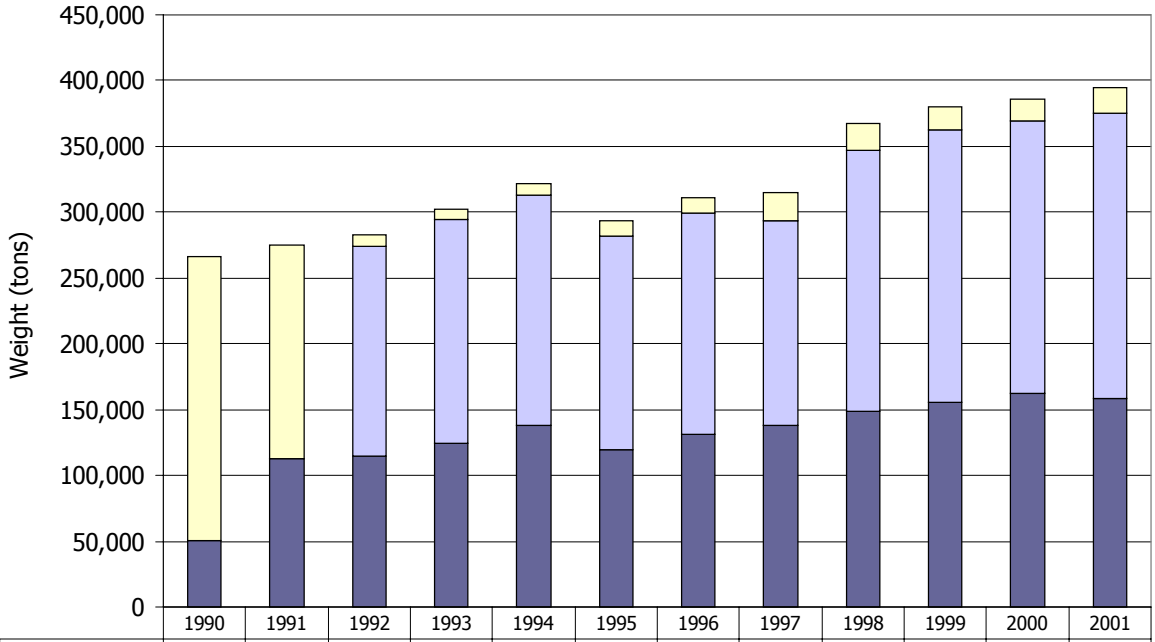
	1991	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*
Total MSW Generation (tons)	275,500	282,880	302,176	322,008	293,738	311,387	315,337	367,579	380,315	385,588	394,713
		2.68%	6.82%	6.56%	-8.78%	6.01%	1.27%	16.57%	3.46%	1.39%	2.37%
Total MSW Recycled (tons)	112,411	114,360	123,923	138,119	119,176	131,574	137,587	148,417	155,668	161,892	157,992
		1.73%	8.36%	11.46%	-13.71%	10.40%	4.57%	7.87%	4.89%	4.00%	-2.41%
Recycling Rate (w/o credits)	40.80%	40.43%	41.01%	42.89%	40.57%	42.25%	43.63%	40.38%	40.93%	41.99%	40.03%
Recycling Rate (w/ credits)	41%	40%	41%	46%	49%	50%	52%	48%	49%	50%	48%
Land Disposal (tons)	NA	159,756	170,938	174,367	162,374	168,122	156,268	198,542	206,783	207,086	216,820
		NA	7.00%	2.01%	-6.88%	3.54%	-7.05%	27.05%	4.15%	0.15%	4.70%
Other Disposal (tons)	163,089	8,764	7,315	9,522	12,188	11,691	21,482	20,620	17,864	16,610	19,901
		-94.63%	-16.53%	30.17%	28.00%	-4.08%	83.75%	-4.01%	-13.37%	-7.02%	19.81%
Total MSW Disposed (tons)	163,089	168,520	178,253	183,889	174,562	179,813	177,750	219,162	224,647	223,696	236,721
		3.33%	5.78%	3.16%	-5.07%	3.01%	-1.15%	23.30%	2.50%	-0.42%	5.82%
% Change	-24.34%	3.33%	5.78%	3.16%	-5.07%	3.01%	-1.15%	23.30%	2.50%	-0.42%	5.82%
County Population	282,632	290,443	298,679	308,002	316,272	325,079	332,657	339,256	347,245	355,904	363,866
		2.76%	2.84%	3.12%	2.69%	2.78%	2.33%	1.98%	2.35%	2.49%	2.24%
Per Capita Generation (tons)	0.97	0.97	1.01	1.05	0.93	0.96	0.95	1.08	1.10	1.08	1.08
		-0.08%	3.88%	3.34%	-11.16%	3.14%	-1.04%	14.30%	1.08%	-1.08%	0.13%
Per Capita Recycling (tons)	0.40	0.39	0.41	0.45	0.38	0.40	0.41	0.44	0.45	0.45	0.43
		-1.00%	5.37%	8.08%	-15.97%	7.41%	2.19%	5.77%	2.47%	1.47%	-4.54%

Source: Minnesota Office of Environmental Assistance: Dakota County *SCORE* and *Waste Certification Reports*, 1991 to 2000; Dakota County Environmental Management Department: recycling and waste generation tonnages, 1990 and 2001, tonnage of waste landfilled, 1990 to 2001

[35] *Regional/Dakota County Solid Waste Master Plan, 1998 to 2017*: Section VII.C Dakota County Recycling Strategies

The *total tons of waste recycled has continued to increase*, from some 51,000 tons recycled in 1990 to nearly 158,000 tons in 2001, *but the number of tons of waste recycled per person has largely remained steady over much of the past decade*. In 1990, some 0.18 tons of municipal solid waste were recycled per capita. By the following year, the per capita volume had more than doubled to 0.40 tons of municipal solid waste recycled per person. From 1991 on, the volume of recyclables has ranged between 0.38 and 0.45 tons collected per person. The number of tons of municipal solid waste generated per capita has increased throughout much of the decade, particularly between 1997 and 1998, when the total volume of waste generated per capita rose by approximately 14% between the two years. Chart 2, below, presents the total weight of municipal solid waste generated and managed in Dakota County over the past decade. The amount of municipal solid waste managed is charted according to the following categories: tonnages recycled, landfilled, and otherwise disposed of.

Chart 2. Waste Management in Dakota County, 1990 to 2001



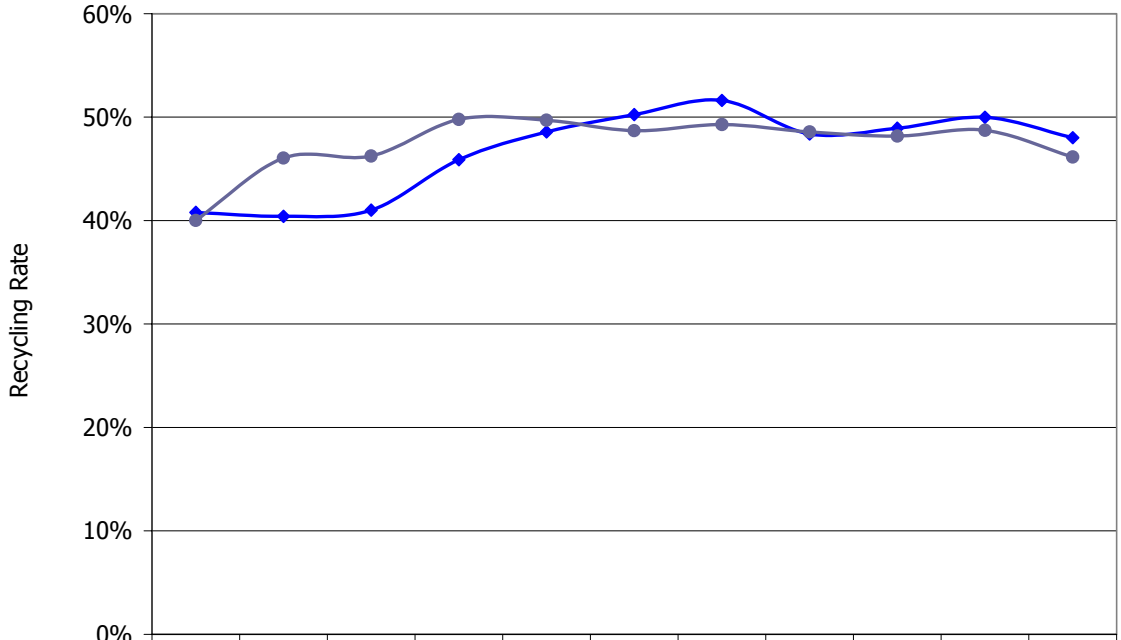
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Other Disposal	215,562	163,089	8,764	7,315	9,522	12,188	11,691	21,482	20,620	17,864	16,610	19,901
Waste Landfilled			159,756	170,938	174,367	162,374	168,122	156,268	198,542	206,783	207,086	216,820
Waste Recycled	50,823	112,411	114,360	123,923	138,119	119,176	131,574	137,587	148,417	155,668	161,892	157,992

Source: Dakota County *SCORE* and *Waste Certification Reports*, 1991 to 2001; US Census Bureau: population and population estimates, 1991 to 2001

The Solid Waste Management Coordinating Board notes that the rate of increase in waste generation has slowed significantly since 1998. The per capita rate of waste generation has remained relatively steady in recent years, rising 1.1% or less between 1998 and 2001. (Table AA.3 in Appendix IV, page 149, presents the total tonnage of materials recycled and MSW generated in each of the seven metropolitan area counties between 1991 and 2001, assuming all source reduction and yard waste credits available were applied.)

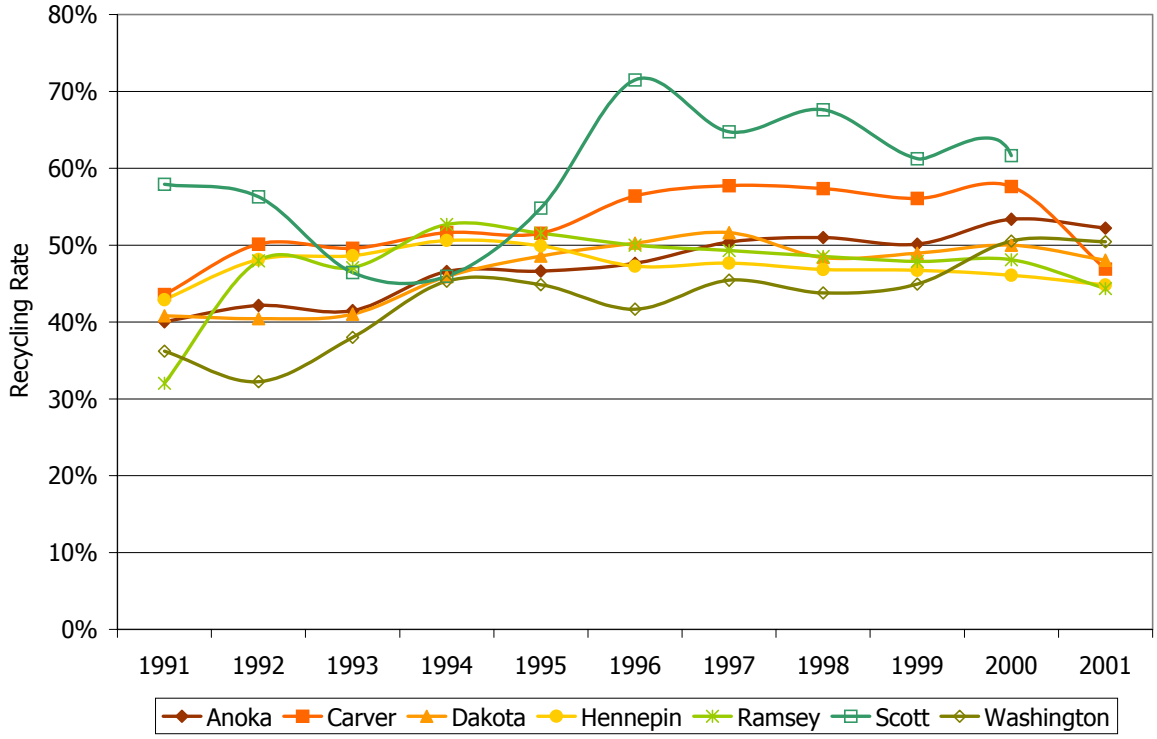
When compared with the average recycling rate for the metropolitan area as a whole, Dakota County fell below the regional recycling rate for the first half of the decade, rising above the regional rate in 1996 and following the region closely over the latter half of the decade.

Chart 3. Metropolitan Area Recycling Rates, 1991 to 2001



	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Dakota	40.80%	40.43%	41.01%	45.89%	48.57%	50.25%	51.63%	48.38%	48.93%	49.99%	48.03%
Metro Average	40.02%	46.05%	46.25%	49.79%	49.71%	48.70%	49.30%	48.57%	48.17%	48.73%	46.14%

Chart 4. Metropolitan Area County Recycling Rates, 1991 to 2001



Source: Minnesota Office of Environmental Assistance: metropolitan area county *SCORE Reports*, 1991 to 2001

Charts 3 and 4, above, compare the recycling rate for Dakota County against recycling rates for Anoka, Carver, Hennepin, Ramsey, Scott[36], and Washington Counties between 1991 and 2001, and against the average recycling rate for the region, respectively. On average, across the decade, Dakota County's recycling rate (46.72%) fell only slightly below average rates for Anoka (47.41%), Hennepin (47.23%), and Ramsey (47.21%) Counties. Carver (52.58%) County featured one of the highest average recycling rates for the decade, while Washington County (43.03%) maintained the lowest average rate regionally.

PROGRAM BUDGETING

As introduced in the Background discussion of funding to support recycling programs (Recycling Program Funding, page 34), Select Committee on Recycling and the Environment, or SCORE, legislation was passed into law in 1989 to support state recycling, solid waste, and related issues. SCORE funding to counties supports specific recycling and solid waste management activities[37] in local communities through establishment of the solid waste management tax. Counties are allocated a based amount of SCORE funding plus an additional amount based upon population size. Based upon annual SCORE reports to the state, total SCORE-related funding information for Dakota County for the decade (1991 to 2001) is presented below in Table G.[38]

Table G. Dakota County SCORE-Related Revenues and Expenditures, 1991 to 2001

Year	*Total Revenues*	*Total Expenditures*	*Expenditures per Capita*
1991	$2,511,088	$2,511,088	$8.88
1992	$1,936,983	$2,204,872	$7.59
1993	$2,466,266	$2,426,266	$8.12
1994	$1,986,710	$1,986,710	$6.45
1995	$1,357,504	$1,357,504	$4.29
1996	$1,212,111	$1,212,111	$3.73
1997	$1,496,044	$1,496,044	$4.50
1998	$1,673,790	$1,224,249	$3.61
1999	$1,605,355	$1,608,646	$4.63
2000	$1,167,865	$1,438,181	$4.04
2001	$905,039	$1,397,792	$3.84

Source: Minnesota Office of Environmental Assistance: Dakota County *SCORE Reports*, 1991 to 2001

[36] Scott County does not participate in the Solid Waste Management Coordinating Board and therefore, does not necessarily maintain program data that is comparable with SWMCB member counties. This section references Scott County data in order to describe waste abatement activities within the metropolitan area as a whole.

[37] Minnesota Statute §115.557, Subdivision 2

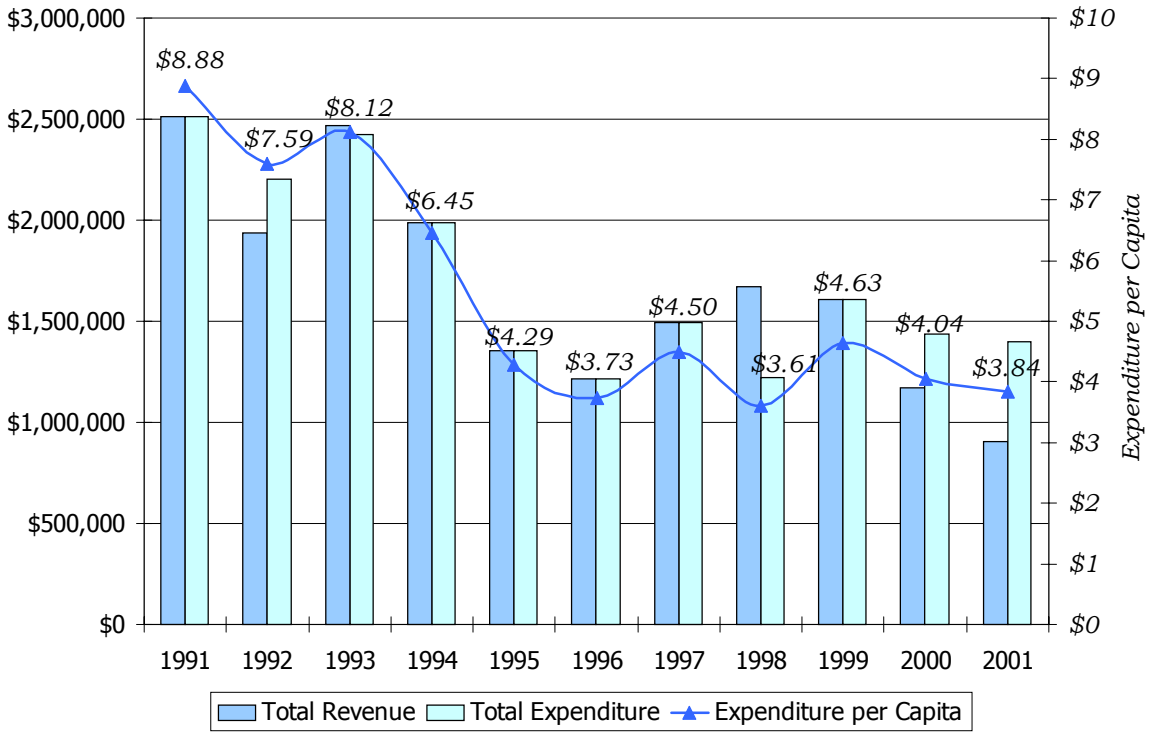
[38] Total SCORE revenue and expenditure information is presented in detail, although SCORE funding supports several County activities in addition to recycling. Because SCORE represents the majority of state funding to counties in support of recycling and related activities, it is important to capture the change in allocation of funding by program area over time.

Since 1989, the Legislature has appropriated $14 million for SCORE grants to counties. In real dollars, however, the State of Minnesota's contribution to recycling initiatives has fallen over time. During fiscal year 2001, the solid waste management tax generated approximately $54 million of revenue. Of this amount, $47 million was appropriated to support environmental activities conducted by the Minnesota Pollution Control Agency and the Minnesota Office of Environmental Assistance, including $14 million for SCORE grants to counties. However, $7 million was not appropriated for environmental purposes and remained in the State's General Fund. The 2002 Legislature has further reduced the $14 million for SCORE grants available in the Fiscal Year 2002-2003 biennium by 10%, or $1.4 million, for the purposes of balancing the State's budgetary shortfall. (The base amount of funding allocated to each county via SCORE has been reduced by 10% to equal $49,500 for Fiscal Year 2002-2003.)

State funding for SCORE-related program activities implemented in Dakota County has fallen in real terms by approximately 134%, from a high value of $3,265,152 granted in 1991 (2001 dollars), to a low of $1,397,792 in 2001. Largely keeping pace with SCORE funding in past years, County expenditure has recently outstripped existing revenue for SCORE-related activities, with the County's expenditure exceeding revenues available to support SCORE programs since 1999. When population is held constant, the amount of SCORE funding expended per capita fell from a high of $8.88 in 1991, at the initiation of the County's recycling program, to $3.84 in 2001. Chart 5 presents annual SCORE revenue and expenditure information for Dakota County for the years 1991 through 2001.

In 2002, Dakota County expected to receive $940,300 from SCORE and $199,650 from the Local Recycling Development Grant (LRDG). The County expects to make approximately $3,029,900 available for recycling and related solid waste management and education efforts in 2002.

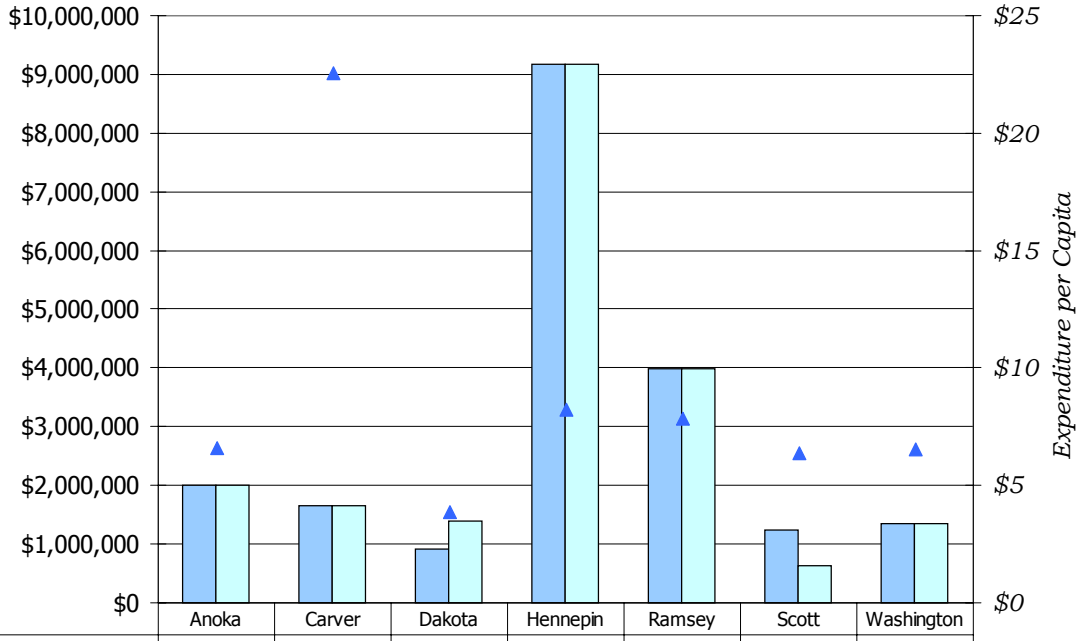
Chart 5. Dakota County SCORE Revenues & Expenditures, 1991 to 2001



Source: Minnesota Office of Environmental Assistance: Dakota County *SCORE Reports*, 1991 to 2001

When compared against the larger SWMCB regional area, SCORE revenue for Dakota County ranked the lowest among the six member counties in 2001, while Dakota County's total SCORE-related expenditure was exceeded by Anoka, Carver, Hennepin, and Ramsey Counties during the same year. Further, per capita SCORE-related program expenditures in Dakota County were the lowest in the SWMCB region by a considerable margin. In 2001, Dakota County spent $3.84 per capita, as compared with the high expenditure of nearly $23 per capita to support SCORE recycling and solid waste programs during the same year by Carver County. Caver County expended a far greater per capita amount than any of the other five regional jurisdictions. Chart 6, presented following, highlights revenue and expenditure information for the seven metropolitan area counties for the year 2001.

Chart 6. Metropolitan County SCORE Revenues & Expenditures, 2001



	Anoka	Carver	Dakota	Hennepin	Ramsey	Scott	Washington
Total Revenue	$2,009,978	$1,655,766	$905,039	$9,165,516	$3,990,104	$1,235,620	$1,358,226
Total Expenditure	$2,009,978	$1,655,766	$1,397,792	$9,165,516	$3,990,104	$627,545	$1,358,226
Expenditure per Capita	$6.58	$22.56	$3.84	$8.22	$7.84	$6.40	$6.54

Source: Minnesota Office of Environmental Assistance: metropolitan area county *SCORE Reports*, 2001

PROGRAM STAFFING

In concert with budget allocations that support recycling activities, local staffing of SCORE-related programs is an important contributor to demonstrated outcomes. State SCORE Report data for Dakota County suggests that County staffing levels for SCORE programs have fallen significantly over the past decade, particularly given the growth in population evidenced in Dakota County. As reported in annual SCORE reports, staffing for all SCORE-related activities in Dakota County fell nearly 89%, from a high of 9.75 full-time equivalent (FTE) staff in 1992, to current staffing levels of 5.17 FTEs in 2001. Holding population constant, staffing levels exhibit an even more dramatic decline. SCORE staffing per 100,000 capita decreased by more than 317% in Dakota County over the decade between 1992 and 2001.

Similarly, the trend in County staffing specifically to support recycling activities -- including both collection/processing and administration/support -- has decreased significantly over the decade. From a high of 2.75 FTEs in 1991 and 1992, the County maintained fewer than one-half or 1.20 FTEs in 2001 to

support recycling activities, a decrease of 56%. Recycling in Dakota County has largely centered around administration and support of local curbside recycling programs: 0.60 FTE supported collection and processing of materials in 2001, a function that was unstaffed at the County level during the previous five-year period.

Over the course of the decade, only staffing for the two SCORE areas of waste education and household hazardous waste/problem materials have increased over time. Although waste education exhibited a high staffing level of 3.45 FTEs in 1999, as compared with staffing at 2.17 FTEs in 2001, staffing in this SCORE program area grew by 24% between 1991 and 2001. Similarly, staffing for household hazardous waste and problem materials has increased substantially over the decade, from 0.50 to 0.80 FTE between 1991 and 2001, respectively.

Table H. Dakota County SCORE-Related Staffing by FTE, 1991 to 2001

County Program FTEs		*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*
Source Reduction		0.50	0.50	0.50	0.40	0.20	0.25	0.25	0.25	0.40	0.50	0.40
Recycling	*Collection and Processing*	0.25	0.25	0	0	1.35	0	0	0	0	0	0.60
	Administration/ Support Staff	2.50	2.50	1.80	2.35	0.50	1.35	1.00	1.00	0.50	0.40	0.60
	Total Recycling	2.75	2.75	1.80	2.35	1.85	1.35	1.00	1.00	0.50	0.40	1.20
Yard Waste		0.75	0.75	0.20	0	0	0	0.50	0.50	0	0	0
Waste Education		1.75	1.75	1.50	1.50	1.95	1.95	2.00	2.00	3.45	2.60	2.17
HHW and Problem Materials		0.50	0.50	0.50	0.50	0.40	0.42	0.52	0.52	0.50	0.50	0.80
Other SCORE Program Planning, Administration		0	3.50	2.00	1.75	0.60	0.50	0.85	1.15	1.30	1.25	0.60
County SCORE FTE		6.25	9.75	6.50	6.50	5.00	4.47	5.12	5.42	6.15	5.25	5.17
County SCORE FTEs per 100,000 Capita		2.21	3.36	2.18	2.11	1.58	1.38	1.54	1.60	1.77	1.48	1.42
City/Township FTE		0	8.00	4.00	4.00	4.00	4.00	2.90	2.90	3.54	3.25	3.95
Total Local Program FTE		6.25	17.75	10.50	10.50	9.00	8.47	8.02	8.32	9.69	8.50	9.12

Source: Minnesota Office of Environmental Assistance: Dakota County *SCORE Reports*, 1991 to 2001; US Census Bureau: population and population estimates, 1991 to 2000

Table H, above, and Chart 7, following, present Dakota County solid waste staffing levels for all SCORE-related activity areas, for reporting years 1991 through 2001. (As with SCORE budget information highlighted above, all County activity areas are presented in order to compare relative program emphasis by County staffing allocation over time.)

Chart 7. Dakota County FTE Comparison, 1991 to 2001

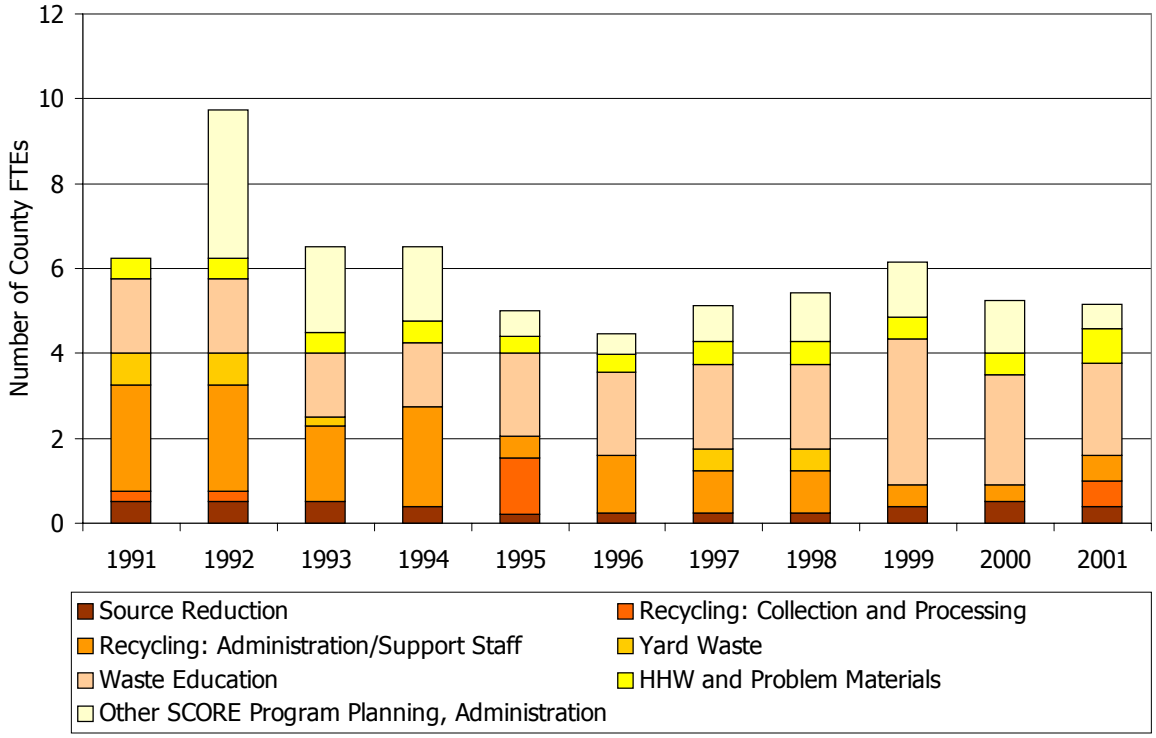
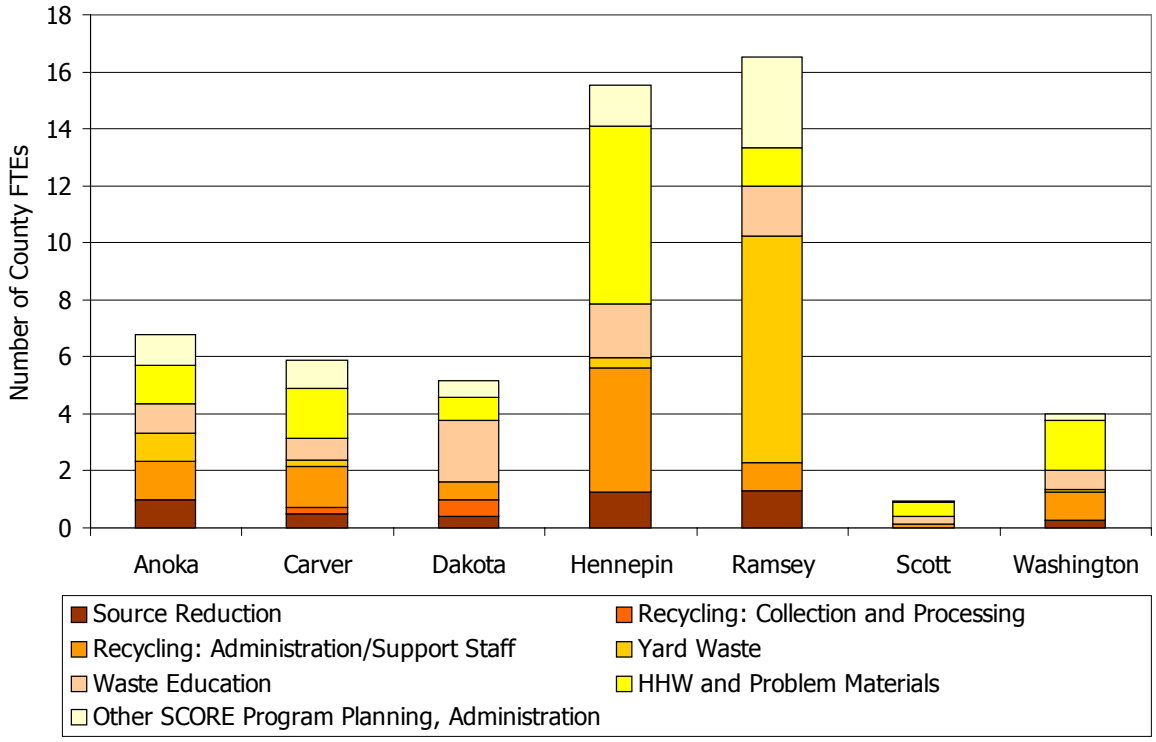


Chart 8. Metropolitan County FTE Comparison, 2001



Source: Minnesota Office of Environmental Assistance: Dakota County *SCORE Reports*, 1991 to 2001; metropolitan area county *SCORE Reports*, 2001; US Census Bureau: population estimates, 2001

As Chart 8 demonstrates above, Dakota County commits fewer County staff resources to support SCORE programs overall than the remaining five SWMCB regional counties. SCORE data indicates that Washington County (4.00 FTE) employed fewer total FTE than Dakota County (5.17 FTE) in 2001. When population is held constant, Dakota County's reported staffing (1.42 FTE per 100,000 capita) outpaces Hennepin County's corresponding level of staffing (1.39 FTE per 100,000 capita).

Hennepin County, however, relies on a substantially higher number of city and township staff (41.00 FTE) to support SCORE program activities than other regional counties. In sum, total staffing of SCORE activities by both SWMCB county and city/township FTEs ranged from a regional low staffing level of 4.00 FTE for Washington County jurisdictions to a high staffing level of 56.55 FTE in Hennepin County jurisdictions. Staffing for SCORE programs in Dakota County totaled 9.12 FTEs in 2001, roughly allocated as 57% County staff and 43% city-township staff. Table I, following, presents 2001 FTE staffing levels for the seven metropolitan area counties by all SCORE-related program areas.

Table I. Metropolitan County FTE Comparison, 2001

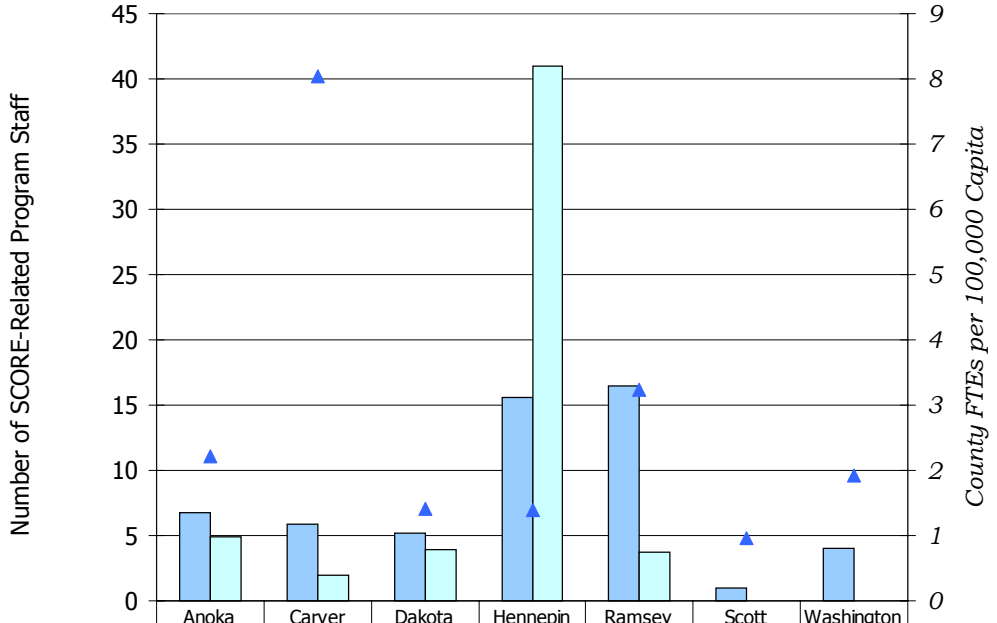
County Program FTEs		*Anoka*	*Carver*	*Dakota*	*Hennepin*	*Ramsey*	*Scott*	*Washington*
Source Reduction		0.97	0.50	0.40	1.25	1.30	0.02	0.25
Recycling	*Collection and Processing*	0	0.20	0.60	0	0	0	0
	Administration/ Support Staff	1.38	1.45	0.60	4.35	0.98	0.10	1.00
	Total Recycling	1.38	1.65	1.20	4.35	0.98	0.10	1.00
Yard Waste		0.98	0.25	0	0.35	7.95	0	0.10
Waste Education		1.01	0.75	2.17	1.90	1.75	0.30	0.65
HHW, Problem Materials		1.37	1.75	0.80	6.25	1.35	0.50	1.75
Other SCORE Program Planning, Administration		1.08	1.00	0.60	1.45	3.18	0.02	0.25
County SCORE FTE		6.79	5.90	5.17	15.55	16.51	0.94	4.00
County SCORE FTEs per 100,000 Capita		2.22	8.04	1.42	1.39	3.24	0.96	1.93
City/Township FTE		4.90	2.00	3.95	41.00	3.77	0	0
Total Local Program FTE		11.69	7.90	9.12	56.55	20.27	0.94	4.00

Source: Minnesota Office of Environmental Assistance: metropolitan area county *SCORE Reports*, 2001; US Census Bureau: population estimates, 2001

In addition to comparisons across total staffing levels for SCORE program activities, Table I further provides insight into the degree to which the metropolitan area counties share similarities in staffing among related program areas. With regards to recycling collection-processing and administration-support in the SWMCB region, Hennepin maintained the largest number of total FTEs in 2001 at 4.35 FTEs. In contrast, Ramsey County featured the lowest number of FTEs in support of recycling activities (0.98 FTE

was reported in 2001). Dakota County reported the largest number of FTEs in 2001 in support of waste education at 2.17 FTEs, in keeping with the County's programmatic emphasis on building public awareness and conducting environmental education campaigns. Aside from the category of waste education in 2001, Dakota County fell below nearly every other regional county in supporting SCORE-related programs with County staffing (1.20 FTE were dedicated to recycling activities in 2001). Chart 9 compares local staffing levels for the metropolitan area counties for the year 2001 by SCORE program area.

Chart 9. Total SCORE-Related Metropolitan Area FTEs, 1991 to 2001



	Anoka	Carver	Dakota	Hennepin	Ramsey	Scott	Washington
County FTEs	6.79	5.90	5.17	15.55	16.51	0.94	4.00
City/Township FTEs	4.90	2.00	3.95	41.00	3.77	0	0
County FTEs per 100,000 Capita	2.22	8.04	1.42	1.39	3.24	0.96	1.93

Source: Minnesota Office of Environmental Assistance: metropolitan area county *SCORE Reports*, 2001; US Census Bureau: population estimates, 2001

SUMMARY

Data reported annually to the Minnesota Office of Environmental Assistance demonstrates that Dakota County has largely met the mandated goal of recycling 50% by weight of mixed municipal solid waste over the past decade, in keeping with recycling rates for the larger SWMCB region and despite diminishing resources for recycling. Annual SCORE reports signify that per capita expenditures in Dakota County in support of recycling and other SCORE-related programming have dropped substantially over time. In 2001, the County received one of the lowest amounts of SCORE revenue ($905,039), expended the smallest amount per capita (at $3.84 per resident) to support recycling and related activities, and dedicated a relatively small number of staff to recycling (1.20 FTE), when compared with the metropolitan region.

ISSUES IN RECYCLING: INTERNAL PROCESSES

DATA ISSUES

One issue that continues to plague more effective management of recycling in Dakota County, including achievement of targeted outcomes, is inherent difficulties in collecting and analyzing recycling data. Generally, it is assumed that 55% of the total municipal solid waste stream is composed of commercial waste, and that 75% of commercial waste is recycled; the remaining 45% of the total waste stream is composed of residential waste, 25% of which is recycled. The difficulty in gathering recycling data has been documented in numerous reports and studies, most recently by the Minnesota Office of the Legislative Auditor (*Recycling and Waste Reduction*, January 2002). Similarly, the Tellus Institute Solid Waste Group emphasizes the importance of data development as one of two critical recommendations for improving recycling within the Solid Waste Management Coordinating Board region (*Recycling Trends Research Study*, August 2001). As best practice research indicates, recycling rates and other program accomplishments are often not strictly comparable across jurisdictions due to variations in data collection and definition. Ideally, three data elements are important to collect for the purposes of evaluating recycling program effectiveness and formulating future policy directions. These data elements include:

- Volume and weight[39] of recyclable materials collected and the amount of material marketed and recycled -- this measure represents the *actual* level of recycling activity,
- Composition of managed waste -- this represents *potential* waste abatement capacity, and the
- Level and frequency of participation by residents, businesses, and other organizations in local recycling programs -- this measure describes program audience.

VOLUME/WEIGHT OF MATERIALS RECYCLED

Tracking the volume and weight of collected recyclables depends upon waste hauler estimates of materials collected. Private haulers are currently required to submit tonnages for recyclable materials collected on a quarterly basis to Dakota County, as stipulated by County ordinance. Currently, 33 private haulers are licensed to provide mixed municipal solid waste and recyclable collection services in Dakota County in 2002, though a small percentage do not provide either residential or commercial collection services to County residents[40]. Licensed waste haulers operating in Dakota County are obligated to report the number of residential and/or commercial accounts, and the weight of recyclable materials collected for each community serviced by material category, verified by scale or market receipts. Beginning in 1997, haulers have been obligated to submit quarterly statements presenting tonnages of recyclable materials collected as a condition of annual licensing. Recyclable materials currently identified by County ordinance include: newsprint, corrugated cardboard, mixed paper, magazines, metal cans, glass and plastic containers, boxboard, yard waste, major appliances, scrap metal, and telephone books.

County ordinance further stipulates that waste hauling firms may estimate the weight of each category of recyclable material collected, based upon the percentage each material comprises in previously documented collections. Additionally, the tonnage of materials collected for each local community may similarly be estimated, based upon the proportion of accounts in each respective community.[41] While

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[39] Due to "light weighting" and other efficiency gains in manufacturing -- which decrease the weight or size of materials used (e.g., aluminum cans, glass and plastic containers) -- both volume and weight are important indicators that may be used to verify demonstrated trends in recycling. Product light weighting and other technological advances have resulted in an overall decrease in recycling figures nationwide.

[40] Dakota County Ordinance No. 110, Section 15.01 License Required mandates waste haulers to obtain a Dakota County license for all collection and disposal of solid waste in the County.

[41] Dakota County Ordinance No. 110, Section 15.05 Recyclable Materials Reporting

estimates of recycling tonnages by community and material category are consistently collected, these estimates depend upon an individual hauler's ability to assign relative weights to the appropriate sector account, jurisdiction served, and material collected. This accounting can be particularly problematic when haulers service several jurisdictions and types of accounts simultaneously in a single day's collection run. (The difficulties associated with collecting consistent commercial recycling data are discussed specifically in the Commercial Recycling section, beginning on page 102.)

Additionally, ***no efficient mechanisms exist to verify the integrity of collected recycling tonnages reported by private waste collection firms in Dakota County.*** Weight slips from landfills and resource recovery facilities indicating actual weights of disposal trucks containing waste or recyclable materials were previously required to accompany every submission of reported tonnages to the County, as one form of independent verification of actual volumes transported to appropriate facilities. Currently, however, weight slips must be on file and available at hauler offices for verification at the County's request.

Gross tonnage amounts from material recovery facilities and associated end markets serve as a second opportunity for corroboration of recycling weights reported by haulers. Independent reports submitted by materials recovery facilities and/or end markets to the state or County documenting volumes and tonnages for all materials received by hauler would serve to confirm hauler reported estimates, and verify overall trends in recycling collection. Given the proprietary nature of these volumes and their commodity value, however, the information is not readily available from either disposal facilities or the end markets that receive recyclable materials. Resource recovery, and other processing and marketing facilities are not required to report independent amounts of materials received or managed to the state.

WASTE COMPOSITION

Waste composition studies offer the best opportunity for measuring the degree to which recycling, and related landfill abatement strategies, have achieved their intended purpose. These studies, however, are costly to implement and are therefore, underutilized. Although resource intensive, waste composition studies conducted at landfills and resource recovery facilities are important tools for characterizing current residential, commercial, and institutional waste streams. Waste composition studies provide complementary information to reported tonnages, and are useful for establishing baselines for measuring the impacts of future program activities and identifying trends in waste disposal over time. The City of Portland, Oregon reports that the city sets program goals based upon waste composition studies, or audits, in which materials and customers with low recycling rates are identified. A review of the 20 largest material categories by weight in a 1999 statewide waste composition study notes that at least eight of these material categories were readily recyclable, including wood pallets, boxboard, and office and mixed paper.[42]

Waste composition studies completed in the metropolitan area in 1992 and 1999 led the Solid Waste Management Coordinating Board to target latex paint and transport materials for additional abatement efforts. The SWMCB and the Office of Environmental Assistance are currently considering enacting statutory changes to the Policy Plan that would require regional waste composition studies to be conducted with each revision of the Policy Plan. Completed on a regular schedule across service collection sectors, waste composition studies contribute necessary information to subsequent analysis of the success of local programs in encouraging landfill abatement practices. The SWMCB has proposed conducting waste composition studies within the region every six years, in keeping with the Regional/County Solid Waste Master Plan planning cycle.

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[42] Minnesota Office of Environmental Assistance, Minnesota Pollution Control Agency, and Solid Waste Management Coordinating Board: *Statewide MSW Composition Study: A Study of Discards in the State of Minnesota*, March 2000.

Best practice research suggest that waste composition studies serve as important audits in determining the types and amounts of materials disposed of as solid waste that are potentially recyclable. The City of Seattle noted that the overall effectiveness of the city's programs, variable rate structure, and education and outreach efforts "can be measured by how much is diverted from the landfill, and how much recyclable material remains in the garbage. Measuring these two indicators is a large undertaking so they are only updated every few years."[43] The City of Portland, Oregon conducts waste composition studies in order to identify what types of materials are recycled least by customer sector, geography, and container size. Similarly, business waste and energy audits help to identify areas for process improvement: San Jose, California assists businesses to increase recycling efficiency and reduce associated disposal costs by providing free waste assessments. In the Twin Cities metropolitan area, the Minnesota Office of Environmental Assistance, the Minnesota Technical Assistance Program, Minnesota Waste Wise, and a number of local counties offer waste assessments to interested businesses and other institutions. (Business technical assistance programs are discussed in greater depth under Commercial Recycling, beginning on page 104.)

PARTICIPATION IN RECYCLING PROGRAMS

Participation rates are difficult to assess, since participation depends largely upon the timeframe and geography in which data is gathered. Measures of participation by residents or businesses are frequently used to indicate the degree to which recycling programs are established in local communities. Household and/or organizational participation in recycling programs is hard to measure and compare, however, since participation can vary from collection to collection event depending upon individual motivation and timing. Further, the growing trend towards more mobile patterns of consumption suggests that an increasing tonnage of waste is generated and disposed of outside the home. While recycling has become well established within the residential sector, the purchase, use, and disposal of beverages, food, and other consumer products outside both home and work environments continues to rise. This increasing mobility of the population poses complications for documenting participation rates if individuals who prefer to recycle do not have the opportunity to recycle when outside the home.

In sum, while the goal of recycling programs is to increase the tonnage of materials averted from disposal in area landfills -- not data collection -- the ability to collect, maintain, and evaluate relatively accurate recycling data over time contributes significantly to measuring program success. ***Several aspects of the waste management system contribute to inherent difficulties collecting and tracking comprehensive recycling data over time.*** The characteristics of this system include the use of estimates from private waste hauling firms without independent verification by resource recovery facilities and end markets, infrequent use of regional waste composition studies to identify trends in disposal due to cost considerations, and problems evaluating patterns of recycling participation due to time and space constraints in measurement. Within the Twin Cities region, countywide residential curbside recycling tonnages alone are used to identify overall trends in recycling activity. Given the characteristics of the waste management system, deeper analysis of recycling weights by sector, city, and material category may suggest conclusions unsubstantiated by more rigorous data.

Several underlying waste issues complicate use and comparison of recycling data, including inconsistent definitions of waste streams despite attempts to standardize definitions. The same materials may be designated, processed, and reported as either municipal solid waste or non-municipal solid waste depending in part upon the source of generation and convenience for disposal (e.g., waste materials from construction and demolition sites may be identified in either category). Additionally, waste originating in Dakota County and delivered to facilities outside the County for processing or disposal may result in underreported waste generation figures, since facilities and landfills located in neighboring states are not required to report tonnages received to either the state or County. The US Environmental Protection

[43] City of Seattle: *2000 Solid Waste Report*, 2000

Agency serves as one resource for standardizing recycling data.[44] Their report, *Measuring Recycling: A Guide for State and Local Governments*, provides detailed measurement guidelines and worksheets for improving tracking activities.

STRATEGIC GOAL SETTING AND OUTCOME MEASUREMENT

Collection and maintenance of recycling data informs establishment of strategic goals and ongoing measurement of recycling program achievement. The Solid Waste Master Plan notes that regional counties will "Gather information about the level and type of service, price of service, quality of service and service performance by 2000 for use in analysis of local recycling efforts."[45] Practiced by local communities in the metropolitan area and nationwide, ongoing measurement efforts serve to assess the relative effectiveness of program strategies to achieve stated outcomes.

One noted characteristic of best practice jurisdictions is that these communities set recycling goals and evaluate programs based upon 'market segments'. Jurisdictions consider both the sector served (e.g., single family or multifamily residential, commercial, industrial, and/or institutional sectors) and the material category collected, and develop specific implementation and measurement strategies to support outcomes in these areas. Complemented by waste composition studies, resulting statistics are used to evaluate program performance, goal setting, and forecasting for designated strategies as well as to measure the overall outcome of program initiatives to increase recycling. Recycling program funding that is tied directly to specified outcomes -- such as the tonnage of materials collected and recycled, or maintaining a recycling rate -- may serve as one means for aligning measurement with goal setting activities more effectively.

Both the Cities of Seattle, Washington and Portland, Oregon uses recycling data to set overall recycling goals and specific goals by sector. Seattle has identified the following goals for achievement by 2008, including 60% recycling of all waste, 70% recycling by single family residents, 37% recycling by multifamily residents, 63% recycling by businesses, and 39% recycling by individuals who self-haul their waste. Seattle utilizes data in a forecasting model for decision-making that is specific to the city's demographic, geographic, and market characteristics. The forecasting model provides cost-benefit analyses of options for program change. The City of Portland plans to recycle 60% of total municipal solid waste generated by 2005. Portland has forecasted waste and recycling tonnages for both residential and commercial sectors, maintaining recycling goals of 52% and 63% for residential and commercial sectors, respectively.

Best practice jurisdictions investigate new initiatives as pilot projects, using results of these efforts to inform ongoing improvement of the recycling program. In attempting to recycle residential food wastes, Seattle implemented a series of pilot projects to explore motivation and participation. The city additionally implemented a pilot program targeting multifamily housing using convenient, in-unit containers for easy separation and carrying of recyclables, but found this program had little or no affect on recycling among multifamily tenants. Similarly, San Jose, California and Seattle, Washington explored the use of grants and rebates of $5,000 as commercial incentives, but found that these pilot incentives did not achieve the outcomes expected.

As a member of the Solid Waste Management Coordinating Board, Dakota County participates in strategic goal setting and planning activities. Dakota County, as a unique jurisdiction, additionally facilitates reconsideration of Department and program goals and outcomes through the County's outcome measurement program[46] and the annual budget process. However, it is often difficult to prioritize between competing waste abatement strategies and evaluate subsequent program successes, in part,

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[44] http://www.epa.gov/epaoswer/non-hw/recycle/recmeas/

[45] *Regional/County Solid Waste Master Plan*, Section VII. Dakota County Recycling Strategies. Page 1 of 3

[46] Described in the Program Description section, page 42.

because regional and County work planning documents do not specifically identify the investment of time and staff resources necessary to achieve environmental outcomes. Regular evaluation of the County's own recycling efforts -- according to program initiative, service sector, and material category -- would be useful for determining relative priorities for Dakota County and suggest new program directions for the larger SWMCB region. With reconsideration of the Regional/County Solid Waste Master Plan in 2003 by the SWMCB member counties, a greater emphasis on region-wide priorities and program activities highlights the importance of partnerships in achieving stated recycling and waste reduction outcomes.

PROGRAM PARTNERSHIPS

Many of the internal administration issues surrounding recycling are not exclusive to Dakota County and apply to jurisdictions across the greater metropolitan area. As a result, collaboration may hold the key to broader, long-term improvements to local programming. Current changes proposed for revision of Solid Waste Master Plans and Policy Plans in Minnesota speak to the strength of regional collaboration, as planning documents reflect greater levels of cooperation between neighboring counties. A recent report by the state's Office of the Legislative Auditor notes that counties can improve the efficiency and effectiveness of administering recycling programs by forming partnerships. The study further cites the experience of the metropolitan area Solid Waste Management Coordinating Board as one example.[47] Streamlining data collection and reporting across the region represent two ways in which recycling programs may benefit directly from metropolitan area collaboration.

Additionally, as solid waste management has gradually evolved in the metropolitan area into a largely private enterprise, more opportunities may exist to sit cooperatively with the private waste management industry to chart new directions and analyze future initiatives. Similarly, greater input and feedback from local recycling program coordinators, residents, and businesses may be beneficial in documenting how Dakota County can redouble its efforts and distribute responsibility for waste management fairly and equitably across all major players.

PROGRAM COMPARISONS

From recycling's programmatic start as a landfill abatement strategy during the late 1980s, it is clear that the majority of easy improvements to recycling programs, particularly residential curbside recycling, have already been implemented. While local communities can attain higher recycling rates by utilizing a variety of "best practice" methods, improvement beyond a 50% recycling rate by weight appears considerably more difficult. Preliminary best practice research[48] suggests that the majority of relatively simple improvements to recycling programs have been implemented by communities nationwide in reaching recycling rates near 40% to 50% of municipal solid waste generated. Subsequently, additional improvements will be more difficult and costly to implement. A 1999 US Environmental Protection Agency study identified twelve communities who maintain residential municipal solid waste reduction rates (i.e., recycling plus composting) ranging between 50% and 65% in 1996. Six additional communities featured waste reduction rates of 43% to 56%: including Ramsey County, Minnesota; San Jose County, California; and Seattle, Washington.[49] Best practice research suggests that the highest

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[47] Minnesota Office of the Legislative Auditor: *Recycling and Waste Reduction*, January 2002, Joint Efforts. Pages 33, 34

[48] In order to compare current practices in recycling, several "best practice" jurisdictions were contacted during spring 2002, including: Anoka, Hennepin, Ramsey, and Washington Counties, Minnesota; City of Saint Paul, Minnesota; City of Portland, Oregon; City of San Jose and Santa Clara County, California; and the City of Seattle and King County, Washington. (Selected information was also obtained from Alameda County, California, and the University of Minnesota, Twin Cities Campus.)

[49] US Environmental Protection Agency: *Cutting the Waste Stream in Half: Community Record-Setters Show How*, EPA-530-R-99-013, June 1999

recycling rates in the nation exist between 50% and 60%: a 60% recycling rate appears to be the highest goal communities set overall for recycling programs.

The City of Seattle, Washington maintains a current goal of achieving an overall recycling rate of 60% of municipal solid waste by 2008, and a residential sector recycling rate of 70%. The city acknowledges, however, that early gains in recycling will be tempered by slower advances in the recycling rate in the future.[50] Similarly, Alameda County, California notes that "Presently, conditions are too speculative to propose specific, realistic programs to achieve diversion beyond 75%. One key element is economics. Generally, on a per ton basis, the last 25% of materials disposed will be far more expensive to reduce or recycle than the first 75%. 'Easy to do' programs will already be in place and the county will be left with the materials that are most difficult to address."[51]

In comparison, Dakota County maintained recycling rates between 48% and 50% (counting available yard waste and source reduction credits) between 1998 and 2001, placing the County within the range of other identified best practice jurisdictions. Further, the County utilizes many of the best practice identified by other high performing communities for the benefit of residential recycling. Although it is not possible to conclude with certainty that Dakota County ranks among the country's best performers, several conclusions seem warranted:

- Dakota County maintains good residential recycling practices,
- The County has implemented easy and obvious practices to improve recycling rates Countywide,
- Improvements over the County's current performance is possible, although future gains in the recycling rate will likely be more difficult and expensive to implement.

SUMMARY

In sum, successful recycling depends in part upon several internal components that highlight the need for effective administration of local programs. These components include the availability of data that is reasonable and consistently collected, maintained, and evaluated. Additionally, based upon demonstrated trends apparent in the data, strategic planning and program goal setting is necessary for redirecting efforts and allocating resources appropriately. Finally, fostering relevant program partnerships and best practice comparisons serves to broaden the potential program success as well as provide a larger context for discussion of recycling goals and outcomes.

Together, these internal process components point to the need for focused studies in Dakota County and the Solid Waste Management Coordinating Board region that identify and fill gaps in existing knowledge.

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[50] Seattle Public Utility: *City of Seattle: Solid Waste at a Glance*, 1999

[51] *Alameda County Source Reduction and Recycling Plan*, 2000. Page 33

ISSUES IN RECYCLING: SOLID WASTE CONTEXT

Three fundamental issues help to explain current recycling outcomes and affect Dakota County's ability to maintain or increase current recycling rates. These primary issues include economic conditions, ethical or moral considerations concerning natural resources conservation, and political and governmental decision making. There are economic disincentives for both private waste collection companies and local residents themselves. The role of environmental ethics and governmental decision making similarly shape current recycling outcomes, and further suggest new directions for Dakota County to consider for the future.

ECONOMICS OF RECYCLING

LACK OF ECONOMIC INCENTIVES FOR WASTE HAULING INDUSTRY

Given current market forces, there exists no economic incentive for the private waste hauling industry to improve recycling in the communities in which they serve. Mandatory requirements established in local ordinances and state laws serve as the primary motivation for the private sector to ensure that recycling occurs; a secondary incentive is avoided disposal costs; and a third incentive for the waste hauling industry is customer demand for recycling services, and the associated opportunity to capture additional market share by meeting customer expectations. This is particularly true of recyclables collection from the commercial sector, where current economic conditions weigh more substantially on both business and private waste hauling decisions than on household preferences. The costs inherent in collecting recyclable materials suggest that market forces do not work to uphold broader environmental goals. Rather, current market conditions nationwide suggest that recycling currently requires a substantial investment of resources before local programs can reach the next level of program achievement. These economic disincentives characterize recycling due to several larger solid waste management conditions:

The real economic burden on private haulers to collect and manage waste and recyclable materials efficiently and appropriately is considerable, often exceeding the value of the resource. Particularly given the competitive waste hauling market in the Twin Cities metropolitan area, profit margins among firms competing for residential and commercial waste hauling accounts can be quite slim. Recent annual reports from two national waste collection firms operating in Dakota County reinforce the consensus among local hauling firms that economic disincentives underlie recycling.

The true costs of waste or recyclables collection is influenced more strongly by fixed costs than by the actual volume of materials managed. As a result, profits are defined by the following fixed costs: purchase and operation of trucks, staff time, associated liability and insurance costs. Estimates of haulers' fixed costs in Dakota County range between $60 and $85 per hour to run disposal trucks on established routes.[52] Additional factors that influence the overall profitability of recycling include efficiencies in collection and subsequent management of collected materials (e.g., compactness of routes, use of separation technologies to substitute for manual sorting), and the relative value of materials collected based upon current commodity prices and availability of end markets, as discussed below. As a result, the substantial fixed costs of collecting recyclables often equals or exceeds the inherent value of recovered materials. Although an accurate assessment of profit margins for waste collection firms nationwide is not available, anecdotal evidence from local waste haulers suggests that collection of recyclable materials does not guarantee a large proportion of company revenues.

Of the major business lines reported for both Waste Management and Allied Waste Industries, Inc. (operating as BFI in the Twin Cities metropolitan area) in 2001 in Table J, waste collection makes up the

[52] Conversation with a member of the Dakota County Solid Waste Management Advisory Committee, and a representative of a private waste hauling firm, spring 2002.

majority of the company's operating revenue, while recycling contributes only between 5% and 7% of the total revenue for each of the three years reported.

Table J. Waste Management and Allied Waste Industries, Inc. (BFI) Revenues by Business

	1999	*% of Revenue*	*2000*	*% of Revenue*	*2001*	*% of Revenue*
Waste Management: North American Solid Waste						
Collection	$7,553,000	57.54%	$7,675,000	61.44%	$7,584,000	66.98%
Disposal	$3,267,000	24.89%	$3,366,000	26.95%	$3,393,000	29.97%
Transfer	$1,195,000	9.10%	$1,394,000	11.16%	$1,435,000	12.67%
Recycling and other	$664,000	5.06%	$805,000	6.44%	$592,000	5.23%
Intercompany	-$1,994,000	-15.19%	-$2,022,000	-16.19%	-$1,994,000	-17.61%
Other	$2,442,000	18.60%	$1,274,000	10.20%	$312,000	2.76%
Revenues	$13,127,000	100%	$12,492,000	100%	$11,322,000	100%
Allied Waste Industries, Inc.						
Collection	$2,422,628	72.51%	$4,227,680	74.07%	$4,203,897	75.54%
Disposal and Transfer	$1,261,106	37.75%	$1,993,276	34.92%	$2,104,467	37.81%
Recycling	$203,632	6.09%	$384,027	6.73%	$231,995	4.17%
Other	$125,215	3.75%	$242,196	4.24%	$196,496	3.53%
Intercompany	-$671,510	-20.10%	-$1,139,694	-19.97%	-$1,171,595	-21.05%
Revenues	$3,341,071	100%	$5,707,485	100%	$5,565,260	100%

Source: Waste Management: *2001 Annual Report* -- Notes to Consolidated Financial Statements, page 70; Allied Waste Industries, Inc.: *2001 Annual Report* -- Notes to Consolidated Financial Statements, page 82

Intense competition among private waste haulers encourages pricing that does not reflect the true costs of collection. Pricing for waste collection services in the metropolitan area must meet variable weight or volume-based pricing, or "pay-as-you-throw" principles. Within the highly competitive solid waste management industry, however, no market incentives exist to create larger price differentials among private waste haulers for collection services. Recycling is often considered a "lost leader" service for the waste management industry, since recycling does not easily generate revenue (particularly given the volatility of market conditions).

Private haulers assert that the majority of costs incurred during waste collection exist in transportation to and from the residential or commercial location, and are not accurately reflected in the price of service. Pay-as-you-throw pricing largely supports environmental objectives that connect the amount of waste managed with costs that the generator must shoulder, although the costs to dispose of 90 versus 30 gallons of waste are marginal when compared with fixed collection costs. As a result, business incentives exist to maintain the *lowest* possible price difference between one container size to the next in order to remain competitive, while still abiding by mandated pay-as-you-throw pricing structures. Improving efficiencies in collection, strong end markets, and charges paid by residents for recycling service all help to defray the underlying costs of collection of recyclable materials. In an open collection system, many independently-owned hauling firms have difficulty charging adequately to recycling services -- including materials collection, processing, and marketing. As discussed below, while there is often a strong

expectation that end markets pay revenues in excess of collection costs for recyclable materials, the reality is that many material categories do not command cost-effective prices for collection.

In Minnesota, households, businesses, and organizations subsidize the cost of recycling through management of mixed municipal solid waste generated. Charges to generators include the costs of waste collection, transportation, and disposal -- as reflected in disposal charges imposed by the hauler, plus a statewide waste management tax imposed on a per tonnage basis -- the proceeds of which help to support recycling programs through SCORE funding to counties.[53] At present, local landfills represent one of the most inexpensive options for private hauling firms to dispose of waste collected: tip fees range between approximately $38 and $42 per ton of waste. Private haulers who dump all of their waste at the Resource Recovery Facility in Newport pay a new, lower rate of $32 per ton, over the previous rate of $38 per ton, while haulers who deliver only part of their waste to the facility are charged $34 per ton. (The true cost of $67 to process each ton of waste is offset by subsidies from the state and Ramsey and Washington Counties.) Given the relatively low cost of materials disposal, collection represents the major cost burden for private haulers and their customers over disposal. Further, because collection and disposal of municipal solid waste generates revenue for the waste hauling industry, unlike collection of recyclable materials, waste collection fees imposed on customers likely subsidize a portion of recyclables collection for the hauler. Residents and businesses are charged an additional solid waste management fee for disposal of municipal solid waste in Anoka, Hennepin, Ramsey, and Washington Counties. These fees are dedicated, in part, to financing resource recovery facilities[54] established in the early 1990s, and are often included on residential and commercial property tax statements.[55]

Two trends in the solid waste management industry reinforce the fact that collection of recyclable materials represents a net loss to private waste hauling firms. "Vertical integration" within the solid waste industry brings different components of a solid waste operation together into a single corporate entity (e.g., hauling companies and landfill operations). Private waste haulers purchase related waste processing facilities to become a more attractive in the marketplace by offering additional waste management services and defraying collection costs. Similarly, "consolidation" of waste haulers from many smaller firms into fewer large firms has become increasingly apparent over the past decade. Currently in Dakota County, three major waste haulers claim the majority of residential and commercial collection in the County, while 20 smaller firms compete for remaining accounts. (Further, this trend is in keeping with waste collection industry conditions across the larger metropolitan area.) Due to fierce competition evident within the hauling industry, both consolidation and vertical integration are business strategies that afford lower cost leads to dominant haulers. Consolidation and vertical integration results in greater efficiencies in operation and consequently, larger market share for successful firms. One hypothetical situation suggests that over the long-term, fewer private firms participating in waste management may eventually lead to rising costs of waste disposal, which in turn may promote a greater willingness and commitment to reduction, reuse, recycling, and composting of waste.

Payment for collection services in public collection systems is often done on a per household basis, rather than on the basis of total tonnage recycled. The majority of cities in the region that contract waste management services in a public collection system pay waste hauling firms that provide recycling by the

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[53] Described under Program Description, Recycling Program Revenues, page 34.

[54] According to Minnesota Statute §115A.03, Subdivisions 27 and 28, resource recovery facilities are waste facilities established and used primarily for the reclamation for sale, use, or reuse of materials, substances, energy, or other products contained within or derived from waste. Typically, resource recovery refers to the recovery of energy and usable materials during the processing of mixed municipal solid waste.

[55] Since 1987, waste produced in Ramsey and Washington Counties has been delivered to the Resource Recovery Facility in Newport where the waste is mechanically processed into a fuel utilized by NRG Energy, Inc. to produce electricity. The majority of municipal solid waste generated in Anoka County is processed into refuse derived fuel at the Elk River Resource Recovery Facility located in Elk River. Located in Minneapolis, the Hennepin Energy Resource Company uses mass burn technology to convert waste materials generated in Hennepin County into electricity that is sold to Xcel Energy Inc.

number of households located within the jurisdiction, regardless of whether or not individual households participate in curbside programs. On average, individual households in these communities are charged approximately $24 per year for the opportunity to recycle, regardless of their participation. These cities provide education and other waste reduction programs at an additional cost. In contrast, households in the City of St. Paul currently pay $22 per year for recycling through a service charge on property taxes; apartment building owners with four or more units pay $14 per year per unit. These fees include funding for education and related programming. Unlike other public collection municipalities, St. Paul pays its contracted recycling provider for each ton of material recycled rather than by the number of households potentially serviced. As a result, the city pays only for the volume of materials actually recycled, which provides a strong incentive for recycling that is independent of set out, collection, or participation rates.[56]

As a commodity, end markets for recyclable materials are subject to extreme fluctuation in pricing, yielding both high and low revenues -- particularly for certain material categories such as plastics and paper. This volatility has been particularly evident during the 1990s, when materials attained record high prices during 1995, and crashed to record lows by the following year. For example, newsprint prices peaked at approximately $200 per ton in June 1995, falling to zero and -$20 per ton later in the year. Due to the fact that paper fibers comprise between 70% and 80% of all materials recycled by volume, the market for paper fibers has a significant financial impact on local recycling programs.[57]

While use of recycled materials as inputs to production continues to improve, the costs of utilizing new, or virgin, natural resources is often more competitive than processing recyclable materials into new consumer products. This dichotomy is true in part because technology has not advanced to the extent that use of recyclables is necessarily more cost effective than use of virgin inputs. Recycled paper fibers and plastics, for example, are often relegated to lower product uses because the structural integrity of the material has been compromised by contamination. The 'true costs' of production, including all environmental and social costs inherent in consumption of virgin resources, are rarely reflected in the price of finished goods. This lack of awareness regarding the true costs of production, coupled with federal policies that subsidize use of virgin resources, highlights the ongoing cost advantages of utilizing virgin inputs over the relative inefficiencies of recycled feedstocks in many production processes.

The volatile nature of recycling end markets has created difficulties for haulers and material recovery facility operators, who rely on the revenue generated from high commodity prices to remain competitive. Recycling end markets play a very substantial role in the relative economic viability of recycling programs both locally and nationally. Local haulers acknowledge that while paper and metals generally have positive economic value for recycling, plastics require a considerable investment per ton to manage, and represent one of the least favorable materials for inclusion in local recycling programs. Ongoing subsidies may become a necessary condition for recycling specific categories of materials that require additional investment. Although Dakota County has committed to adding a material to the list required for Countywide collection when collection is shown to be technically and economically feasible (Regional/County Solid Waste Master Plan), economic practicality may necessitate the use of additional resources particularly to aid in development of suitable end markets.

Finally, the promotion of end markets is recognized as an important focus for state and national agencies, since development of end markets depends upon influencing broad policy directions, such as the

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[56] Eureka Recycling: *A Comparative Analysis of Applied Recycling Collection Methods in Saint Paul*, May 2002.

[57] January 2002 market prices for glass containers ranged between $12 and $32 per ton received; tin was priced at $10 per ton; and aluminum was priced at $956 per ton. Plastics ranged from $90 to $200 per ton, while various categories of paper were priced between $25 and $85 per ton. According to a comparative study conducted by Eureka Recycling, glass comprises approximately 14% of the recyclable materials collected curbside by volume, while aluminum and tin together make up 5% of the total volume. Plastics comprise 4% of the volume collected, while paper fibers total the remaining 77% of the volume of recyclable materials collected. (Eureka Recycling: *A Comparative Analysis of Applied Recycling Collection Methods in Saint Paul*, May 2002)

establishment of national standards in product packaging. The Minnesota Office of Environmental Assistance and the regional Solid Waste Management Coordinating Board have acknowledged the state's role in continuing to assist development of end markets for recycled materials. Counties, however, may support and complement state policies with their own contracting and purchasing decisions (e.g., Dakota County Policy 2742 Procurement of Recycled Products, discussed on page 120). Operating under the auspices of public collection, San Jose, California allows haulers to keep the revenue from the sale of recyclable materials and additionally pays haulers per ton of material recycled. The city averages $150 per ton as an incentive payment. Ramsey County has committed to addressing market volatility with creation of the Recycling Market Support Fund, a dedicated fund of $500,000 for use by municipalities in Ramsey County during poor recycling market conditions. Ramsey County has additionally collaborated with municipalities to focus on recycling procurement, development of contracts and ordinances, and other recycling policies.

LACK OF ECONOMIC INCENTIVES FOR HOUSEHOLDS

A second major economic factor contributing to the recycling outcomes outlined in the previous section is the lack of incentives for citizens to participate in local recycling programs. Private waste hauling firms contend that environmental education's primary emphasis on the inherent value of recyclable materials distorts and contradicts broad realization that recycling is largely dependent upon fluctuating end markets for profitability. In turn, misperception of the economic reality surrounding recycling encourages citizens' skewed perspective regarding recycling's ability to address growing solid waste management concerns.

According to County Ordinance No. 110, the Dakota County Solid Waste Management Ordinance, collection fees for mixed municipal solid waste must increase with the volume or weight of waste collected. The Ordinance further prohibits waste haulers from imposing a greater charge on residents who recycle than on residents who do not recycle.[58] This weight or volume-based pricing, known as the "pay-as-you-throw" principle for collection fees, establishes an economic incentive for waste generators to recycle more in order to reduce the amount of waste being managed and minimize the high costs of collection and disposal. Pay-as-you-throw pricing is founded on the premise that the greater the connection established between tonnage of waste generated and cost for disposal, the stronger the incentive for individual households and businesses to invest in reuse and recycling.[59]

The State of Pennsylvania highlights the importance of variable weight/volume-based pricing to encourage recycling: 211 municipalities participated in pay-as-you-throw pricing structures in 2000.[60] Similarly, the New Hampshire Governor's Recycling Program recently developed a software program, entitled PriceSetter, which assists smaller communities with populations under 50,000 to estimate a "price-per-bag" system in accordance with pay-as-you-throw concepts.[61] Although the US Environmental Protection Agency stresses that communities with pay-as-you-throw fees for waste disposal generally see a significant decrease in the volume of waste managed per household[62], the corollary is that larger differentials in price prove more effective at encouraging recycling than do small variations in price. While variable pricing for collection of waste and recyclable materials is in effect in Dakota County, the range of prices quoted remains narrow, particularly for residential collection services.

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[58] Dakota County Ordinance No. 110, Section 15.08. *Additional Requirements for Haulers Licensed Under the Regional Hauler Licensing Program*. Page 112

[59] For additional information regarding pay-as-you-throw pricing, see the US Environmental Protection Agency's website at http://www.epa.gov/payt/.

[60] http://www.dep.state.pa.us/dep/deputate/airwaste/wm/recycle/PAYT/payt.htm

[61] http://www.pricesetter.org/

[62] US Environmental Protection Agency: *Cutting the Waste Stream in Half: Community Record-Setters Show How*, EPA-530-R-99-013, June 1999. Page 38

A recent survey of waste haulers licensed to collect municipal solid waste in Dakota County yielded the following residential and commercial hauling rates presented in Tables K and L, respectively.[63] The Dakota County call rates presented below correspond closely to rates summarized for several Anoka, Ramsey, and Washington County communities in 2001[64], and suggest that relatively limited pay-as-you-throw pricing structures characterize the metropolitan area as a whole.

Table K. Rates Analysis of Residential Waste and Recycling Collection in Dakota County

Container Size	Monthly Waste + Recycling Rates: Combined		Monthly Waste + Recycling Rates: Separated			*Per Month Average*
	Recycling Included	*Recycling 'Free'*	*Waste*	*Recycling*	*Total*	
30 Gallons	$13.32	$12.82	$9.78	$1.75	$11.53	$12.56
60 Gallons	$15.24	$15.65	$12.46	$2.00	$14.46	$15.12
90 Gallons	$17.49	$17.32	$13.80	$2.00	$15.80	$16.87

Source: Dakota County Office of Planning, Evaluation, and Development: hauler rates analysis performed on 33 municipal solid waste hauling firms licensed to operate in Dakota County in 2002: analysis conducted in April and May, 2002.

The monthly fee quoted for residential collection of 90 gallons of waste and recyclable materials ($16.87) represents an average increase of nearly 12% over collection of 60 gallon containers ($15.12), which in turn represents a 20% increase over the collection price of a 30 gallon container ($12.56). While the percentage difference appears substantial, the actual price differential is small, amounting to no more than an average annual cost of $51.74 to incent disposal of 30 gallons ($150.67) -- versus three-times as much waste ($202.41) -- each year.

Table L. Rates Analysis of Commercial Waste and Recycling Collection in Dakota County

Container Size	Monthly Commercial Waste + Recycling Rates: Combined (Actual Rates*)	Monthly Commercial Waste + Recycling Rates: Separated			*Per Month Average*
		Waste	*Recycling*	*Total*	
2 Cubic Yards	$60.00	$54.88	$28.93	$83.10	$71.55
4 Cubic Yards	$95.00	$83.60	$31.80	$115.40	$105.20
6 Cubic Yards	$120.00	$108.18	$37.80	$145.98	$132.99

* Combined commercial rates are actual quotes from a single private hauling firm: rates are not averaged.

Source: Dakota County Office of Planning, Evaluation, and Development: hauler rates analysis performed on 33 municipal solid waste hauling firms licensed to operate in Dakota County in 2002: analysis conducted in April and May, 2002.

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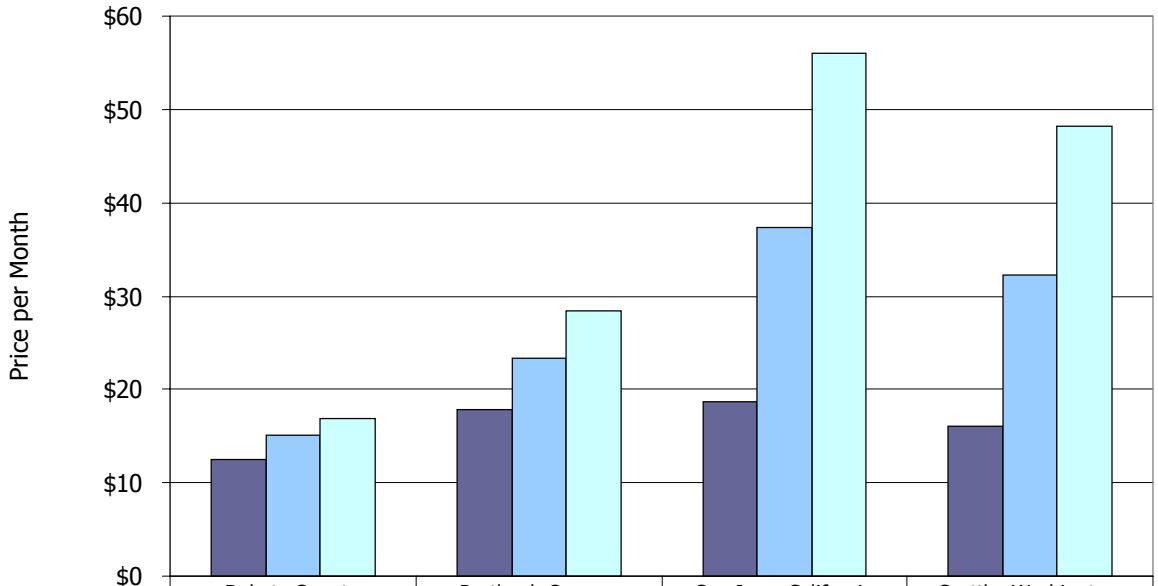
[63] The hauler rates analyses are based upon a survey of 33 mixed municipal solid waste (MSW) haulers licensed to operate in Dakota County in 2002: hauler licenses were accessed and haulers were individually contacted to document monthly 'call rates' (collection rates currently being offered) for weekly collection. Rates quoted were averaged across container size based upon category of pricing: either separate or combined collection rates for recyclable and waste materials. Due to industry competitiveness, various promotions and special offers advertised were not documented or otherwise factored into the analyses. Average call rates presented in Tables K and L represent a point-in-time survey of current market conditions for residential and commercial MSW collection services in Dakota County.

[64] Solid Waste Management Coordinating Board

While factors that govern the pricing of commercial collection services are numerous and varied, the price differential for commercial accounts is nevertheless considerably more significant than for residential customers. Weekly collection of six cubic yards of waste plus recyclable materials ($71.55) represents an average increase of more than 26% over collection of four cubic yards ($105.20), while four cubic yards represents an increase of 47% over collection of two cubic yards of waste and recyclables ($132.99). Tables K and L suggest that, although weight or volume-based pricing standards exist in Dakota County, pay-as-you-throw pricing may not exert great influence on residential, and possibly even commercial, waste management decisions due to the marginal difference in price between levels of collection service.

As the data above demonstrates, Dakota County maintains modest overall collection rates and relatively minor increases for larger quantities of waste material collected. Additionally, the County, together with much of the metropolitan area, participates in open collection systems for both waste and recyclable materials collection in which haulers negotiate directly with individual customers to provide residential and commercial hauling services. As a direct result, Dakota County does not establish specific pricing standards for collection services, and is therefore limited in how aggressively it can leverage this incentive for the benefit of improved recycling rates. In contrast, the Cities of Seattle, Washington, San Jose, California and Portland, Oregon maintain contractual relationships with haulers within a public collection system, and are therefore able to specify collection rates haulers must charge for collection services. (A discussion of organized or public collection follows in the next section, Issues in Recycling: New Opportunities, beginning on page 75.)

Chart 10. Pay-As-You-Throw Pricing Comparison



	Dakota County (2002)	Portland, Oregon (2000 estimate)	San Jose, California (2002)	Seattle, Washington (2000)
30 - 32 gallons	$12.56	$17.85	$18.69	$16.10
60 - 64 gallons	$15.12	$23.30	$37.38	$32.20
90 - 96 gallons	$16.87	$28.40	$56.07	$48.25

Source: Informal call rates analysis and comparison based upon information collected from Dakota County (D. Insisiengmay); Portland, Oregon (S. Anderson); San Jose, California (E. Ryan); and Seattle, Washington (J. Bagby), Spring 2002

Seattle, Washington and San Jose, California both require haulers to charge twice as much for a 64 gallon container as for collection of a 32 gallon container, although the incremental costs to the hauler for

providing collection services do not equal the weight-based rate. (The majority of costs incurred by waste hauling firms represent transportation and liability costs. The costs of disposing 64 versus 32 gallons of waste are relatively marginal, particularly when compared with the substantial costs of driving a vehicle to the location for curbside collection.) Both cities utilize more aggressive rate differentials in order to create stronger incentives for individual residents to recycle, and both cities believe that sharper rises in pay-as-you-throw pricing serve as effective incentives to recycle. Above, Chart 10 provides a comparison of weight-based collection rates found in Dakota County, and the Cities of Portland (Oregon), San Jose (California), and Seattle (Washington). The data presented below highlights the sizeable difference in the incremental rates for increasing quantities of waste material collected: considerably higher collection rates are charged in the best practice jurisdictions identified than in Dakota County.

The City of Portland, Oregon similarly sets collection rates, and additionally utilizes a formula in order to reflect the true incremental cost for disposal at larger volumes of waste. As in Dakota County, Portland's incremental rise in pricing is less rapid. Current rates in Portland for collection of 32 and 64 gallon containers are $17.50 and $22.85 per month, respectively -- a difference of 29%. As one best practice jurisdiction that maintains relatively smaller pay-as-you-throw differential rates, the City of Portland continues to debate the proportional effect of variable pricing on recycling rates -- citing a variety of other factors, including neighborhood 'peer pressure', as important influences that shape residential recycling behavior.

ENVIRONMENTAL ETHICS

A second major area that shapes the recycling outcomes presented in the previous section is the role of environmental ethics in guiding recycling programs. Ethical considerations emphasize the importance of maintaining the natural environment's ability to sustain and renew itself over the long-term.

Over the years, successful education campaigns have helped to cultivate the perspective that recyclable materials are resources with inherent value. Although public awareness of environmental issues have largely been successful at convincing the public of the importance of recycling, educational initiatives however, have been less effective at expanding end markets for recycled materials by creating actual consumer demand for recycled products.

GOVERNMENTAL DECISION MAKING

Aside from policies that provide regulation authority (i.e., sanitary landfill operations), government policy alone can not dictate solid waste management activities. The appropriate role of government in administering and facilitating local recycling programs hinges on both economic and ethical considerations, as upholding the public good is sometimes juxtaposed against private decision making. Formerly an exclusive governmental responsibility, the management of solid waste in general, and recycling in particular, has evolved over the past several decades to feature greater responsibility by the private sector. Within the metropolitan area in particular, the trend in solid waste management has been moving towards less involvement by governmental agencies in favor of greater control by private industry. The manner in which government balances and integrates market forces with larger environmental objectives serves to establish the role of government in setting future policies and priorities.

Prior to 1994, local governments with resource recovery facilities maintained the ability to direct waste to specific facilities through designation (commonly referred to as "flow control") ordinances. Designation was believed necessary because of fears that resource recovery facilities would otherwise find it difficult to compete with landfills, as landfills charged lower tipping fees for disposal of waste. In 1994, however,

the US Supreme Court issued the Carbone decision[65], ruling that certain types of designation ordinances are an unconstitutional restraint upon interstate commerce. The implications of this federal ruling to solid waste management have been substantial. As a result of the Carbone determination, mixed municipal solid waste is recognized as a commodity, and local government waste designation ordinances have largely been struck down or severely restricted. While the precise definition of what constitutes a restriction of interstate commerce is still being litigated, local governments in Minnesota effectively lost their ability to direct waste to identified resource recovery facilities. While constitutional means do exist for counties to ensure that waste are directed to specific facilities (discussed further in the next section, under organized collection), few local governments have taken advantage of this potential.

In Dakota County, the Cities of Farmington and Hastings utilize organized collection of waste and recyclable materials, and are therefore able to exert specific control over designation of their respective waste streams.

SUMMARY

The interaction of three primary factors largely determines current recycling outcomes evident in Dakota County and the larger metropolitan area. These factors include economic disincentives for private waste management firms and private citizens to improve current recycling behavior, environmental ethics of recycling that often conflict with strict economic assessments, and finally, governmental decision making that must satisfactorily balance the demands of private industry against those of the public good. Economic drivers for recycling and solid waste management, and environmental preferences held by the citizenry both underlie political considerations that shape subsequent policies. As a result, effective partnership between private industry and governmental entities, informed by citizen input, is important for identifying future management options and opportunities for continued improvement. Closer collaboration between waste management firms and local government may identify the benefits and costs of ordinance changes (including monitoring and enforcement), the need for subsidies to support management of particular waste streams and material types, and the implications of changes in technology associated with greater commingling of materials, among other suggested areas.

The new program strategies and directions for recycling outlined in the following section represent opportunities to leverage the effects of economics, ethics, and governmental decision making to improve recycling outcomes in Dakota County.

[65] C & A Carbone Inc. versus Town of Clarkstown, 511 US 383 (1994)

Issues in Recycling: New Opportunities

With the success of environmental education campaigns in promoting recycling and local investment in recycling infrastructure, it is clear that recycling is one landfill abatement practice that is well established among households nationwide. The challenge to recycling programs, therefore, will be to continue to refine local programs, building participation and tonnage of materials collected, with the knowledge that relatively 'easy' improvements have likely already been made. Future recycling program improvements will require greater investment of resources for smaller increments of additional benefit, until programs reach a point of diminishing returns.

Although little benefit cost data is available to accurately quantify the point of diminishing returns regarding recycling rates, best practice research indicates that recycling in Dakota County may be approaching best practice performance in specific program areas, including residential recycling. Research suggests that while improvements may continue to be made to existing recycling programs, dramatic increases to Dakota County's recycling rate will likely not be easy to make. According to Alameda County, California, "As a general rule, on a per ton basis, the last 25% of materials disposed will be far more expensive to reduce or recycle than the first 75%. 'Easy to do' programs will already be in place and the county will be left with the materials that are most difficult to address."[66]

Further, as the amount of materials diverted from disposal through recycling is maximized over time, local programs will increasingly pursue other, related waste abatement strategies. These related strategies include changing individual behavior to broaden the types of materials collected, improving markets for recycled products, and emphasizing source reduction more strenuously. The section below highlights several of these new, and/or re-emerging ideas as complementary strategies for Dakota County to consider in improving recycling and landfill abatement practices in the County. Specifically, a number of potential areas suggest possible opportunities for further improvement in Dakota County, including:

Changing Technology of Recyclables Collection

Currently, three primary ways exist to sort and collect recyclable materials curbside. Source separated collection relies upon residents to sort materials into separate categories at the curb. This process results in less convenience for the resident, but a higher quality of materials collected and consequently, a greater percentage of materials that reach end recycling markets. Two-stream collection depends upon residents to separate materials into two categories for collection -- most often paper fibers and 'rigid' containers (e.g., glass and plastic bottles, aluminum cans). The drawbacks of greater source separation of materials include difficulties fully utilizing trucks, longer truck times, and ergonomic issues for hauling staff.

Single-stream collection offers the greatest convenience for the resident as all materials are collected and processed together in a single container, though material quality may be compromised. Advocates maintain that single-stream collection increases participation rates, encourages fleet standardization, reduces truck time while improving truck utilization, and lends itself to greater automation. In general, materials that are kept clean and separate command higher prices by their respective end markets than those that are less pure. Due to greater residential convenience, however, greater commingling of materials is becoming more practical and widespread among local recycling programs nationwide. Many jurisdictions and organizations now allow residents to commingle more recyclable materials, making recycling more expedient at the curbside, and necessitating more sophisticated handling during materials processing. Further, continuing improvements in automation and separation technologies, particularly

[66] Alameda County: *Source Reduction and Recycling Plan*, 2000. Page 33

screening equipment, at materials recovery facilities will help to make greater commingling of collected materials possible, and may help to improve recycling rates over time.

Contracted to provide recycling services for the City of St. Paul, Eureka Recycling recently demonstrated that the single-stream method of collecting recyclable materials did not prove to be cost effective when compared to other methods examined in a recent comparative study of recycling collection methods. Although single-stream processing resulted in the most inexpensive *collection* costs of the five methods studied, the increase in processing costs and the decrease in revenue due to material loss made single-stream the most expensive method within the overall collection system. Of particular concern for single-stream collection is the fact that the net overall recovery, or environmental benefit of this method, resulted in fewer materials reaching end markets than every other tested method when residuals were subtracted from collection volumes.

Table M. Comparison of Recycling Collection Methods: Overall Costs and Performance

Method	*Collection Costs/Yr*	*Processing Costs/Yr*	*Net Costs/Yr*	*Materials Diverted/Yr (pre-processing)*	*Materials Diverted/Yr (post-processing)*	*Materials Recycled/Yr (lbs/household)*
Source Separated	-$975,548	+$251,412	-$724,136	16,300 tons	16,039 tons	417 lbs/HH
Two-Stream Bins	-$820,432	-$119,854	-$940,286	16,453 tons	14,666 tons	383 lbs/HH
Two-Stream Carts	-$1,335,194	-$113,401	-$1,448,595	20,394 tons	18,046 tons	469 lbs/HH
Two-Stream Weekly	-$1,143,437	-$144,912	-$1,288,349	19,361 tons	17,273 tons	450 lbs/HH
Two-Stream Organics	-$2,340,820	-$87,025	-$2,427,845	29,410 tons	27,222 tons	*Not Applicable*
Single-Stream	-$951,178	-$493,150	-$1,444,328	18,519 tons	13,482 tons	353 lbs/HH

Source: Eureka Recycling: *A Comparative Analysis of Applied Recycling Collection Methods in Saint Paul*. May 2002. Appendix A. RecycleWorlds Consulting Report

An important outcome measure with regards to the actual percentage of materials recycled, residuals consist of materials picked up during collection that are not accepted by the program (e.g., toys, certain plastics, waste materials), as well as recyclable materials too damaged or contaminated to be shipped to market. Currently, the City of St. Paul's residential recycling program does not exceed a 1.6% residual rate. Research demonstrates that two-stream collection programs average a 6.4% residual rate, based upon a survey of 215 facilities nationwide, and assuming that all glass collected was recycled back into glass. In contrast, single-stream programs average a 27.2% residual rate, based upon a survey of 16 facilities nationwide, and assuming that no glass collected was recycled back into glass.[67] Table M above summarizes overall costs and performance results from Eureka Recycling's recent study of five collection methods.

While greater commingling of materials simplifies separation for customers, and allows haulers to operate more efficient truck payloads and serve a larger number of households daily, the waste diversion benefits

[67] Eureka Recycling: *A Comparative Analysis of Applied Recycling Collection Methods in Saint Paul*, May 2002

of commingling may be mitigated by increased materials loss during processing. As Table M demonstrates, the efficiencies of single-stream collection, including extensive automation and other collection-side savings, are tempered by significantly worse performance. Two-stream carts collected biweekly and two-stream bins collected weekly maintain similarly high levels of performance, though carts are associated with higher costs overall. (Appendix V presents additional discussion regarding single-stream collection of recyclable materials.)

One trend evident among private haulers has been the avoidance of workers compensation claims, due to the great expense in providing liability insurance for employees. The single-stream process for collecting recyclables serves as one way to minimize workers compensation claims because single-stream collection relies more heavily on mechanized operations to provide service. Many local communities in the Twin Cities metropolitan area and nationwide are considering adopting single-stream collection with the expectation that recycling rates will increase due to improved convenience for residents, although thorough analysis of the advantages and disadvantages this collection method offers may not be clearly identified. In Dakota County, the City of Farmington switched its residential curbside pickup from multiple stream collection to a two-stream system in June 2000. The national collection firm, Waste Management, recently completed construction of a materials recovery facility in Northeast Minneapolis that separates commingled recyclables from a single-stream. Waste Management is now offering single-stream collection in some of its service areas in the Twin Cities metropolitan area.

Similarly, the trend in collection among local communities across the nation is towards greater commingling of materials. The residential recycling program administered by the City of San Jose, California, for example, changed from multiple stream recycling to single-stream collection on July 1, 2002.[68] A pilot single-stream collection program implemented in a portion of the city showed an increase in current rates of waste diversion. The City of Seattle, Washington maintains two-stream collection of recyclable materials plus separate collection of yard waste. Contracted haulers collect waste plus yard trimmings, and waste plus glass and commingled recycling streams on alternate weeks. The City of Portland, Oregon began commingling more recyclables in 1999. Like Seattle, glass was separated from other recyclable materials, and haulers collected yard waste and recyclables on alternating weeks. Portland found that households increased their volume of recycling from 663 pounds per year in 1998 to 731 pounds per year in 2000 -- an increase of 68 pounds, or 10% -- due in part to greater commingling of materials.[69]

PUBLIC/ORGANIZED COLLECTION SYSTEMS

Several local governments have recently explored or used changes in their system of collection as a tool for implementing the state's 1980 Waste Management Act.[70] One means available for public entities to set standards for waste collection services and address environmental objectives is to enter into exclusive contracts that specify how and where waste must be managed with one or more private hauling firms[71]. Counties in Minnesota may pursue public collection directly under Minnesota Statute §115A.94 Organized Collection Statute, and through authorities granted under Minnesota Statutes §145A, 400, and 473. Collection services may include: mixed municipal solid waste, recyclable and compostable materials (including tree, shrub, yard, and food wastes), bulky items (including appliances), and household

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[68] Customers will have the option of recycling yard waste separately from other recyclables. More information regarding San Jose's program is available from http://www.recycleplus.org/recycle/cleangreen.htm.

[69] City of Portland, Office of Sustainable Development, Solid Waste and Recycling Division: *Management Report for 2000 Activities*, April 2001. Page 3

[70] For example, see City of Chanhassen: *Organized Collection Study, Final Report*, September 1993. The SWMCB surveyed residential recycling programs in 2001 to document local participation in public collection -- see Tellus Institute Solid Waste Group: *Recycling Trends Research Study: Final Report*, Appendix C, August 2001.

[71] Portland, Oregon maintains franchises, or exclusive contracts within small geographic areas, for collection of solid waste. Currently, 38 haulers operate in the City of Portland, each within a respective franchised area.

hazardous waste. Contracts may stipulate where waste must be disposed of and require haulers to submit proof that waste is delivered to appropriate facilities. When local jurisdictions assume responsibility for the hauling and disposal of waste, even in the case of designating and facilitating contractual relationships with haulers, this system is termed public or organized collection.

In contrast, open collection communities are municipalities and counties, including the majority of local communities in Dakota County, in which residents negotiate directly with available haulers to collect and dispose of waste. Currently, only the Cities of Farmington and Hastings have implemented public collection of waste and recyclable materials within Dakota County, though all communities in the County facilitate public collection of household hazardous waste. In comparison, 13 municipalities have public collection of mixed municipal solid waste in Ramsey and Washington Counties, and most municipalities in Ramsey and several in Washington County participate in organized collection of residential recyclable materials. All Ramsey County and several Washington County municipalities have public collection of yard waste, and all Ramsey and Washington County communities participate in public collection of household hazardous waste.[72]

One substantial benefit of public collection is the ability of local government to impose stipulations on the hauler(s) as a condition of contract. As discussed above, municipal solid waste was designated a commodity by the federal courts[73]. As a direct result, local governments are generally restricted from mandating where waste is taken and how it is processed due to unnecessary interference in interstate commerce. Public collection serves as one critical mechanism available for local government jurisdictions to assert particular preferences in the handling and disposal of waste materials. Contracts may specify that haulers monitor and enforce recycling practices, reporting noncompliance to local governments to address gaps in information or education. By entering into an exclusive contractual relationship with one or more private waste haulers, local government entities become a "market participant" and a joint owner with shared liability in the process of collecting materials. Public collection additionally offers several long-term benefits, including reducing the costs of improper waste management (e.g., closed sanitary landfill cleanup), and ensuring that more waste is recycled, composted, and converted into energy.

A second important benefit to public collection is consistency of service for all customers. While public collection systems may be designed to facilitate a contracting relationship with a single hauler, or many haulers, public collection nevertheless maintains the same standards for all service provision. In this way, all homes located within a specified "zone of service" receive recycling collection services on the same day in the same manner, and with the opportunity to recycle the same materials. Rates charged to residential accounts are generally less expensive than for curbside open collection systems, assuming a single hauler is contracted to collect materials within a specified service zone. An additional, related benefit is the potential for lower environmental impact from a single hauler collecting materials from a designated service area. Under the auspices of open collection, numerous trucks may service a single neighborhood numerous days of the week, depending entirely upon the number and services of hauling firms individual residents have contacted to collect their waste. Public collection necessitates fewer trucks consuming less fuel and expiring less exhaust on neighborhood routes, resulting in lower impact and less congestion on roadways. Under the auspices of exclusive contractual agreements, haulers may be required to provide direct education to their customers regarding acceptable materials for recycling.

A third benefit of public collection of recyclables is the availability of more accurate data for the purposes of program management. Accurate data is difficult to compile in open collection communities in which individual households negotiate directly with private haulers for collection of materials. As discussed previously in Issues in Recycling: Internal Processes (page 57), Dakota County ordinance ensures that recycling tonnages are reported, but does not necessarily guarantee that resulting hauler tonnages have been accurately estimated by community and type of customer. Public collection frequently defines

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[72] Ramsey and Washington Counties: *Final Report: Study on Public Collection*, April 2002, Executive Summary. Page 4 of 49

[73] Carbone, 1994: see page 70.

collection services according to all-inclusive, pre-defined geographical areas with singular types of customer accounts (e.g., single family and multifamily households). Based upon efficiencies of collection routes, haulers in open collection communities collect from a broad service area that may readily cross jurisdictional boundaries and mix account types, in order to maximize vehicle loads and minimize attendant transportation costs.

According to a recent policy report from the Minnesota Office of Environmental Assistance (*Solid Waste Policy Report: Waste as a Resource*, April 2002), the State of Minnesota's organized collection law is outdated and should be amended to reflect current trends in the management of solid waste. New collection strategies available to local governments demonstrate the potential to be less expensive than existing collection systems, while still remaining competitive. These strategies also support the policy that waste contains resources that should be managed by methods that maximize the "highest and best use" of those resources. The choice of a collection system is critical to public sector success in meeting the goals of the Waste Management Act, while offering the potential to have a positive impact on related public policy areas, including environmental policy, noise pollution, litter, hauling costs, and local government finances.

The Minnesota Office of Environmental Assistance encourages local jurisdictions to investigate organized collection strategies as one tool that supports the responsible management of solid waste, and further anticipates working with local communities to develop model organized collection ordinances for future implementation. Similarly a study of recycling trends in the metropolitan area conducted by the Tellus Institute Solid Waste Group recommends that local jurisdictions contract directly for recycling services rather than allow residents to negotiate collection on an individual basis. The report emphasizes the importance of exclusive contracts within both residential and non-residential sectors of recycling service as the most valuable way to improve recycling within the region. Within residential recycling, one critical finding was that a direct contracting relationship between local jurisdiction and private haulers "is an important determinant of how successful recycling will be."[74]

Public or organized collection of waste and/or recyclable materials has recently received local attention as a waste management strategy, in part because of joint efforts by Ramsey and Washington Counties to explore the potential to implement such a public collection system.[75] Recent findings from Ramsey and Washington Counties' study of public collection suggest that although implementation of public collection addresses goals articulated in the Regional/County Solid Waste Master Plan, changes made to waste management financing and regulation recognizes fewer difficulties in implementation.[76] Public collection contracts proposed in Ramsey and Washington Counties would allow the two counties to direct waste to the Resource Recovery Facility located in Newport, Minnesota. The counties maintain that public collection is a more effective system for protecting public health and safety, since the counties will share liability for any infractions or violations in waste hauling or disposal as equal partners within the contractual relationships with private haulers.

Public collection additionally offered the two metropolitan counties a framework for addressing a broad range of waste management and environmental health and safety issues, including opportunities to target waste abatement outcomes via pilot studies. Ramsey and Washington Counties concluded their study with the acknowledgment that "If these recommendations are implemented and good faith efforts in a public/private partnership result in progress toward the environmental goals, the Counties should not implement public collection at this time. However, if the Counties cannot substantially achieve these recommendations, and a public/private partnership does not materialize and move the system toward the

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[74] Tellus Institute Solid Waste Group: *Recycling Trends Research Study: Final Report*, August 2001. Page 4

[75] See *Pioneer Press*: "Public garbage collection studied: Waste haulers oppose every angle in proposal", March 5, 2002 and "Washington/Ramsey Counties: Public garbage pickup plan set aside for now", April 11, 2002; also *Star Tribune*: "Trash talking: trying to save a waste processing plant", March 11, 2002

[76] Ramsey and Washington Counties: *Final Report: Study on Public Collection*, April 2002

goals using these methods, public collection should then be implemented."[77] It was determined that public collection can be designed and implemented to address environmental, health and safety goals. Public collection is not being implemented in Ramsey or Washington County at this time, however, in order to develop a public-private partnership for implementing system improvements as outlined in their analyses. The counties acknowledge that if significant improvements are not made and a public-private partnership does not materialize, public collection may then be implemented.

Complaints directed against public collection focus on the issue of choice for individual homeowners and businesses. Because public collection depends upon a contractual relationship between local government and a private or public hauling enterprise, the number of haulers responsible for providing services is necessarily restricted. Private waste hauling firms stand in firm opposition to public collection, concerned that public collection may preclude individual haulers' ability to compete in an open marketplace. Over the course of their recent study, Ramsey and Washington Counties received extensive feedback from waste haulers regarding public collection. Generally, larger national collection companies considered public collection as a threat to their substantial share of the local market and their preference for directing waste to company-owned facilities and landfills. Medium and larger independent firms regarded public collection as a barrier to continued growth, while smaller independent haulers acknowledged that public collection threatens the value of their company in the event of a buyout by a larger firm.[78]

ORGANICS COLLECTION

Local communities in the Twin Cities region and the nation consider composting of food waste as one promising new focus for increasing the tonnage of materials abated from landfills at a reasonable cost. Composting, as defined by the State of Minnesota, is the controlled decomposition of organic materials, including food scraps and soiled paper products, and is not considered a component of recycling.[79] As a practice, residential organics composting is still in the early stages of development as local jurisdictions experiment with a variety of collection strategies in order to better understand underlying issues and improve program performance. The City of Hutchinson has implemented a citywide Food Waste Recovery Program as a strategy to manage solid waste more cost-effectively. Conducted on a voluntary basis, Hutchinson's program saves a percentage of landfill costs and creates a valuable product for soil enrichment.

Similarly, Dakota County and the Solid Waste Management Coordinating Board are committed to exploring the benefits and costs of organics collection. The SWMCB and the County are currently sponsoring a pilot organics processing project in which food waste generated in one school district (ISD 196 -- Apple Valley, Eagan, Rosemount) will be collected and composted at NRG Processing Solutions, located in Empire Township. The results of this pilot project will demonstrate ways in which the County and the region may help to support systematic collection of organic materials.

Information from Eureka Recycling's[80] recent comparative study serves to complement existing SWMCB and County initiatives with additional data regarding the potential for diverting organic material from disposal. The study estimates a potential collection rate of 254 pounds per household per year in the City of St. Paul, increasing diversion of the waste stream by 68% (10,160 tons) per year over current

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[77] Ramsey and Washington Counties: *Final Report: Study on Public Collection*, April 2002, Executive Summary. Page 7 of 49

[78] Ramsey and Washington Counties: *Final Report: Study on Public Collection*, April 2002, Results of Public Input from Waste Industry. Pages 27 to 30 of 49

[79] Minnesota Rules §7035.0300

[80] Eureka Recycling is a nonprofit organization founded in November 2001 by the Saint Paul Neighborhood Energy Consortium to focus on waste reduction and recycling in the metropolitan area. Eureka Recycling has been contracted to manage the City of Saint Paul's recycling program through the year 2013. More information is available from http://www.eurekarecycling.org/.

curbside rates. Organics collection would result in additional program costs, but would net the greatest recovery of resources from the waste stream. There is some evidence to suggest that overall waste diversion may achieve rates as high as 85% given the addition of composting of source-separated organic materials and non-recyclable paper to curbside programs.[81] The study notes that organics collection should be further evaluated for transportation cost and residential acceptance issues. The possibility of utilizing transfer stations to reduce the cost of having to transport multiple loads to the nearest organics processor in Dakota County (NRG Processing Solutions, formerly SKB, located in Empire Township) is as yet unknown. Permits, regulations, and other structures that inhibit this type of collection need to be analyzed by state, county, and city regulators and changes should be made to streamline this collection alternative.

The City of Seattle, Washington considers collection of commercial food waste as a potentially very significant contributor to the city's recycling rate[82], in terms of tonnage available and associated cost effectiveness of collection and processing. Seattle has experimented with collection of organics in the past, particularly in the residential sector, and is committed to promoting commercial food waste separation and development of food waste processing facilities throughout the region.[83] Similarly, the City of Portland, Oregon designated food waste recycling one of its top two goals in the commercial sector, along with the establishment of incentives for recycling construction and demolition debris. Nearing completion, a food waste processor will make collection more feasible in the residential sector.

OTHER TARGETED MATERIALS COLLECTION

CONSTRUCTION AND DEMOLITION DEBRIS

In 2001, San Jose, California initiated the Construction and Demolition Diversion Deposit Program[84], to require refundable deposits for recycling of construction and demolition debris -- the first program of its kind in the nation. Construction and demolition materials comprise some 30% of the waste entering landfills in San Jose. Under the auspices of the program, the city collects a refundable deposit whenever a building permit is requested. The deposit is calculated based upon square footage of the project, type of permit issued, and is refundable if the construction and demolition debris is either reused on-site, or taken to a certified recovery facility that will divert at least 50% of the materials accepted. Portland, Oregon is similarly considering a deposit program to provide incentives for recycling of construction and demolition debris.

ELECTRONICS

Several best practice jurisdictions target electronic materials for recycling or "e-cycling". The Cities of San Jose, California and Portland, Oregon have actively promoted electronics recycling; San Jose will ban cathode ray tubes from landfills. In the Seattle, Washington area, King County operates a computer recovery project. The county offers a $10 coupon for turning in unwanted electronic equipment. To date, some 6,200 monitors were recycled, and an additional 2,000 monitors were reused or refurbished.

In Dakota County, surplus property may be reassigned to another County Department; given to local governments or schools; sold by competitive, sealed bid; or sold at public auction. Surplus computer

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[81] The State of Minnesota's definition of recycling does not include management of organic materials, unless resulting organic materials meet state definitions for definition (e.g., Endres food processing). Therefore, curbside collection of organics will increase the amount of waste diverted from area landfills, but will *not* necessarily increase the corresponding recycling rate.

[82] Unlike Minnesota, some states and local jurisdictions include the management of organic materials within the definition of recycling.

[83] City of Seattle: *2000 Solid Waste Report*

[84] http://sjrecycles.org/business/cddd.htm

equipment is offered, free of charge, to local governments and school districts located in the County for their continued use. The County collects, recycles, and/or discards obsolete or inoperable equipment as appropriate.

SOURCE REDUCTION

Many metropolitan experts in the waste management field assert that the next frontier in solid waste management may well be source reduction. As the Solid Waste Master Plan acknowledges, the County's recycling efforts are closely aligned with source reduction activities. Movement towards simplifying lifestyles and consuming fewer products, or relying more heavily on products with higher recycled material content, has taken hold in venues as various as metropolitan area houses of worship and national campaigns. The development of subsidies that target purchasing decisions, coupled with greater product stewardship by manufacturers, may help to reduce the rate of waste generation in the region and nationally, since these efforts strive to broaden the focus on solid waste from discard to resource.

What impacts promoting source reduction to the public have on educational programs remain largely to be seen: environmental education remains a critical component to building awareness and informing future decision-making.

PROGRAM FINDINGS AND RECOMMENDATIONS

While Dakota County has largely maintained the state mandated rate of 50% of mixed municipal solid waste recycled by weight, opportunities exist to improve ongoing collection of recycling data and collaborative partnerships with best practice jurisdictions, private industry, local communities and Solid Waste Management Coordinating Board member counties. Additionally, over the past decade, the County has dedicated a smaller overall proportion of resources to support local recycling programs -- targeting a growing number of households, businesses, organizations, and County staff -- than comparable SWMCB counties.

Specifically,

GENERAL PROGRAM FINDINGS

- **Recycling rates increased between 1990 and 1997.** A goal of the Environmental Management Department is protection and enhancement of the environment of Dakota County (*Dakota County Environmental Management Outcome Measurement Plan*, 1998). Recycling contributes to this goal by reducing waste that would otherwise be landfilled or require processing (e.g., by incineration), and by assuring that problem materials are properly managed. The increase in the recycling rate in Dakota County in the 1990s (from 26% in 1990 to 48% in 2001, with a high of 52% in 1997), and the growth in the number of tons recycled (from 51,000 tons in 1990 to 158,000 tons in 2001), indicates important movement towards achievement of this County goal.

- **Recycling and waste generation rates have remained steady since 1997.** In recent years, the apparent leveling of recycling rates (between 48% and 50% since 1997) and tonnage recycled per capita (between 0.43 tons and 0.45 tons collected per capita since 1997), coupled with the relatively steady rate of waste generated in Dakota County (from a low amount of 0.93 tons generated per capita in 1995 to 1.08 tons generated per capita in 2001), has resulted in a net increase in the tonnage of waste landfilled and an associated decline in landfill capacity.

  While recycling should not, and cannot, be expected to shoulder the entire responsibility for adequate solid waste management (for example, federal, state, and local waste reduction initiatives have failed to curb the growth in the generation of waste), reversing the level recycling rates of the past five years can contribute significantly to continued landfill abatement in the metropolitan area. The Minnesota Office of Environmental Assistance noted in a recent policy report (2002) that 72% of the waste currently being landfilled or incinerated consists of materials that could be put to higher and better use through recycling or composting activities.

- **Best practice comparisons with local jurisdictions suggest that the best recycling rates nationwide range between 50% and 60%.** Although recycling programs across jurisdictions may not be strictly comparable, it seems clear that the potential for recycling programs to excel beyond this level of performance becomes increasingly more difficult with diminishing returns on improvement. Similarly, Dakota County should expect continued progress above this level of recycling at a much slower rate with greater investment of resources.

- **Environmental education is a primary Dakota County activity in support of recycling, although the impacts and overall effectiveness of these educational initiatives within the County and larger region are largely unknown.** Because public awareness is critical to stimulating interest and promoting support, a major goal of the Environmental Management Department is to "create an environmentally aware community" (*Dakota County Environmental*

Management Department Outcome Measurement Plan, 1998). To this end, the Department dedicates a significant share of its resources to public education activities and participates with the Solid Waste Management Coordinating Board to develop and distribute environmental education materials to residents and businesses to encourage recycling. Regional focus currently centers on collaborating with existing organization to spread environmental messages (e.g., Community Power initiative).

Participation in recycling depends primarily upon individual motivation. In all sectors, individual initiative prompts participation in recycling activities. Further, recycling behavior learned and practiced in the home generally carries across to other sectors, including work. Assuming equal opportunity and access to education, resources, and technical assistance, the propensity of a resident or an organization to recycle depends largely upon individual interest and motivation. Therefore, a principal strategy has been -- and should continue to be -- increasing interest and motivating individual action.

- **Dakota County cooperates with metropolitan area counties through the Solid Waste Management Coordinating Board.** Dakota County has been an active participant in the Solid Waste Management Coordinating Board since its inception in 1990. The Solid Waste Management Coordinating Board is a joint powers board comprised of two county commissioners from Anoka, Carver, Dakota, Hennepin, Ramsey, and Washington Counties whose mission is to increase the efficiency and environmental effectiveness of the region's solid waste management system. Inter-county initiatives have convinced a number of counties that joint efforts can help to save money and improve service delivery (Minnesota Office of the Legislative Auditor: *Recycling and Waste Reduction*, January 2002). The Solid Waste Management Coordinating Board works with County staff to create annual work plans towards achieving regional and County environmental outcomes identified in the Regional/County Solid Waste Master Plan. Regular and constructive forums for exploring waste management strategies with state agencies, municipal recycling coordinators and rural representatives, and local waste management firms similarly provide additional opportunities for ongoing cooperation and program assessment.

- **Dakota County's ongoing collection and organization of data remains an important concern.** Counties are required to report recycling data to the Minnesota Office of Environmental Assistance as part of the SCORE and LRDG funding programs. In addition, counties must report solid waste fee information to the Office of the State Auditor. Due to the inherent difficulties in collecting actual recycling tonnages, available data is most appropriately used for making broad comparisons of gross metropolitan area trends over time. The absence of reasonably sound, quantitative data is particularly problematic given that recycling program success is determined by mandated recycling rates. The County's Environmental Management Department is to compile and regularly evaluate recycling data by sector and material type, in order to identify components of the recycling system that may be improved. Specifically:

    - Residential tonnages are estimated based upon "the percentage of each material type recorded in previously documented collections", and the proportion of accounts held in each local community (*Dakota County Ordinance No. 110*, Section 15.05 Recyclable Materials Reporting). This process of estimation relies upon private waste hauling firms to accurately assess the relative weight of collected materials, associate collected volumes of recyclables with specific geographic jurisdictions and accounts, and report these estimates to the County.

    - Commercial data is particularly difficult to collect and confirm. Private hauling firms provide commercial data based primarily upon actual hauler weights (e.g., a hauler with commercial accounts only) or percentage amounts (e.g., estimates of commercial versus residential accounts). The Dakota County business environment has changed dramatically through the 1990s, with the County adding over 2,400 new businesses over

the decade. Accurate estimates of commercial and industrial recycling tonnages remain largely undocumented, however, since current estimates are based upon a 1991 survey of County businesses. (Current estimates of commercial recycling vary by a factor of three, or the difference between 16,000 tons and 50,000 tons.)

- No information is available to determine the degree to which institutions in the County participate in recycling. Institutional data is currently subsumed within commercial recycling data (i.e., the commercial-industrial-institutional sector) in private hauler reports to the County. (To date, minimal County effort has been directed towards institutional recycling.)

- Similarly, no systematic data is presently available to describe apparent trends in in-house recycling, though collection of these data would help to guide the County's programmatic activities in this area. Contracted waste haulers report in-house recycling tonnages as one component of commercial recycling data. In-house tonnages are not collected or maintained by County staff.

- **Market forces drive the collection and processing of recyclable materials.** The evolution of the solid waste management industry from public to greater private sector control is particularly evident in recycling programs, as local jurisdictions have increasingly delegated management and operation of collection and processing activities to private waste hauling firms. Improving competitive advantage, the dual effects of greater consolidation among private hauling firms in the marketplace, and vertical integration of haulers expanding waste management services, lead to greater reliance on fewer hauling companies.

- **Public collection of recyclable materials increases direct public control over recycling collection and processing, and facilitates compilation of more accurate recycling data.** Additionally, public collection supports pay-as-you-throw pricing structures, which represent important opportunities for increasing the tonnage of materials recycled by offering households financial incentives for recycling over waste disposal. Exclusive contracting relationships for the collection of recyclables may further include opportunities for greater education, monitoring, and enforcement of recycling practices by private waste hauling firms.

  The experience of other cities and counties in the region suggests that stringent contracting for collection of waste and recyclable materials is one way to increase recycling rates and to provide access to more accurate and consistent trend data. Ramsey and Washington Counties recently completed a detailed analysis of public collection, in which they determined that public collection was the optimum solution to controlling municipal solid waste. Public collection has not been implemented at this time, however, due to uniform opposition by private waste haulers, reluctance by some residents to terminate existing household collection contracts, and agreement by private haulers to dedicate a minimum tonnage of waste for processing at the Ramsey/Washington County Resource Recovery Facility in Newport, Minnesota.

- Given that program performance has remained relatively steady, as the recycling program has matured, **Dakota County staffing and funding levels have shifted to support other solid waste management priorities over time.** State SCORE data reported for Dakota County suggests that County staffing levels for SCORE programs have fallen significantly over the past decade, particularly given Dakota County's population growth. Further, when population is held constant, the amount of SCORE funding expended per capita fell from a high of $8.88 in 1991, at the initiation of the County's recycling program, to $3.84 in 2001. In comparison with the six metropolitan area counties, Dakota County expends the least amount of funding per capita to support recycling and other SCORE-related activities, and commits a small number of County staff to support SCORE programs overall. Dakota County staffing for recycling decreased by more than 56% (from a high of 2.75 FTEs to 1.20 FTEs) between 1991 and 2001.

- **The gap between state and local financing for recycling programs continues to grow.** Since the establishment of the solid waste management tax in 1989, the Legislature has appropriated $14 million for SCORE grants to counties. In real dollars, the state's commitment to recycling, as financed by the solid waste management tax, has declined over time. The current Legislature has reduced the contribution to SCORE by 10% as part of its budget balancing initiatives and proposes to reduce the statewide base amount for SCORE funding from $14 million to $5 million in future fiscal years.

  The solid waste management tax generated about $53.9 million of revenue in fiscal year 2001. Of this amount, $47 million was appropriated for environmental activities in the Minnesota Pollution Control Agency and the Office of Environmental Assistance (including the $14 million for SCORE grants to counties). However, $7 million was not appropriated for environmental purposes and remained in the State's General Fund. The 2002 Legislature reduced the $14 million for SCORE grants in the FY 2002-03 biennium by 10%, or $1.4 million for purposes of balancing the state budget.

  Dakota County received $1.2 million in state funding ($934,292 in SCORE and $208,664 in LRDG funds) and other revenues to support recycling and other waste abatement activities in 2001, expending approximately $1.7 million for SCORE-related programming during the same year. In 2002, Dakota County expects to receive $940,284 from SCORE and $199,650 from the Local Recycling Development Grant (LRDG).

- **Recycling exists within a larger solid waste management context characterized by a demonstrated lack of economic incentive for private industry and citizens to participate in recycling, a strong environmental ethic held by many individuals that occasionally runs counter to economic priorities, and governmental decision making that must be sensitive to both economics and ethics.** These three factors coincide to strongly impact recycling activity in Dakota County, the Solid Waste Management Coordinating Board region, and the nation at large. The gradual shift from public to greater private decision-making highlights the changing role of local and state government, from regulation of the marketplace to leadership, education, provision of incentives, and market participation. These three factors provide a context for solid waste management that has helped to establish recycling as a successful waste abatement strategy, despite a lack of strong economic incentives for private waste management firms, and poses important considerations for future and continuous improvement. The County should be aware of the pay-as-you-throw pricing, and should further consider supporting policy initiatives that establish economic incentives for recycling and source reduction activities.

- **Critical internal processes, including strategic planning and measurement efforts, and external opportunities, including the impacts of changing technology, shape the direction of future recycling improvements in Dakota County.** Important internal processes include continued refinements to collection and maintenance of comparable data, systematic and strategic goal setting, promoting program partnerships, and encouraging program comparison for the benefit of ongoing evaluation. Based upon best practice comparisons with local jurisdictions (including the Cities of San Jose, California; Seattle, Washington; and Portland, Oregon), external opportunities include the impact of shifting technologies to support greater commingling of recyclables, household collection of additional material categories (including organics, construction and demolition debris, and electronics), and increasing emphasis on source reduction.

  In particular, single-stream and two-stream recycling are prominent national trends that appear to increase the amount of recyclable materials collected, though the amount actually recycled may not reflect this increase. The effects of greater materials commingling have strong implications for the recycling rate, and require detailed analyses to determine the benefits and

costs of single and multiple-stream collection systems. In Dakota County, the Hastings City Council recently approved implementation of single-stream collection of recyclable materials for all households in the community.

GENERAL PROGRAM RECOMMENDATIONS

- **The Environmental Management Department's Outcome Measurement Plan should be updated to reflect strategic opportunities and challenges, in keeping with the Master Plan.** The Environmental Management Department should re-evaluate its Outcome Measurement Plan, considering opportunities to combine regional goals and County activity measures, and regularly report progress to County Administration and the Board of Commissioners on the outcomes achieved, as outlined in the Plan. The opportunity to reconsider the Department's activities systematically within a demonstrated County and regional framework will be useful, particularly as the Metropolitan Solid Waste Management Policy Plan is updated in 2003. Specifically:

    - In a concerted effort to facilitate strategic, long range planning, the Dakota County Environmental Management Department Outcome Measurement Plan should be consistent with the Metropolitan Solid Waste Management Policy Plan (to be updated in 2003), and the Regional/Dakota County Solid Waste Master Plan (1998).

    - The current Outcome Measurement Plan lacks an outcome statement (i.e., the "if/then" statement), a key component for evaluation of progress towards expected program outcomes.

    - Significant gaps exist in the measurement data available for ongoing program administration. Data identified in the current Outcome Measurement Plan is not readily available for management use. The updated plan should address outcomes for the major areas of County activity, including the Community Funding Program and targeted environmental education initiatives.

- **Dakota County should continue coordination efforts with the Solid Waste Management Coordinating Board, strengthening opportunities to collaborate with the waste management industry, local municipalities, and best practice partners.** Dakota County should continue to explore and take advantage of regional, private waste hauler, local community, and inter-county initiatives that have the potential to save money and improve service delivery through demonstrated partnerships.

  Closer association with private waste management firms and local communities is conducive to improving the County's recycling efforts. Because solid waste management decisions are driven largely by private sector priorities, greater collaboration -- with local haulers, landfill and materials recovery facility operators -- offers the County a significant resource for promoting landfill abatement. Additionally, open and ongoing discussion with private sector waste management firms affords the County greater opportunity to close data gaps, initiate and implement targeted case studies, improve educational efforts to residents and businesses, and investigate new strategies for landfill abatement. Similarly, productive interaction between the Environmental Management Department and local municipalities will help to communicate best practice and improve program effectiveness at the local level.

    - Dakota County should combine efforts with other Solid Waste Management Coordinating Board member counties to achieve economies of scale and meet common goals to the broadest extent feasible. Continued active participation in the SWMCB will contribute to this recommendation.

- Forging more productive partnership with the private waste management community strengthens the County's recycling efforts by inviting private sector participation and feedback regarding local recycling programs. Similarly, engaging local solid waste staff serves to identify gaps in service provision, and focus resources to address program priorities. Best practice comparisons with local jurisdictions nationwide present ongoing opportunities for program evaluation, particularly as the impacts of changing technology and other recycling developments become better known. Cooperation with private sector firms and local municipalities may include periodic roundtable discussions, tracking and confirming reported recycling tonnages, and exploring public collection of recyclables and other exclusive contracting arrangements.

- In cooperation with local municipalities, private waste hauling firms, the SWMCB region, and other County Department staff, Environmental Management Department staff should design and implement targeted case studies to gather additional information regarding specific recycling practices and residential and commercial preferences. Jurisdictions nationwide cite the importance of designing localized case studies for targeting particular materials and/or underrepresented audiences for the benefit of improved recycling.

  Although many aspects of residential recycling are well-established, multifamily recycling, household purchasing preferences, the implications of single-stream recycling, collection of source-separated organic materials, and the effect of demographics on participation rates remain largely unknown. For example, the impact of changing demographics on local recycling programs is not well understood, though growing racial and ethnic diversity in the County may have strong implications for ongoing education of residents. Examining these, and other, related program issues, will assist in informing future program design and implementation.

- Because recycling exists within a larger hierarchy of integrated waste management that depends upon the collaboration of state, regional, local, and private stakeholders, Dakota County should continue to assess the relative effectiveness of specific County strategies and priorities within this network of stakeholder interests. Benchmarking against comparable jurisdictions may guide development and implementation of new strategies. Similarly, by capitalizing upon best practice partnerships that influence recycling policies within the region and nationwide, the County is better informed to improve existing performance. The County's communication and participation with industry representatives and professional organizations (e.g., the National Recycling Coalition) should be expanded to evaluate additional opportunities for recycling improvement, including evaluation of single-stream recycling, public collection of recyclables, and the effects of demographics on household participation in recycling.

- **Dakota County should report progress towards achievement of Master Plan goals and negotiated outcomes to the Board of Commissioners on a regular basis.** In the *Regional/County Solid Waste Master Plan* (1998), Dakota County identified several priorities, including the following:

  - The Master Plan specifically states that Dakota County will focus its efforts on food waste recycling to assist the region in maintaining the 50% recycling goal, and add a material to the list of collected materials when collection is show to be technically and economically feasible. The Environmental Management Department should regularly report to County Administration and the Board of Commissioners on progress towards achieving these, and other identified outcomes, including interim steps being taken to accomplish them.

- Although residential recycling volumes are consistently collected and reported annually to the region and the state, no County mechanism presently exists for periodic review of recycling data. Time series residential recycling data is not compiled and readily accessible for analysis within the County, or broadly available to share among other local jurisdictions.

- **The County should continue to improve the ongoing collection and maintenance of recycling data.** While comparative recycling data is inherently difficult to acquire, the County should consider dedicating more resources into systematic collection and regular maintenance of quantitative information, particularly in the following areas:

  - In order to strengthen overall reliability of hauler estimates, Environmental Management Department staff should periodically verify hauler reported volumes of recyclable materials collected against weight slips from materials recovery facilities, as authorized by *Dakota County Ordinance No. 110*. (The County, in conjunction with the region, should consider alternative reporting relationships to complement estimated tonnages of recyclable materials collected. Alternative reporting arrangements might include materials recovery and other processing facilities as sources of independent data to corroborate estimated recycling tonnages.)

  - Given that recycling data currently best identifies metropolitan area trends over time, and is less indicative of specific comparisons among local jurisdictions, the County and the region should investigate the possibility of summarizing and reporting recycling data on a regional basis. A single regional reporting framework serves to establish reasonable parameters and consistent definitions for hauler reported estimates, and streamlines metropolitan area reporting to state and regional agencies.

  - Given continued business growth and the potential of commercial volumes to increase the recycling rate substantially, the Environmental Management Department should regularly assess commercial participation rates and recycling volumes collected. More comprehensive and frequent surveying of businesses in the County is necessary to determine recycling activity within the commercial-industrial-institutional sector. Similarly, a representative sample of large institutions should be surveyed on a regular basis in order to provide more information regarding recycling activity over time.

  - With regards to Dakota County's in-house recycling efforts, the Environmental Management Department, in collaboration with the Dakota Environmental Review Team, County Administration, and associated Departments, should require contracted waste haulers to supply service volumes of in-house materials recycled on a regular basis. Complementary strategies that will further strengthen future analyses of in-house recycling and source reduction trends include regular waste composition studies, and staff and visitor waste disposal and recycling surveys.

- **The County should continue to examine relative educational program effectiveness, considering appropriate message, media, frequency, jurisdictional level, and target audiences.** If Dakota County continues to utilize education as a key strategy for supporting recycling rates, then the Environmental Management Department, with cooperation from the Office of Planning and SWMCB member counties, should undertake efforts to determine the relative effectiveness of educational campaigns. The Department should continue to conduct surveys and focus groups as one method for gauging the effectiveness of public awareness initiatives. Best practice comparisons with respect to several components of environmental educational programs should be examined, including the following educational factors:

- Message -- What are the most important aspects of recycling and waste abatement to communicate to the public? What opportunities exist, as sponsored by the state, region, and other partners, to present environmental education messages? What existing messages may be adapted for use in campaigns in Dakota County and the region (e.g., should coordinate with industry contacts to assure public messages represent current recycling practices)?

- Media -- What are the best methods for communicating information to individuals and organizations inundated with information?

- Frequency -- How frequently should residents, businesses, and institutions receive messages related to recycling?

- Jurisdictional level -- Currently, local, regional, and state agencies invest in educational activities for broadening awareness of waste management issues, including recycling. Which level is most effective at outlining recycling program guidelines, and encouraging greater participation? How might educational campaigns reflect messages from private industry, and local and regional governments?

- Audience -- The Environmental Management Department should identify audiences currently underserved by existing recycling messages, in order to target awareness campaigns. Given changing demographic patterns, how should recycling messages be tailored to appropriately target households? Is there a significant need to translate educational materials to, and offer assistance in, other languages?

- In collaboration with local communities and the region, **Dakota County should promote local ordinances that support recycling.** The Environmental Management Department should work with local community representatives to promote model ordinances for increased recycling of excess materials and for building/site designs that encourage recycling. For example, haulers have indicated that some commercial establishments and multifamily dwellings do not include space for both garbage and recycling carts.

- **Dakota County's legislative platform should support strengthening state fiscal support of local recycling programs.** In real dollars, the State of Minnesota's commitment to recycling financed with the solid waste management tax has declined. The State of Minnesota has not dedicated the full proceeds of the solid waste management tax to environmental activities. Further, the current Legislature has reduced the contribution to SCORE by 10% as part of its budget balancing initiatives. The Dakota County legislative program should reflect the importance of a strengthened state commitment to support recycling initiatives and restore base funding for SCORE in future fiscal years.

RESIDENTIAL RECYCLING

CURRENT SYSTEM

Characteristics of the residential recycling program are as follows:

- The residential recycling program in Dakota County and the larger metropolitan area is mature -- residential recycling requires fewer resources to maintain over time, but increasingly more resources for continuous improvement of overall program effectiveness,
- Dakota County has largely achieved its mandated goal of recycling 50% of all mixed municipal solid waste generated by weight in recent years,
- Residential recycling includes both residential curbside and local drop-off collections of recyclable materials: residential curbside pickup of recyclable materials occurs in all cities and townships, on the same day as waste collection (minimum biweekly collection is required), while the Dakota County Eco-Site, cities, and nonprofit organizations (e.g., Goodwill) offer drop-off opportunities,
- Materials collected include newspaper, glass, metal cans, magazines, cardboard, residential mixed paper, and bottle-grade container plastics,
- Residential recycling is voluntary, with more limited participation by multifamily units,
- County provides recycling containers to single and multifamily residences, via cities and townships, and promotes residential recycling efforts through educational materials distributed to all households (e.g., *Green Guide 2002*),
- Private waste haulers largely provide collection services -- both the Cities of Farmington and Hastings utilize public collection for curbside waste and recyclables (Farmington additionally uses city staff and equipment to provide collection services),
- According to Dakota County ordinance, private waste hauling firms are required to offer the opportunity to recycle to all residents, and must charge customers according to weight or volume-based pricing structures, and
- Joint Powers Agreements (JPAs) with local communities provide a process for the County to give annual grants to cities and Rural Solid Waste Commission for administration of local residential recycling programs. Extending through 2003, current JPAs require municipalities to offer a specified level of service to residents.

As discussed earlier in the Recycling Outcomes section, Dakota County has maintained the mandated 50% recycling rate of all municipal solid waste generated by weight, achieving between 48% (2001) and 52% (1997) over the past five years. Residential recycling in Dakota County is not mandatory, although the County mandates that waste haulers offer recycling services to all residential customers. Additionally, waste haulers are required to report estimates of recycling tonnages collected by community, service sector (residential versus commercial), and material category. (As discussed earlier, the County provided a direct economic incentive to private waste hauling firms to collect recycling materials at the start of the Countywide recycling program. From 1992 through 1996, the County paid haulers to pick up recycling based upon monthly tonnage statements submitted. The payment was $25 per ton of materials collected in 1992, and declined $5 per year until payments ceased altogether in 1997. From 1997 to the present, haulers are required by Dakota County Ordinance No. 110 to submit quarterly reports of recycling tonnages, but receive no payment for tonnages collected.)

While Minnesota's statewide recycling rate has more than doubled since SCORE programs began (increasing by 25 percentage points between 1990 and 2000), slower growth and smaller rates of increase have characterized recycling rates for the latter part of the decade. The Minnesota Office of Environmental Assistance associates this trend with several characteristics of local recycling programs. These characteristics include mature residential curbside programs, a demonstrated increase in waste generation, end market issues, shift in materials usage, diminished statewide financial support for

recycling, and waste reduction activities.[85] These characteristics aptly describe the residential recycling program in existence in Dakota County and the greater Solid Waste Management Coordinating Board region, and present challenges for the County in continuing to improve existing curbside collection.

Local government plays a key role in assuring the consistency and stability of residential recycling programs. Additionally, the County, in conjunction with other metropolitan area counties, plays a critical role in promoting recycling among its residents and businesses. The County, both as an independent entity and as a member of the regional Solid Waste Management Coordinating Board (SWMCB), utilizes education, pilot programs, and other initiatives to encourage recycling among Dakota County single and multifamily residents. Much of Dakota County's activities are focused on residential recycling, and major program activities include education and local community administration components, as described below.

COMMUNITY FUNDING PROGRAM

Negotiated as individual Joint Powers Agreements (JPAs) with municipalities and the Rural Solid Waste Commission (representing thirteen townships and six rural cities), the Dakota County Community Funding Program is a five-year policy to implement residential recycling programs in each community in Dakota County. Approximately $300,000 is reserved annually for local communities to utilize to operate and maintain recycling programs, at the current rate of $5,000 minimum per community plus an additional $1.60 per house. (The current JPAs are in force until 2003.) Unlike other regional county community funding programs, Dakota County's program includes $25,000 in funds to purchase recycling containers for residents. Table N provides a comparison of community funding amounts for the six member Solid Waste Management Coordinating Board region for a sample municipality (Apple Valley) in 2000.

Table N. Sample Community Funding Comparison for the City of Apple Valley, 2000

SWMCB County	*2000 Community Funding*		*Total Funding **
	Base Amount	*Per Household Amount*	
Anoka	$10,000	$5.79	$95,611
Carver	$2,000	$1.25	$20,483
Dakota	$5,000	$1.60	$28,658
Hennepin	—	$8.74	$129,230
Ramsey	—	$2.01 (per capita)	$87,371
Scott	—	$8.32	$123,020

** Total Funding for Dakota County does not include $3,525 for residential recycling bins, a maximum of $10,000 available through the County's Sustainable Environmental Grant program, or costs to the County for development of educational materials. Total Funding received from Washington County assumes that the municipality meets all county criteria and receives the maximum amount available.*

Source: 2000 Dakota County Solid Waste Management Advisory Committee: *Dakota County Waste Abatement Community Funding Plan*, Funding Period: January 1, 2001 to December 31, 2004 -- Table 1, page 4

[85] Minnesota Office of Environmental Assistance: *Report on 2000SCORE Programs: A Summary of Waste Management in Minnesota*, April 2002. Page 9

Table O. Residential Recycling Programs in Dakota County Municipalities, 2002

Municipality	*Residential*	*Commercial*	*Materials Collected*	*Comments*
Apple Valley	Open hauling of waste and recycling for all residential units -- single and multifamily.	Open hauling of waste and opportunity to recycle for all commercial accounts.	Newspaper, cardboard, metal cans, glass containers, magazines, mixed paper, plastic bottles	City ordinance prohibits curbside collection of waste and recyclables: collection occurs in residential alleys.
Burnsville	Open hauling of waste and recycling for all residential units -- single and multifamily.	Open hauling of waste and opportunity to recycle for all commercial accounts.	Newspaper, cardboard, metal cans, glass containers, magazines, mixed paper, plastic bottles	Burnsville and Eagan combined staff resources and have a joint recycling coordinator (2000).
Eagan	Open hauling of waste and recycling for all residential units -- single and multifamily.	Open hauling of waste and opportunity to recycle for all commercial accounts.	Newspaper, cardboard, metal cans, glass containers, magazines, mixed paper, plastic bottles	Eagan currently issues only a limited number of hauler permits and has established day specific collection zones.
Farmington	Public collection of waste and recycling for all residential units -- single and multifamily.	Public collection of waste and recycling -- selected commercial accounts (businesses have opportunity to opt out, typically because of waste type and/or quantity).	Newspaper, cardboard, metal cans, glass containers, magazines, mixed paper, plastic bottles	City's public collection system utilizes both city staff and trucks, and Dick's Sanitation to collect and dispose of waste.
Hastings	Public collection of waste and recycling for all residential units -- single and multifamily.	Open hauling of waste and opportunity to recycle for all commercial accounts.	Newspaper, cardboard, boxboard, metal cans, glass containers, magazines, mixed paper, plastic bottles	City contracts collection and disposal with Waste Management, Inc.
Inver Grove Heights	Open hauling of waste and recycling for all residential units -- single and multifamily.	Open hauling of waste and opportunity to recycle for all commercial accounts.	Newspaper, boxboard, metal cans, glass containers, magazines, mixed paper, plastic bottles	Large number of small, local haulers provide collection services.
Lakeville	Open hauling of waste and recycling for all residential units -- single and multifamily.	Open hauling of waste and opportunity to recycle for all commercial accounts.	Newspaper, metal cans, glass containers, magazines, mixed paper, plastic bottles	Very rapid growth recently and has well established, city-sponsored, spring clean-up day.
Lilydale	Open hauling of waste and recycling for all residential units -- single and multifamily.	Open hauling of waste and opportunity to recycle for all commercial accounts.	Newspaper, metal cans, glass containers, magazines, mixed paper, plastic bottles	Small city consisting almost entirely of multi-family dwellings with small household size and high seasonal transition for residents.
Mendota	Open hauling of waste and recycling for all residential units -- single and multifamily.	Open hauling of waste and opportunity to recycle for all commercial accounts.	Newspaper, metal cans, glass containers, magazines, mixed paper, plastic bottles	Very small city (62 homes) with many city services provided through volunteer efforts.
Mendota Heights	Open hauling of waste and recycling for all residential units -- single and multifamily.	Open hauling of waste and opportunity to recycle for all commercial accounts.	Newspaper, metal cans, glass containers, magazines, mixed paper, plastic bottles	City has low percent of households in multifamily dwellings.
Rosemount	Open hauling of waste and recycling for all residential units -- single and multifamily.	Open hauling of waste and opportunity to recycle for all commercial accounts.	Newspaper, metal cans, glass containers, magazines, mixed paper, plastic bottles	Very rapid growth in recent years.
South St. Paul	Open hauling of waste and recycling for all residential units -- single and multifamily.	Open hauling of waste and opportunity to recycle for all commercial accounts.	Newspaper, metal cans, glass containers, magazines, mixed paper, plastic bottles	Older city with sizable industrial areas, served by numerous local small haulers.
Sunfish Lake	Open hauling of waste and recycling for all residential units -- single family housing only.	Not applicable.	Newspaper, metal cans, glass containers, magazines, mixed paper, plastic bottles	Very small, affluent city consisting entirely of single family households -- no multifamily residences or commercial properties.
West St. Paul	Open hauling of waste and recycling for all residential units -- single and multifamily.	Open hauling of waste and opportunity to recycle for all commercial accounts.	Newspaper, metal cans, glass containers, magazines, mixed paper, plastic bottles	Older city with sizable commercial strip served by numerous local small haulers.

Source: Dakota County Environmental Management Department; Dakota County Local Solid Waste Staff

Although Dakota County's Community Funding Guidelines do not outline specific outcomes that communities must achieve in order to receive funding, the guidelines identify a specific checklist of tasks and activities that communities must perform. Expected activities include a minimum number of community presentations and promotional materials that community staff must develop, as well as attendance at County-sponsored monthly Local Solid Waste Staff meetings, and participation in environmentally-responsible purchasing and source reduction activities. The County additionally requires more reporting and accountability from local communities than other SWMCB county programs.[86] Table O above describes curbside recycling programs for the County's largest urban communities. Approximately $40,000 of County SCORE funding is additionally made available on an annual basis to municipalities and townships as Sustainable Environmental Grants. The grants fund projects that expand, enhance, or improve existing waste abatement programs or support sustainability, and must result in increased amounts of materials collected or additional types of materials collected. (Hennepin County offers a similar fund to municipalities, known as the Waste Abatement Incentive Grant program.)

Table P. County Household Residential Recycling Tonnages, by Community, 1996 to 2001

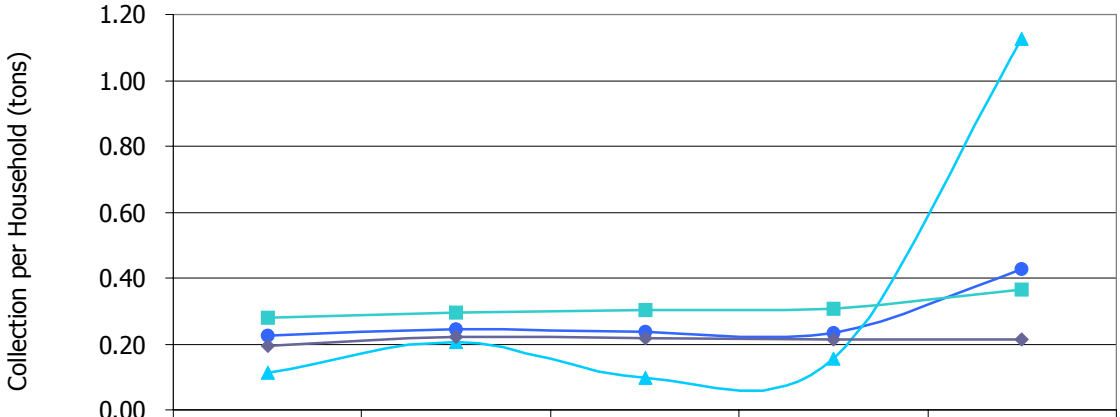
Community	*1996*		*1997*		*1998*		*1999*		*2000*		*1996 to 2000 % Change*
	# of HH	Tons per HH	# of HH	Tons per HH	# of HH	Tons per HH	# of HH	Tons per HH	# of HH	Tons per HH	
Apple Valley	14,060	0.22	14,445	0.26	14,786	0.25	15,296	0.25	16,344	0.18	-19.12%
Burnsville	21,761	0.18	22,079	0.19	22,661	0.18	23,004	0.18	23,687	0.17	-5.69%
Eagan	21,483	0.22	22,004	0.25	22,481	0.23	22,971	0.20	23,773	0.20	-11.81%
Farmington	3,062	0.20	3,383	0.25	3,656	0.26	3,923	0.24	4,169	0.28	37.86%
Hastings	6,107	0.23	6,230	0.24	6,372	0.24	6,507	0.23	6,642	0.43	88.92%
Inver Grove Heights	9,564	0.14	9,915	0.18	10,439	0.20	10,849	0.21	11,257	0.22	56.35%
Lakeville	11,475	0.18	11,883	0.24	12,282	0.27	12,937	0.27	13,609	0.23	30.72%
Lilydale	418	0.05	420	0.09	420	0.03	420	0.04	338	0.29	452.69%
Mendota	71	0.11	71	0.21	71	0.10	71	0.15	80	1.13	911.75%
Mendota Heights	3,992	0.28	4,068	0.30	3,860	0.30	3,865	0.31	4,178	0.36	30.53%
Rosemount	3,963	0.24	4,137	0.26	4,278	0.28	4,412	0.34	4,742	0.19	-20.85%
Rural Areas	5105	0.19	5209	0.19	5308	0.17	5475	0.20	10,086	0.13	-33.46%
South St. Paul	8,037	0.21	8,062	0.19	8,079	0.19	8,096	0.17	8,123	0.28	34.88%
Sunfish Lake	159	0.27	164	0.28	166	0.28	170	0.24	173	1.01	278.75%
West St. Paul	8,632	0.10	8,645	0.16	8,682	0.14	8,752	0.14	8,645	0.16	58.08%
County Total	117,889	0.19	120,715	0.22	123,541	0.22	126,748	0.21	135,846	0.21	9.96%

Source: Dakota County Environmental Management Department; Dakota County Local Solid Waste Staff

[86] A 2000 comparison of community funding plans across the SWMCB region is presented in *Dakota County Waste Abatement Community Funding Plan*, Funding Period: January 1, 2001 to December 31, 2004.

Municipal recycling data presented above in Table P suggests that the number of tons of recyclables collected per household exhibits wide variability over time. While the Cities of Mendota and Sunfish Lake report recycling tonnages as high as over one ton recycled per household in 2000, the majority of communities report household tonnages between 0.13 tons in rural areas of the County, to 0.43 tons collected in the City of Hastings. (As discussed above, reported data are estimates of recycling tonnages by community, account type, and material category over time. As such, these data depend upon accurate documentation of route geography and collection tonnages: discrepancies in reporting strongly impact these data and potentially skew demonstrated trends in community recycling activity.) Chart 11 below presents household recycling tonnages, collected curbside, for selected Dakota County communities.

Chart 11. Household Curbside Recycling by Municipality, 1996 to 2000



	1996	1997	1998	1999	2000
Burnsville	0.18	0.19	0.18	0.18	0.17
Farmington	0.20	0.25	0.26	0.24	0.28
Hastings	0.23	0.24	0.24	0.23	0.43
Lakeville	0.18	0.24	0.27	0.27	0.23
Mendota	0.11	0.21	0.10	0.15	1.13
Mendota Heights	0.28	0.30	0.30	0.31	0.36
Rural Areas	0.19	0.19	0.17	0.20	0.13
West St. Paul	0.10	0.16	0.14	0.14	0.16
County Total	0.19	0.22	0.22	0.21	0.21

Source: Dakota County Environmental Management Department; Dakota County Local Solid Waste Staff, Spring 2002

MULTIFAMILY RESIDENCES

Nationally, multifamily residences have proven to be difficult households for provision of recycling services: associated recycling rates tend to be lower for multifamily dwellings than for single-family homes. Given tenant turnover among rental properties, education initiatives require frequent and ongoing efforts to build awareness of recycling goals and procedures. Further, residents who speak English as a second language may be more likely to rent multifamily housing. As a result, bilingual and multilingual materials may be necessary to help facilitate household recycling for these residents. Particularly in multifamily complexes where recycling is centrally located alongside waste receptacles, recycling may become contaminated with waste materials and require disposal. Additionally, local jurisdictions cite a lack of financial incentives to encourage participation in local recycling programs, lack of space for storage of recycling containers, and greater inconvenience for multifamily residents.

Best practice jurisdictions target multifamily participation in curbside programs separately from single family participation in recycling. These jurisdictions establish goals, develop strategies, and evaluate performance specific to multifamily households, in order to tailor relevant recycling programs and outreach to multifamily units. Eureka Recycling dedicates staff resources specifically to supporting multifamily recycling within the City of St. Paul. The organization asserts that turnover is the most difficult issue to address regarding multifamily recycling. St. Paul experiences upwards of 25% turnover each year for multifamily residences. Because Eureka Recycling maintains exclusive contracts with Waste Management for provision of recycling services in St. Paul, Eureka Recycling is able to collect specific multifamily data by building in the city, monitor their relative recycling tonnages over time, and distribute targeted educational materials in the hopes of addressing specific trends.[87]

Seattle, Washington implemented a pilot program that distributed convenient, in-unit containers to multifamily residences for easy separation and carrying of recyclable materials. Despite greater ease and convenience for the resident, the city found that in-unit containers had little or no affect on multifamily recycling rates. In contrast, Seattle's Friends of Recycling program was much more effective. The program enlists volunteers in multifamily buildings to provide information and assistance to other building tenants regarding correct recycling procedures. Friends of Recycling additionally offers landlords $200 for each volunteer recruited to participate in the program and undergo training. The city's provision of an economic incentive has made the Friends of Recycling program relative more successful at encouraging multifamily residents to recycle.

RURAL AREA RESIDENCES

Dakota County is the only county in the state that offers curbside recycling for all township and rural area residents. Representing thirteen townships (Castle Rock, Douglas, Empire, Eureka, Greenvale, Hampton, Marshan, Nininger, Randolph, Ravenna, Sciota, Vermillion, and Waterford Townships) and six rural cities (Coates, Hampton, Miesville, New Trier, Randolph and Vermillion), the Rural Solid Waste Commission was created in 1988 by a joint powers agreement to manage solid waste abatement programs in rural areas of Dakota County. The Commission is governed by five members chosen by the Town Board Chairs or Mayors of each rural district, and is staffed by the County. Townships receive community funding grants from the County to administer and promote curbside residential recycling in all communities.

On April 1, 1989, all residents in rural areas were provided with curbside recycling services by existing waste haulers through agreements with Dakota County. Easier to manage and maintain than drop-off locations, curbside recycling offers rural residents the same opportunity for convenient recycling as residents in larger urban centers. During the early stages of the County's recycling program, between 1989 and 1991, private haulers were subsidized at the rate of $1.00 per stop (or house) per month for every residential waste collection account, and reimbursed through landfill tip fees. While the majority of rural residents who recycle curbside also take advantage of waste collection through the same hauling service, residents who self-haul waste are still eligible for curbside recycling. One area of targeted public education for the Rural Solid Waste Commission is to provide specific information to those residents who choose not to use a hauler to collect and transport waste materials regarding opportunities for curbside collection of recyclables. Commission members report that rural residents appreciate the convenience of curbside recycling, and that rural curbside collection operates smoothly.

EDUCATION AND PUBLIC AWARENESS INITIATIVES

The County works closely with the SWMCB member counties to educate area residents and businesses. Promotional efforts include three annual publicity materials distributed to every household in the County. Of the nine reduction and recycling projects identified in the Solid Waste Management Coordinating

[87] Interview with Tim Brownell, President and Chief Operating Officer, Eureka Recycling, January 2002.

Board's 2002 Work Plan[88], seven projects are directed towards education and public awareness campaigns that comprise approximately 50% of budgeted Reduction and Recycling funds for the year. (The remaining two projects include distribution of residential composting bins and overall communication and coordination activities.) SWMCB adopted a strategy to use community-based social marketing to foster sustainable behavior in 2001. This strategy, the Community POWER[89] education program, leverages the work of existing community groups with related environmental interests as a more effective method for sustaining long-term changes in behavior. The program distributes grant funding, technical assistance, and partnering opportunities to community organizations to reduce waste and toxicity within their respective networks. The County additionally participates with the SWMCB to develop the *Resourceful Waste Management Guide* for distribution to all businesses in the region. Current educational efforts include a variety of activities targeting specific audiences, including:

- Customer Newsletters: Environmental Pathways, Hauler Newsletter, Generator Newsletter, and contributor to the Extension Line, citizen Update and employee Digest,
- Program Brochures: VSQG, Battery, Fluorescent Bulbs, Dakota County Eco-Site,
- Action Guides: Green Guide for residents and project manager for Resourceful Waste Management Guide for Businesses,
- Web site updates: Registrations, notices, forms, Green Guide,
- Classroom participation: Providing speakers, contracting professional singers and puppeteers; Earth Day, America Recycles Day, and Pollution Prevention Day activities,
- Special children's activities: Summer library program, Earth Camp, school speaker,
- Educators: Teacher workshops; educational curriculum and products with Extension,
- Community events: Community collections, Green Living Expo,
- Community organizations: Presentations, incorporating messages into pre-existing newsletters and activities,
- Business events: Booths, presentations,
- County Fair: Display, kids day,
- In-house events and activities: Eco-10 Challenge, DERT, sustainability, waste sorts, and
- Eco-Site tours: Elementary through college-aged students.

Dakota County relies on the results of surveys and focus groups to tailor waste reduction and recycling messages to specific audiences. Based upon feedback from metropolitan area residents, this year's edition of the regional *Green Guide* focuses on water quality and features online Internet access. In similar campaigns, Dakota County has conducted focus groups with residents of various demographic characteristics; surveyed and hosted waste reduction workshops for other specific audiences, including printing companies; and distributes an annual newsletter, *Environmental Pathways*, and hosts a June workshop for 30 teachers (in collaboration with other public and nonprofit environmental agencies). Formal, County-sponsored commercial campaigns -- including the *Green Sheet* tailored specifically towards addressing waste issues for financial institutions, hospitals, churches, and retail establishments, respectively -- have been scaled back in recent years due to lack of business interest and staffing availability. While education is critical to stimulating interest and promoting awareness among County residents, the characteristics of effective education campaigns (i.e., media, frequency, target audiences, sponsoring organization/jurisdiction) is not completely known.

DEMOGRAPHIC ANALYSIS

According to the US Census Bureau, the population of Dakota County in 2000 was 355,904 individuals, corresponding to 131,151 households. Based upon a current population growth rate of approximately 1.7% between 2000 (355,904) and 2001 (363,866), approximately 370,000 individuals are estimated to live in Dakota County in 2002. One of the fastest growing counties in the state, particularly during the

[88] Solid Waste Management Coordinating Board: *2002 SWMCB Work Plan*, Approved September 26, 2001.
[89] http://www.swmcb.org/CommunityPowerMN/

1980s to early 1990s, current demographic information for Dakota County indicates that the County is relatively younger than the metropolitan area as a whole and becoming increasingly more racially and ethnically diverse. Further, recent economic data suggests that families residing in the County are relatively well able to support themselves. According to recent demographic analysis of Dakota County 2001 Residential Survey respondents[90], several associations between environmentally supportive practices (e.g., willingness to recycle, compost organic waste, fix and reuse items, minimize usage of hazardous chemicals, etc.) and demographics become apparent, particularly with regards to homeownership, age, level of education, and annual income.

Respondents to the 2001 Residential Survey suggest that Dakota County females were more likely to purchase used items, fix broken items to continue usage, and purchase items with less packaging; males, however, composted organic waste more frequently than females. Homeowners were more likely to compost food and yard waste, fix broken items to continue their usage, buy items with less packaging, reduce the frequency of lawn chemical usage, and use rechargeable batteries. Renters, however, reported purchasing products made from recycled materials slightly more frequently than homeowners. Similarly, age appears to impact individual behavior. County residents between the ages of 35 and 54 years old tended to more frequently compost waste, purchase items with less packaging, reduce the frequency of lawn chemical usage, and switch to less hazardous cleaning products than any other age group. In contrast, citizens between the ages of 18 and 34 years, and those aged 55 and over, did not exhibit specific trends. Relatively educated individuals (graduates of vocational and technical colleges, residents with some college experience) were more likely to purchase used items, fix broken items, and switch to less hazardous cleaning products. College graduates and postgraduates were more likely to compost, buy products made from recycled materials, and reduce the usage of lawn chemicals.

Similarly, income appears to be a significant factor affecting household recycling behavior. Households with an annual income between $50,000 and $99,999 tended to more frequently compost waste, and switch to less hazardous cleaning products. Dakota County households earning $100,000 or more per year, however, were more likely to buy products with less packaging, reduce the use of lawn chemicals, take hazardous waste to a drop-off site, and use rechargeable batteries. In contrast, households with an annual income of $49,999 and less exhibited few tendencies, due to the variations in response. Relatively young and able to support itself, Dakota County residents have likely achieved higher levels of education and homeownership status than other areas of the metropolitan area. As such, County residents may be relatively more willing to participate in recycling programs and otherwise engage in related environmentally beneficial practices. Although comparable analyses of demographic trends in recycling and related behaviors have not been conducted on a systematic basis across the region, it is clear that several demographic characteristics likely offer important insights into focusing future educational and outreach efforts to residents. (A more detailed discussion of statistical methodology regarding demographic analysis of 2001 Residential Survey data is found in Appendix VI.)

BEST PRACTICE COMPARISONS

Most local governments have focused their recycling efforts in the area of residential recycling. As a direct result, easy improvements to residential recycling have largely been implemented, and ongoing progress in this sector will continue at a considerably slower pace. Best practice research suggests that model residential recycling programs nationwide maintain recycling rates within the range of 50% of total municipal solid waste generated. A nationwide comparison of recycling programs conducted by the US

[90] From a sample of 700 Dakota County residents, the 2001 Residential Survey included 14 questions concerning recycling and household waste reduction, as described in Appendix VI. Survey results, however, were not designed for in-depth analysis of specific recycling trends. As a result, the survey does not represent all activities undertaken by individuals in the area of recycling. Survey results are self-reported without independent confirmation of actual practices (i.e., residents may report that their household *always* composts food and yard waste, but in actuality composts less frequently than reported).

Environmental Protection Agency in 1999 identified one theme common to all successful waste management programs: "waste diversion is not an 'add-on' to the trash management program. Rather, source reduction, recycling, and composting are all integral elements of their overall solid waste management programs."[91] Fundamental to the success of all waste abatement programs are public education and outreach, and the development of end markets for recovered materials. The national study also identified several key components that contribute to residential recycling program effectiveness. These key factors include encouraging or requiring participation, offering curbside recycling service to multifamily dwellings, augmenting curbside collection with drop-off collection of recyclables, and targeting a wide range of materials for recovery (participating communities collected between 17 and 31 recyclable materials through curbside or drop-off recycling programs, out of a potential 37 material categories).[92] While identified factors similarly characterize Dakota County's residential recycling program, analyses performed by Eureka Recycling and Skumatz Economic Research Associates, Inc. offer several important best practice comparisons.

Contracted to provide residential recycling services for St. Paul, Eureka Recycling recently completed an in-depth analysis of applied collection methods that included a comprehensive evaluation of environmental impacts, cost, and convenience and customer satisfaction. Based upon the results of their study, Eureka Recycling recommended that the city's curbside recycling program specifically adopt:

- Two-stream system for collection of papers (including newspaper, cardboard, paper, and mail) and rigid containers (including cans, glass and plastic bottles),
- Collection of PET (#1) and HDPE (#2) plastic bottles to curbside collection,
- Provision of 18-gallon recycling bins with weekly collection, and
- Further exploration of organics collection as an addition to the current curbside program, since organics collection represents the greatest potential for further waste stream diversion.

By carefully implementing suggested changes to St. Paul's curbside recycling program, Eureka Recycling will more effectively control costs, improve convenience, and divert a total of 74% of the municipal solid waste stream from disposal through composting and recycling activities. Anticipated improvements to the city's residential curbside program could result in an overall increase in collected materials of 26%, which in turn, would result in higher revenues for the city and higher expenditures to pay for additional recycling tonnages. An increase in program costs would likely be passed to city residents: Eureka Recycling estimates that residents would pay $2 to $4 more per year to cover increased program costs. The study further surveyed St. Paul residents to assess their priorities regarding curbside program cost, convenience, and environmental benefit. Residents ranked environmental benefit as the first priority in all study areas, and although cost was an important consideration, cost overwhelmingly ranked third as a priority by residents. According to survey responses, residents preferred 'closed loop' recycling processes that maintain the 'highest and best use possible' for a material; for example, none of the respondents accepted use of glass collected for recycling as landfill cover (a practice referred to as recycling by some waste processors).[93]

Although recycling in the City of St. Paul is collected in an organized system that depends upon exclusive contracts for services provided, the results of Eureka Recycling's recent analysis of curbside collection programs identifies areas of improvement for residential recycling within Dakota County. Eureka Recycling's experience suggests that County residents may be similarly interested in pursuing environmental objectives above economic concerns up to some maximum level of commitment. Households' willingness to pay a larger share of the cost of recycling may serve to create an economic incentive for haulers and local governments to improve program effectiveness. Further, St. Paul

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[91] US Environmental Protection Agency: *Cutting the Waste Stream in Half: Community Record-Setters Show How*, EPA-530-R-99-013, June 1999. Page 3, 4

[92] US Environmental Protection Agency: *Cutting the Waste Stream in Half: Community Record-Setters Show How*, EPA-530-R-99-013, June 1999. Page 12, 13

[93] Eureka Recycling: *A Comparative Analysis of Applied Recycling Collection Methods in Saint Paul*, May 2002

residents' opinions regarding 'closed loop' processes highlight potential environmental preferences County residents may similarly hold with regards to waste management practices. Residential surveys conducted on a biennial basis in Dakota County question residents on numerous environmental issues. A more frequent, separate questionnaire targeted more specifically to surveying recycling program preferences, however, would provide additional guidance to future program development in Dakota County, and provide a current barometer of public opinion regarding waste management priorities. Finally, the City of St. Paul exemplifies a number of benefits of public or organized collection of recyclable materials, as presented earlier in Recycling Opportunities. One of the fundamental benefits of organized collection appears to be the opportunity to collect more comprehensive and specific program data that in turn, can suggest areas for improvement. As Eureka Recycling has demonstrated through the results of their evaluation of curbside collection strategies, additional rates of diversion are possible to quantify in situations where close partnership or additional oversight of recycling services yield comparable data.

Analyses conducted by Skumatz Economic Research Associates, Inc. (SERA)[94] suggests that recycling practices may be strongly influenced by a variety of demographic or community, economic, and specific program characteristics. SERA was selected by the California Chapters of the Solid Waste Association of North America to conduct an evaluation of California's 1989 recycling law (Legislation AB939). Under the auspices of state legislation, California is mandated to reach a rate of 25% diversion of municipal solid waste by 1995, increasing diversion to 50% by 2000. The law encourages intensive recycling, waste diversion, and source reduction, and additionally outlines data reporting requirements, measurement methods, and financial penalties for noncompliance. SERA's assessment focuses primarily on state legislation and related policy impacts on local recycling programs.

Table Q. Factors Affecting Residential Recycling/Landfill Diversion and Costs in California

	Recycling/Landfill Diversion Impacts	*Related Cost Impacts*
Community Factors	• Higher in communities with higher levels of education • Lower for communities that have a higher concentration of residents who do not speak English • Higher in larger California cities and suburban communities	• Higher costs for programs in larger communities; however, this cost is balanced by greater population density • Higher costs for higher income communities
Financial Factors	• Higher in communities with variable program rates (pay-as-you-throw rates) • Lower if separate charges are applied for recycling (i.e., line items and fees)	• Higher costs to maintain variable program rates (pay-as-you-throw rates)
Recycling Program Factors	• Higher for commingled collection programs than for programs that requires residents to separate the items into separate streams • Higher for programs with additional materials collected (i.e., mixed waste paper and corrugated cardboard) • Higher for more established programs (pre-1988) • Higher for mobile homes and multifamily units • Slightly higher if recycling bins are provided to residents	• Lower cost on a "net" basis for commingled and less frequent collections • Higher cost for additional materials collected • Higher cost for automated (versus manual) collection programs • Lower cost for mandatory programs • Lower cost for more established, mature programs • Higher cost when special recycling containers/bins are provided to residents

Source: Skumatz Economic Research Associates, Inc. (SERA): *Achieving 50% Recycling-Program Elements Analysis and Policy Implications*, 1998

[94] http://www.payt.org/publicat.htm

Results of SERA's evaluation, as presented above in Table Q, correspond well with statistical analysis of the 2001 Residential Survey of Dakota County residents discussed above in Demographic Analysis. SERA's analyses note the importance of economic incentives in supporting recycling practices, including pay-as-you-throw variable pricing for waste collection services, and the correlation between greater household convenience with generally greater program cost for providing services. Ongoing assessment of residential recycling program benefits and associated costs in Dakota County will necessitate development of targeted case studies and pilot projects, supported by vigorous data collection and maintenance.

RESIDENTIAL RECYCLING: FINDINGS AND RECOMMENDATIONS

Similar to many mature curbside recycling programs established in the early 1990s, residential recycling in Dakota County is relatively well established. County households receive educational materials on a regular basis and track estimated tonnages from licensed waste haulers. Nevertheless, with the support of best practice research, one improvement to residential recycling in the County includes exploring opportunities to increase participation by multifamily residences.

RESIDENTIAL RECYCLING FINDINGS

- **Residential, curbside recycling in Dakota County is well established and effective.** Overall, because curbside recycling programs have been in operation in many metropolitan communities nationwide since the early 1990s, residential recycling is largely well established. Similarly, following a decade of programmatic emphasis, residential recycling in the County is mature and effectively administered within municipalities and rural communities. The key elements of residential recycling programs include program consistency, stability, and household convenience.

  Although residential recycling is voluntary in the County, private waste hauling firms must provide all households the opportunity to recycle, per Dakota County Ordinance No. 110. The County's partnership with local cities and townships through the Community Funding Program strongly supports curbside recycling in local communities. A majority of County recycling activities support residential recycling, including distributing funds to local communities to implement curbside recycling programs, developing educational materials disseminated primarily through newsletters and other mailings, and provision of recycling containers to new residents through community programs.

- **Many aspects of residential recycling in Dakota County compare favorably with best practice jurisdictions around the country**, including the existence of pay-as-you-throw variable pricing structures and collection of many material types. Best practice comparisons further indicate that continued improvements in residential recycling may yield fewer gains in the recycling rate over time, at greater program expense, due to diminishing returns. Additionally, although recycling is widely practiced by households in local communities throughout the County, region, and nation, it has been difficult to continue to improve waste management practices to develop a stronger focus on waste reduction and materials reuse (both more favorable strategies than recycling within the waste management hierarchy).

- **Including multifamily units in residential recycling collection requires dedicated effort to maintain participation rates.** Multifamily units are difficult residences to incorporate within local curbside recycling programs because they require targeted effort to improve participation rates and quality of recyclable materials collected. Particularly in more urbanized areas, multifamily residences comprise a significant percentage of total housing in some communities,

and may represent a substantial number of households in the County potentially underserved by local recycling programs.

Best practice research suggest that improving multifamily recycling requires development of dedicated strategies, such as pilot programs implemented by Seattle, Washington (e.g., Friends of Recycling recruited volunteers in multifamily buildings to provide information and assistance to other building tenants regarding recycling practices). Within the City of St. Paul, Eureka Recycling dedicates staff specifically to tracking multifamily recycling trends and working with property managers and landlords to assure that residents have opportunities to recycle.

RESIDENTIAL RECYCLING RECOMMENDATIONS

- **The County should evaluate opportunities to improve multifamily residential recycling**, including opportunities for collaborative efforts with municipalities. Given the inherent difficulties of facilitating multifamily recycling, the Environmental Management Department should invest resources to encourage greater participation by multifamily households in curbside recycling. The Environmental Management Department should consider the applicability of educational and other programs geared principally towards promoting multifamily participation in local programs. The experience of best practice jurisdictions suggest practical comparisons for Dakota County and regional recycling programs to consider, including Seattle, Washington's Friends of Recycling multifamily program.

- **The County should examine and assess the work of jurisdictions in the region and nationwide to maintain and improve residential recycling rates on an ongoing basis.** While curbside recycling in Dakota County is well established, current efforts by comparable jurisdiction in the metropolitan area and across the nation may help to further identify factors that impact participation in residential recycling programs and household awareness of related waste management issues.

  The Environmental Management Department should specifically consider recent analyses, such as those conducted by Eureka Recycling (to test recycling collection strategies in St. Paul), and the Cities of Burnsville and Eagan (to improve the collection, processing, and marketing of residential mixed paper). The current evaluation efforts of best practice jurisdictions suggest areas Dakota County and the Solid Waste Management Coordinating Board region should consider for developing local case studies and pilot projects, including specific collection methods, waste streams, and education strategies.

COMMERCIAL RECYCLING

CURRENT SYSTEM

Characteristics of commercial recycling in Dakota County include:

- Commercial recycling sector often includes industrial, institutional, and multifamily recycling,
- Participation in commercial recycling is voluntary and largely unknown, though limited participation by businesses is likely,
- County technical assistance and education activities are promoted in coordination with the Solid Waste Management Coordinating Board region (e.g., distribution of the *Resourceful Waste Management Guide 2001*),
- Commercial recycling includes both 'curbside' and local drop-off collections of recyclable materials: the Dakota County Eco-Site offers recycling drop-off opportunities to businesses,
- Materials collected include newspaper, glass, metal cans, magazines, cardboard, residential mixed paper, and bottle-grade container plastics,
- Private waste haulers provide waste and recycling services in an open collection system in which individual businesses contract directly with haulers for services,
- Haulers are required to offer the opportunity to recycle to all businesses, and must charge customers according to weight or volume-based pricing structures, and
- It is generally assumed that the commercial sector generates 75% of the total municipal solid waste stream, and contributes 75% of the volume of materials recycled: as a result, businesses represent the greatest potential for increasing the amount of waste diverted from area landfills.

Greater interest in commercial recycling activities was prompted with establishment of the 50% mandated rate for recycling of municipal solid waste in the Twin Cities metropolitan area. Analysis of state recycling data suggests that the majority of growth in waste generation and recycling can be attributed to the commercial, industrial, and institutional waste sector.[95] The fact that commercial activities potentially comprise the lion's share of total waste generated and recycled, coupled with more stringent recycling standards, has shaped county recycling initiatives within the region in recent years. The commercial sector has become a target for outreach and technical assistance largely because achievement of the 50% mandated rate necessitates increased participation by more than just area residents in local recycling programs.

Employment and economic data demonstrates that business growth has been robust in Dakota County, growing somewhat faster during the second half of the 1990s (an average of 3.3% annually) than during the first half of the decade (average of 2.4% annually). Between 1990 and 2000, there was a 36% increase in the number of businesses located in the County, resulting in more than 9,000 total firms by 2000. The number of jobs located in the County also continues to rise, increasing by an average annual rate of 5.6% from 1993 to 2000. Further, growth in the service and trade sectors has accounted for approximately 53% of all job growth in Dakota County between 1995 and 2000. (Note that a large portion of all employment growth has occurred in trade and services for all seven regional counties.)[96] While the implications of business and employment growth on the potential to increase recycling rates are not well understood, it is clear that the commercial sector in Dakota County plays a significant waste generation role in the County and potentially, represents a critical venue for making ongoing program improvements in the area of recycling.

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[95] Ann L. Bernstein, Minnesota Office of Environmental Assistance: "Residential vs. Commercial MSW generation trends in Minnesota", Paper #362

[96] Minnesota Department of Economic Security: *ES-202 Program*, First Quarter 2000. The ES-202 Program collects employment by sector, as well as the average weekly wage by sector for counties. Due to variability in employment by season, average employment for the year is used for the purposes of comparison.

It is important to note that unlike residential recycling, commercial recycling occurs largely because businesses are motivated by practical cost considerations. Businesses are charged to recycle, particularly in situations where tip fees may be subsidized, such as in Ramsey and Washington Counties. The direct economic benefit of recycling for most companies who do not generate large enough quantities of recyclable materials may be apparent only as a discount in associated waste hauling fees, since the volume of recyclable materials offsets the volume of waste that requires disposal. A business is more likely to recycle if it produces substantial quantities of clean, easily-separated recyclable materials (e.g., office paper, corrugated cardboard, scrap metal, plastic), and it anticipates that the effort to place these materials in separate containers for recycling collection will:

- Generate extra revenue because the items have economic value, or
- Reduce waste hauling costs because the disposal cost for items in a recycling bin are less than the disposal costs of the same items placed in a garbage dumpster.

In turn, waste hauling firms offer recycling services to businesses based upon:

- *Competition* -- if a business expects a waste hauler to provide recycling collection and a specific hauler does not offer this service, then the hauler risks losing a valuable waste collection account. The profit received from the waste collection portion of a commercial account is often attractive enough to motivate a hauler to provide recycling services, even though recycling often yields less revenue than waste collection (this is particularly true for residential recycling).

  Additionally, private hauling firms dedicate personnel to help assess waste streams from larger companies and conduct waste audits as a service to the firm, since steady volumes of recyclable materials from larger firms are generally more valuable than smaller or mixed volumes from smaller companies.

- *Value of the Materials* -- if the market for materials like office paper or corrugated cardboard are very high, then haulers might promote recycling services to their commercial accounts (in 1995, the value of corrugated cardboard was so high, that some haulers offered to share their revenue from the sale of recycled cardboard with their customers who generated the material).

Other factors that motivate commercial recycling include the personal commitment of a business owner or manager to environmental principles. Some businesses choose to pay for recycling services, even though the demonstrated cost of recycling is greater than the cost to discard all waste materials, because of a personal or corporate commitment to an environmental ethic. Similarly, those companies that are highly visible and dependent upon public contact (i.e., retail and dining establishments) may choose to recycle in order to foster positive public relations -- the risk of acquiring a negative public image may outweigh the costs of recycling. Finally, businesses operating in a state, county, or municipality with mandatory recycling laws will usually observe statutory requirements and pay to recycle rather than risk noncompliance.

COMMERCIAL DATA

Commercial recycling has been particularly problematic to define, collect, and compare with any accuracy, since it generally includes commercial, industrial, and institutional recycling tonnages. Additionally, private hauling firms often include collection from multifamily housing in commercial recycling volumes, since multifamily residences often constitute special challenges for recycling, as discussed above in the Residential Recycling section. Commercial recycling figures are at best imprecise, in part because private haulers are not required to report the actual weight of vehicle loads collected, despite routes that may cross several jurisdictional boundaries. Given the inherently inexact nature of commercial recycling data, surveys and corresponding estimates are frequently the best information for shaping local program decision-making. Regionally, although no standard formula for estimation exists, it

is believed that the vast majority of recycling is initiated by the commercial sector. The Solid Waste Management Coordinating Board reported that the category of commercial, industrial, and institutional waste constituted approximately 75% of the municipal solid waste recycled in the region in 2000, totaling 995,000 tons, as compared with 22% recycled by area residents during the same year, or 294,000 tons.[97]

In Dakota County, commercial recycling figures represent a range between estimated tonnages collected and reported by private waste haulers, and an estimate of recycling activity[98] based in part upon results of a survey of local businesses. Dakota County conducted a comprehensive survey of businesses located in the County in 1991 to establish a reasonable baseline for commercial recycling. Businesses were categorized by SIC code and number of employees: larger firms operating in the County were subsequently contacted and asked to document their current level of recycling activity. These estimated tonnages then formed the basis of each subsequent year's estimation of commercial recycling in Dakota County: the baseline data is updated annually by contacting haulers operating in the County for the number of commercial accounts serviced, and whether the number and size of commercial accounts appear to be relatively increasing or decreasing over the past year. Estimated tonnages are further qualified by current employment and business growth figures for the County and informal surveys of tonnages received by local end markets and resource recovery firms.

While the survey of businesses has not been updated since 1991, recycling tonnages collected by private haulers and reported to the County on a quarterly basis complement tonnages estimated from the 1991 survey of businesses. The County's estimate of commercial recycling falls between approximately 16,000 and 50,000 tons of recyclable materials collected annually, reflecting the distance between known and expected volumes. Both reported and estimated commercial recycling amounts are reported to the state Office of Environmental Assistance via the annual SCORE report.

Washington and Ramsey Counties similarly employ this method of estimation to calculate the relative percentage of commercial recycling activity occurring in any given year. Hennepin County, in collaboration with the Center for Urban and Regional Affairs at the University of Minnesota, surveyed businesses regarding waste management practices during the mid-1990s: figures are adjusted annually to approximate current conditions. Hennepin County recommends surveying end markets across the region in order to provide checks and balances for the overall system of estimating commercial data, and to determine the actual proportion of collected materials that are in fact recycled. Both Carver and Anoka Counties conducts surveys of businesses for the benefit of estimating commercial recycling: Anoka County surveys businesses biennially, as discussed in greater depth below (see Best practice Comparisons). While the regional counties share an interest in improving commercial estimates of tonnages recycled, neither the regional Solid Waste Management Coordinating Board, or the Minnesota Office of Environmental Assistance, is currently pursuing standardized estimation techniques for commercial recycling due to high costs and difficulties in implementation.[99]

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[97] Solid Waste Management Coordinating Board: *Annual Progress Report 2000*, Recycling. Page 18

[98] Dakota County calculates estimated commercial tonnages based upon the 1991 Dakota County Business Analysis as a baseline. Each succeeding reporting year uses Minnesota Department of Economic Security data to determine whether the number of County business employees has increased, decreased, or remained the same when compared with the previous year. An annual telephone survey of hauling companies is conducted to identify whether the amount of business recycling has relatively increased, decreased, or remained the same over the past year. (If the hauler identifies a relative change, justifications for the change are established. For example, one hauler added collection of a new recyclable material in 2001, impacting resulting tonnages.) Additionally, haulers are asked if they have new business accounts, and whether these accounts are new to the County or represent transferred accounts from other haulers. Historically, if haulers indicate no change in tonnages collected from the previous year, the County's commercial recycling rate is estimated to increase approximately 2.1% based on growth in the number of individuals employed in the County.

[99] Staff from regional counties have investigated the feasibility of producing firmer estimates for commercial recycling in recent years. While improvements may exist to produce sound commercial figures, these improvements are considered too costly to implement for the benefit of better data.

As discussed above (Data Issues, page 57), recycling tonnages are difficult to confirm, particularly for commercial amounts. Outside of enforcing more explicit reporting requirements, little opportunity exists to verify overall accuracy of weights reported or estimated for commercial recycling. Private hauling companies, materials recovery facilities, and end markets generally consider recycling tonnages and their associated value to be proprietary information -- especially for commercial tonnages, since these amounts potentially represent large revenues for hauling and processing firms.

Further, it is particularly difficulty to track comprehensive recycling data for smaller firms. Small businesses that rent space in larger complexes or malls often observe no connection between the amount of waste generated and the costs associated with collection and disposal of that tonnage. Larger office buildings often do not keep good records of recycling tonnages generated per business, since waste and recyclables collection are provided as a service to the building. As a result of incomplete information available from the waste management industry regarding commercial recycling tonnages, the use of business surveys plays a critical role in assessing current levels of recycling activity, and the potential to improve business participation over time.

TECHNICAL ASSISTANCE AND BUSINESS RECOGNITION

A 1999 survey of recycling programs nationwide conducted by the US Environmental Protection Agency, found that institutional and commercial sector best practice programs provide some form of technical assistance.[100] Providing technical assistance to companies includes serving as a reference, disseminating information, and communicating suggestions for improvement. Several counties in Minnesota offer technical assistance to interested businesses as one strategy to increase recycling tonnages. Blue Earth County directed staff to speak with every business located in the County to improve recycling rates among businesses. Hennepin County provides the most comprehensive commercial program in the metropolitan area, investing staff and other resources into face-to-face waste audit visits and providing other technical assistance through their Business Waste Reduction Program.

Other resources available to businesses include Minnesota Waste Wise[101], a collaboration between the Minnesota Chambers of Commerce and the Minnesota Office of Environmental Assistance to provide technical assistance to interested firms for a small fee, and the Minnesota Technical Assistance Program, a free service sponsored by the University of Minnesota.[102] The OEA additionally assembled a network of regional experts within the Minnesota Retired Engineers Technical Assistance Program (Minnesota RETAP) in August 2001 to provide more in-depth environmental audits to businesses, hospitals, schools, and other organizations interested in reducing costly waste.[103]

According to a recent survey conducted by the Solid Waste Management Coordinating Board[104], businesses located in the metropolitan area cite a variety of barriers that prevent their businesses from recycling more of their solid waste. Over one-fourth (27%) of those firms surveyed identified no barriers to additional recycling. For the 342 companies that were able to identify barriers, however, the availability of storage space was the most frequently cited factor in preventing the business from improving its recycling efforts, as noted in Table R below. Although technical assistance does not necessarily offer solutions to physical space or storage limitations, technical assistance may serve to address cost issues and build management support of recycling activities by highlighting strategies that

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[100] US Environmental Protection Agency: *Cutting the Waste Stream in Half*, 1999. Page 31

[101] Minnesota Waste Wise provides technical assistance to interested businesses and organizations for a small membership fee. Member are entitled to information and access to staff, on-site visits to help identify areas for improvement, newsletters, ongoing education, and other waste reduction programs: http://www.mnchamber.com/about/wise_waste.cfm.

[102] http://www.mntap.umn.edu/

[103] http://www.moea.state.mn.us/media/010815.cfm

[104] Solid Waste Management Board: *Business Survey 2000 Final Report*, January 29, 2001. Pages 27, 28

provide economic benefit to the company over the long-term. (It is interesting to note that survey results additionally demonstrate no discernible difference in barriers cited between counties or between companies of various sizes.)

Table R. Reported Barriers to Commercial Recycling

Reported Barrier:	*To Recycling*	*To Waste Reduction*
Available Storage	42%	31%
Added Time	30%	29%
Lack of Service from Hauler	30%	20%
Available Staff	27%	25%
Not a Demonstrated Priority	25%	24%
Added Cost	21%	20%
Lack of Staff Participation	18%	18%
Lack of Management Support	10%	11%
Other	8%	6%

Source: Solid Waste Management Coordinating Board: *Business Survey 2000 Final Report*, January 29, 2001. Pages 27, 28

One aspect of encouraging private businesses to participate in source reduction and recycling programs is the role of both public education and recognition efforts. In Dakota County, the ARROW (Awards for Recycling and Reduction of Waste) Program recognizes organizations who have implemented a recycling program, buy recycled-content materials or supplies, sell products with recycled content, reuses material, or have reduced waste in Burnsville, Eagan, and Apple Valley. Sponsored by the Burnsville and Eagan city recycling programs, the program stipulates that businesses meet at least one of the waste reduction strategies listed; most companies, however, meet several of the identified qualifications. Initiated in 1999 as a pilot project to reward area businesses for making environmentally-conscious decisions, the program is designed to be simple and convenient for businesses to participate. Interested businesses fill out and submit a short application, which is reviewed for outstanding environmental violations, and eligible businesses are awarded a window decal and certificate.

ARROW firms are recognized annually in a local newspaper advertisement listing all participants and highlighting special waste reduction achievements. Companies receive three mailings each year containing waste minimization information geared to private businesses, and also receive evaluation cards to provide feedback to program administrators. During the first year the program was established, 15 firms participated from the City of Burnsville. Currently, the ARROW Program has grown to include 58 firms from Burnsville, 21 from Eagan, and four from Apple Valley. Due to resource limitations, the ARROW Program does not directly offer technical assistance to interested companies.[105]

BEST PRACTICE COMPARISONS

Because commercial recycling frequently exerts a financial burden on participating businesses, local recycling programs frequently target establishment of economic incentives for commercial recycling.

[105] Conversation with Sue Bast, Recycling Coordinator, Cities of Burnsville and Eagan, Summer 2002.

Although later discontinued, the City of San Jose, California offered a one-time $5,000 rebate program for businesses that implement new recycling programs or install equipment that increase the amount of material recycled. San Jose additionally provides desk-side containers to businesses for in-house recycling, free of charge. Seattle, Washington funds grants and rebates to businesses of up to $5,000 as an incentive to develop recycling plans. The city excludes recycling revenues from haulers' Business and Occupation Taxes on waste collection revenues.[106] Additionally, the City of Seattle recently identified small businesses as one niche underserved by recycling services. As a result, the city developed a program in which small businesses are included in residential curbside collection of recyclable materials. The Small Business Curbside Recycling Program[107] allows businesses that generate a weekly total of 90 gallons or less of waste to participate in city-sponsored curbside or alley recycling service at no charge to the firm. Similarly, Hennepin County identified a commercial recycling strategy that would encourage municipalities in the county to include small businesses that generate household quantities of recyclable materials on residential curbside collection routes in its 1998 Solid Waste Master Plan.

The large number of businesses located in Hennepin County, coupled with the fact that the commercial sector generates tremendous amounts of municipal solid waste, served as one important driver for creation of the county's Business Waste Reduction Program[108]. Initiated in 1998 as a pilot project funded by the Minnesota Office of Environmental Assistance, the program target recycling and source reduction within the commercial sector as an important strategy for improving the total amount of waste diverted from disposal. The Business Waste Reduction Program serves as a no cost, no obligation, non-regulatory service to businesses interested in reducing the amount of waste being generated and managed. A cross-divisional team of Hennepin County staff target interested firms and other organizations to perform on-site waste assessments; provide technical assistance; distribute information regarding waste reduction, reuse, recycling and pollution prevention; provide links to other resources, follow-up, annual recognition, and ongoing assistance. Baseline data for individual firms are established based upon waste hauling fees currently being assessed: companies located in Hennepin County pay an additional solid waste charge of 31% of the total fee due to state and county fees.

Program staff conduct in-person waste audits with larger firms since larger companies often represent a greater potential for waste reduction and recycling; waste audits for smaller firms are often conducted via the telephone. Although the program does not currently target specific commercial or industrial sectors, the program may become more customized to specific waste streams (e.g., office paper generation) in the future. In coordination with presentations to area neighborhood and business associations, program staff specialize outreach efforts to particular geographic areas. While economic incentives exist to reduce waste management costs and businesses have some interest in the program -- approximately 150 firms have participated since the program's initiation in 1998 -- several challenges for the Business Waste Reduction Program remain.

These include ongoing promotion of the benefits of the program, attracting more businesses to participate, and measuring the level of impact technical assistance has on business decisions and tonnages recycled in the county. Committed to building long-term awareness, the Business Waste Reduction Program represents the most structured commercial recycling program in existence in the region, and is central to Hennepin County's efforts to improve recycling rates countywide. In contrast, Ramsey County's emphasis on commercial waste abatement has shifted from more time-consuming tours of businesses to perform on-site interviews and waste assessments, to providing more telephone assistance. Ramsey County continues to produce educational and promotional materials and conduct training sessions to help commercial generators reduce waste; the county is currently considering targeting specific waste streams, including office paper, for specialized reduction and recycling initiatives.

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[106] US Environmental Protection Agency: *Cutting the Waste Stream in Half*, page 145
[107] http://www.cityofseattle.net/util/services/recycling/sbusiness.htm
[108] http://www.co.hennepin.mn.us/environmental/business/BWReduction.html

Anoka County surveys large businesses in the county on a biennial basis to track weight-based recycling data from commercial entities, through the county's Integrated Waste Management program[109]. Unlike the other metropolitan area counties, Anoka County has dedicated staff time to surveying businesses regularly to determine more accurate estimates of recycling tonnages for at least the past five years. (Although not absolutely conclusive, SCORE data reported to the Minnesota Office of Environmental Assistance demonstrates higher recycling rates in Anoka County over Dakota County between 1998 and 2001: see Appendix IV.) Initiated in January of every other year, a two-page survey and cover letter is sent to a database of all businesses located in the county. The same survey is mailed to a smaller contingent of large businesses during off-survey years for the benefit of comparison. Businesses are encouraged to return the survey via business reply mail, and may additionally request other information via business reply postcard. The survey is modeled after the SCORE report forwarded to counties for reporting the tonnage of recyclable materials collected annually, and requests information for a variety of material categories, including: paper, metal, glass, and plastic.

Last year, 6,832 surveys were mailed to businesses employing four or more employees. Approximately 300 surveys were returned, which serve as the basis for the county's annual estimate of commercial recycling volumes. Staff supplement the information by selectively contacting large, longstanding firms, employing 250 staff or more, with established recycling programs, and school districts in the county. Between 30 and 40 firms are contacted specifically and asked to fill out the recycling survey: during 2002, 37 firms were contacted for information. Anoka County staff additionally interact with interested businesses to conduct site visits and waste audits, as requested.

Anoka County further supports recycling by commercial enterprises by offering a rebate of the county's Solid Waste Management Charge for businesses who are able to demonstrate lower levels of waste. The Solid Waste Management Charge is applied to all improved properties in Anoka County at the single rate of $36.09 for all residential properties. For nonresidential properties, the charge varies depending upon the size and assessed value of the property and the amount of waste generated, as categorized by the county. Nonresidential properties include improved property classified as commercial, industrial, nursing home, service station, utility, railroad, or tax-exempt property. Nonresidential property owners are assessed by tax parcel according to the value of the improvements on the parcel, not including the value of the land, according to five classes as presented in Table S for 2002.

Table S. Anoka County Business Solid Waste Generation Charge, 2002

Category Improvement Value	*Waste Generation Tonnage*	*Charge*
Micro-Generator Rate	0 to1.5 tons/year	$41.95
$25,000 to $200,000	1.5 to6.0 tons/year	$79.97
$200,001 to $500,000	6.0 to 15.0 tons/year	$259.72
$500,001 to $1,000,000	15.0 to 30.0 tons/year	$584.21
$1,000,001 and over	Greater than 30.0 tons/year	$2,047.71

Source: Anoka County Integrated Waste Management

Businesses have the opportunity to appeal a portion of this assessed fee based upon their ability to document and verify annual source reduction and recycling activities. An appeal of the fee may be accepted by Anoka County based upon one of three criteria:

[109] http://www.co.anoka.mn.us/departments/int_waste_mngmnt/index.htm#commerecycle

- Businesses are able to confirm that waste generation levels are less than those assigned by the category of the buildings present (i.e., houses of worship are assigned higher levels of waste due to the relative price of the building, but usually generate less waste weekly),
- Businesses confirm that they are able to recycle 50% of all waste generated in order to gain a 20% reduction in the solid waste management fee, or
- Businesses can document both a lower level of waste generation as well as operation of an effective recycling program.

While residents must pay the annual fee, and businesses are obligated to pay some portion of the solid waste management fee, the reduction for businesses may be sizeable, depending upon their waste categorization and documented recycling efforts. The largest discount a business may obtain is 25% less than their level of waste generation, or potentially as low as 20% less than the lowest rate possible, or $64 per year. After an application for waiver is approved, businesses must renew their application annually to forestall reinstatement of the fee to their property tax bill. Anoka County staff state that approximately 170 businesses participate in the program annually, including some 20 to 25 new businesses added each year.

COMMERCIAL RECYCLING: FINDINGS AND RECOMMENDATIONS

Businesses, industries, and institutions generate the majority of mixed municipal solid waste, and additionally represent substantial potential for improving the recycling rate. Recycling programs in the metropolitan area and nationwide note that improvements in commercial recycling offer one of the most substantial strategies for mitigating waste disposal and lengthening the life of area landfills. Little data is available, however, to rigorously assess the degree to which additional recycling within the commercial sector will potentially increase recycling rates and minimize the amount of waste disposed.

Commercial recycling nevertheless represents a new area for local program emphasis, particularly given the lack of economic incentives in place to support commercial recycling. Dakota County currently directs few resources towards supporting commercial recycling. Recommendations for improvement include gathering more updated data regarding business participation in recycling programs, and developing more targeted education and assistance activities to businesses in the County.

In addition:

COMMERCIAL RECYCLING FINDINGS

- **The commercial sector faces financial disincentives by recycling over waste disposal.** Due largely to the low cost of landfilling waste, the costs for businesses to recycle frequently outweigh any demonstrated economic benefits, which suggests that incentive programs may have to offer substantial benefits in order to be meaningful to companies to participate. Disincentives are particularly formidable for smaller firms over larger firms, who are often better able to leverage economies of scale and publicity as added benefits to recycling. While many larger firms participate in recycling and have established in-house recycling programs (e.g., West Publishing), it is considerably more difficult for smaller companies to allocate resources to support recycling activities, particularly given that recycling frequently implies equal or larger costs than waste disposal. Economies of scale work to the benefit of larger businesses, which are better able to take advantage of waste and recycling collection efficiencies.

- **At present, there exists minimal program focus on commercial recycling in Dakota County.** Hennepin and Anoka Counties provide examples of counties statewide that are proactive in working with businesses to document and improve commercial and industrial recycling efforts. Cities including San Jose, California, and Seattle, Washington provide economic

incentives to encourage participation in commercial recycling. Additionally, Seattle's Small Business Curbside Recycling Program allows businesses that generate a small amount of waste (90 gallons or less) to participate in city-sponsored curbside or alley recycling service at no charge to the firm.

Because commercial recycling is largely dependent on its cost to businesses and the relative value of materials collected, Dakota County currently has only a limited role in increasing commercial recycling rates directly. There exists, however, potential for some businesses in the County to recycle more:

- Some businesses do not recycle because they do not realize that recycling may prove economical for them. The County should maintain a stronger outreach and educational presence for the benefit of the commercial sector.

- A number of obstacles exist that hamper recycling by businesses, including city ordinances requiring screening of containers, and one-time expenses for recycling equipment (i.e., baler) that may not demonstrate a timely return on investment. The County should explore providing direct financial assistance in addressing and alleviating these and other barriers to commercial recycling.

- Dakota County should explore the possibility of enacting a selective mandatory or volunteer program that requires all generators of certain quantities of cost-effective materials (e.g., corrugated cardboard, office paper) participate in recycling.

- According to Seattle, Washington, including small businesses with residences for the purposes of solid waste management can shift commercial recycling from operating as a cost burden to a cost savings. This shift would extend pay-as-you-throw pricing for waste collection to small businesses and consequently provide them with an economic incentive to recycle. The County should explore the effect of extending residential curbside recycling collection to small businesses.

- **Current estimates regarding the amount of materials recycled by the commercial-industrial-institutional sector in Dakota County is lacking.** Although businesses contribute an estimated majority (73%) of the volume of waste recycled in Dakota County, the metropolitan area, and the state as a whole, Dakota County recycling programs have focused most heavily on encouraging residential recycling. Between 1990 and 2000, there has been a 36% increase in the number of businesses located in Dakota County, or a growth of about 2,400 businesses. This growth has exceeded the rate of business growth for the metropolitan region as a whole, with the proportion of businesses located in Dakota County increasing from approximately 9.0% of those in the region in 1990 to 11.2% in 2000.

  Recycling data indicates that commercial businesses generate more than one-half of the recycling rate by weight. However, no data describes the potential amount of waste that is not being captured. County inspectors have noted the existence of more recyclable materials from businesses present at landfill inspections, suggesting potentially untapped capacity for additional commercial recycling.

COMMERCIAL RECYCLING RECOMMENDATIONS

- **The County should dedicate greater recycling program emphasis towards the commercial and industrial sectors, providing resources to support commercial sector outreach and technical assistance.** Commercial recycling offers additional capacity for improving the County's recycling rate, though results are inherently difficult to credit to particular

levels of programmatic effort. The Environmental Management Department, in conjunction with the Office of Planning and the SWMCB region, should create a more targeted commercial-industrial recycling program, based upon information exchange and dedicated technical assistance.

Dakota County should consider working with specific expertise to develop and implement a targeted commercial recycling campaign. Minnesota Waste Wise maintains a unique mission to support commercial recycling and waste reduction practices. Targeted commercial recycling programming will further support achievement of the County's commitment to "implement a phased business recognition program" (*Regional/Dakota County Solid Waste Management Plan*, 1998 to 2017).

- **Dakota County should regularly update its business survey in order to improve current estimates of commercial recycling in the County**, and collaborate with the Solid Waste Management Coordinating Board region to establish practical commercial data standards. Given that commercial recycling data is inherently problematic, the Environmental Management Department should establish solid estimates of commercial recycling activity each year in order to more effectively track the potential of this sector to influence countywide recycling rates. The Department should focus on the largest firms located in the County (employing 500 individuals or more), and collect haulers' estimates of total waste generation and commercial service volumes. Dakota County, in conjunction with the SWMCB member counties and the Minnesota Office of Environmental Assistance, should review commercial estimation practices, and formulate applicable standards for estimation across the region.

- **Dakota County should study and adapt best practice comparisons for improved commercial recycling** from Anoka, Hennepin, Ramsey, other counties and municipalities. The growth in businesses and the best practice of other counties provide both a reason and an opportunity for Dakota County to emphasize and adapt best commercial-industrial recycling practices to continue to increase the tonnage of material recycled in Dakota County. Seattle, Washington's Small Business Curbside Recycling Program represents one practice that potentially alleviates a disincentive for smaller businesses to participate in local recycling. With cooperation from the Dakota County Office of Planning, the Office of Planning, Evaluation, and Development, and the SWMCB, best practice research will further the achievement of identified County outcomes.

- **The County, with assistance from the state, region, and local communities, should identify and address obstacles to commercial recycling**, including but not limited to:

  - The impact of grants, loans, and other financial incentives to encourage commercial recycling,

  - Identification of local ordinances and other statutes that potentially hamper recycling activity among businesses in Dakota County, and

  - The practicality and implications of including small businesses within current residential curbside collection programs.

INSTITUTIONAL RECYCLING

CURRENT SYSTEM

Institutional recycling in Dakota County may be characterized as follows:

- Institutional (and industrial) recycling is often considered one subset of commercial recycling, and includes recycling activity in schools and colleges, medical clinics and hospitals, houses of worship, and other for profit and nonprofit organizations,
- Solid waste generated within governmental facilities must be managed according to Minnesota Statutes §115A.46 and §115A.471 -- the "Public Entities Law", which requires solid waste to be processed prior to disposal,
- State statutes require cities, counties, and similar public entities to participate in recycling, including recycling a minimum of three materials -- although the authority to regulate institutional recycling is not clearly articulated,
- The level of recycling activity among institutions varies by the individual organization's available resources and interest (some organizations have implemented well-established, mature, and effective recycling programs),
- Further, the organizational commitment to recycling is often a logical extension of everyday household practices. That is, institutional recycling often stems from residential recycling activities,
- Institutions contract for waste and recycling services directly with private hauling firms within an open collection system; institutions additionally provide their own containers for recycling,
- Collection of recyclable materials may range from once per week to multiple pickups per week depending upon respective institutional demand, and
- Materials collected from institutions include mixed paper, corrugated cardboard, and metal, plastic, and glass containers.

State and regional mandates support institutional recycling, and further specify that governmental agencies serve as leaders in the community for implementing sound recycling practices. Minnesota Statute §115A.552 requires counties to provide organizations with the opportunity to recycle, but does not delegate demonstrated authority to counties. Public entities in Dakota County, however, are subject to more stringent waste management practices. Public entities must ensure that municipal solid waste that is not reused or recycled, that is generated at their facilities or under their control through waste management contracts, must be processed prior to disposal in accordance with state statutes.[110] Further, state mandates specify that, whenever practicable, public entities are required to:

- Purchase uncoated office and printing paper,
- Use recycled content paper with at least 10% postconsumer material by weight, and
- Print documents on both sides of the paper where commonly accepted publishing practices allow.[111]

Similarly, the Metropolitan Solid Waste Management Policy Plan identifies state, county, local governmental units, and school districts as leaders in recycling in the region. The plan does not, however, stipulate which agencies have the authority to oversee recycling activities within public sector institutions at the local level. (It is assumed that the state retains the authority to monitor and regulate public sector recycling, although local governments play a significant role in encouraging and supporting waste abatement practices throughout institutions in their jurisdictions.) The Metropolitan Solid Waste Management Policy Plan states that units of government will implement strategies to aggressively:

[110] Minnesota Statutes §115A.46 and §115A.471

[111] Minnesota Statute §16B.122, Subdivision 2

- Maximize internal recycling efforts through continuous improvements and performance reporting;
- Making purchasing decisions for commodities and construction materials that promote resource conservation and environmental protection; and
- Maximize the recycling of non-municipal solid wastes.[112]

In 1991 and 1995, the "Jurisdiction of the Plan" section of the Waste Management Act[113] was amended such that public entities arranging for solid waste services are required to follow the county's respective solid waste master plan, unless they receive county permission to do otherwise. Public entities include: state agencies, offices, and institutions; metropolitan agencies, the Metropolitan Council, and the Metropolitan Mosquito Control District; the state Legislature; the courts; counties; cities and townships; school districts; special taxing districts (e.g., watershed districts); and also contractors acting on a contract with a public entity. When a public entity hires a contractor for solid waste services in the metropolitan area, for example, both the public entity and the contractor are responsible for following the Regional/County Solid Waste Master Plan. In the event that a public entity maintains current solid waste contracts that are inconsistent with the county plan, then the public entity must renegotiate the contract at the first opportunity. Additionally, an amendment to the Waste Management Act[114] stipulates that public entities must determine the potential liability to the public entity and its taxpayers for managing waste using a method that is lower on the waste management hierarchy than the method required by the county plan. Entities are further required to develop a plan for managing the potential liability, obtain the permission of the county through a county resolution, submit these items to the state, and implement the plan for managing liability *before* it enters into a contract for solid waste services.

Although Dakota County has a limited role in facilitating institutional recycling, the County serves as an important resource for all organizations located in the County. According to state statute, each county is responsible for providing information on how, when, and where materials may be recycled, including a promotional program that publishes notices at least once every three months.[115] Clarifying recycling procedures and assisting interested organizations with waste assessments and other forms of education, promotion, and technical assistance fall within the County's broad sphere of work and complement the County's ongoing efforts to improve residential, commercial, and in-house tonnages recycled.

COMPARISON OF DAKOTA COUNTY INSTITUTIONS

Six institutions located in Dakota County were contacted in order to provide information regarding their recycling activities. These organizations and their practices are presented following to provide a broad indication of commitment and levels of activity within institutions located in the county. (Note that the institutions presented are self-selected: therefore, these six organizations likely do not represent the full range of institutions and recycling activities in practice in Dakota County.) The organizations contributing information to this study include: Dakota County Independent School Districts (ISD) 196 (Apple Valley, Eagan, and Rosemount) and 200 (Hastings), Inver Hills Community College (Inver Grove Heights), Fairview Ridges Hospital (Burnsville), St. John Neumann Church (Eagan), and Berean Baptist Church (Burnsville). In general, the six institutions share the following characteristics:

- Institutions that recycle in Dakota County often do so as an extension of practices implemented by individual staff members in the home. In other words, because recycling is practiced in the household, many individuals transfer the same behavior to workplace, school, and church, and
- One or more of the institutions have implemented the following recycling efforts:

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[112] Minnesota Office of Environmental Assistance and Solid Waste Management Coordinating Board: *Metropolitan Solid Waste Management Policy Plan, 1997 to 2017*. Section 5.2.2 Recycling Policies. Page 5-5

[113] Minnesota Statute §115A.46, Subdivision 5 (1995)

[114] Minnesota Statute §115A.471 (1995)

[115] Minnesota Statute §115A.552, Subdivision 3 Recycling information, education, and promotion

- Participation in the Minnesota Waste Wise Program, which provides information and technical assistance to support waste reduction efforts (Waste Wise has recently conducted on-site waste assessments for several Dakota County schools, and will be providing specific suggestions for reducing waste and improving recycling performance),
- Commitment to reusing office supplies (e.g., binders) between departments, and
- Collection of all confidential non-public information for shredding and recycling.

All six of the participating institutions recycle, and further, the general organizational commitment to recycling was often rooted in individual commitment to environmental ethics and sound solid waste practices. Many individual staff acknowledged that recycling is the "environmentally sound thing to do"; a logical extension of everyday household practices. Further, while the six institutions that provided information for the study are not necessarily representative of all organizations in existence in Dakota County, all six institutions reported administering recycling programs that are relatively effective. Although marginal program improvements continue to be made on an ongoing basis at the six institutions selected, the recycling practices in place at each organization are well established and represent mature recycling programs.

The participating institutions noted a range of barriers that prevent their respective organizations from increasing tonnages of material recycled. Demonstrated barriers listed in Table T vary from the availability of staff and storage space to the décor of available recycling containers, with cost considerations ranking highest among the five barriers identified. While lack of knowledge regarding proper recycling procedures (i.e., which categories of materials can and cannot be recycled) ranked relatively low in comparison with other noted barriers, lack of knowledge represents one barrier that Dakota County programs may effectively address.

Table T. Reported Institutional Barriers to Recycling, Selected County Institutions *

Barriers	*Number of institutions (N = 6) who note this as a barrier:*
Available Storage	2 out of 6
Available Staff	2 out of 6
Added Cost	4 out of 6
Container Décor	1 out of 6
Lack of Knowledge	1 out of 6

** It is important to note that the barriers represent the views of the six institutions interviewed, and may not fully reflect the situations or circumstances of all institutions located in Dakota County.*

Source: Information reported by staff from respective organizations, 2002

Estimates of institutional recycling tonnages are challenging to gather, particularly since actual tonnages from organizations are collected with business and industrial tonnages as commercial sector service. As a result, no data specific to institutions is currently reported to the state or the County for analyses. Additionally, many private hauling firms charge businesses and institutions according to service volumes (the number of containers by size emptied by frequency, regardless of weight), rather than by actual volumes or tonnages of material collected. Similarly, the six institutions participating in the study acknowledged fees charged by contracted haulers for service volumes collected. Monthly estimated figures from data available for the six institutions in Dakota County interviewed for this study are shown

below in Table U. The numbers represent extrapolations calculated from container size and frequency of collection per month, rather than averaged estimates of the total weight of materials actually recycled.

Table U. Monthly Waste and Recycling Estimates for Selected County Institutions, 2002

Institutions	*Waste Materials*	*Waste Materials Collected per Capita*	*Recyclable Materials Collected*	*Recyclable Materials Collected per Capita*
ISD 196	5,060 yd^3	106 yd^3 per 1,000 persons	Paper, Cardboard = 1,109 yd^3 Metal, Plastic, Glass = 182 yd^3	40 yd^3 per 1,000 persons
ISD 200 [116]	536 yd^3	104 yd^3 per 1,000 persons	Paper, Cardboard = 133 yd^3 Metal, Plastic, Glass = 19 yd^3	40 yd^3 per 1,000 persons
Inver Hills Community College	6.5 tons	1 ton per 1,000 persons	Commingled materials = 2.3 tons	0.5 tons per 1,000 persons
Fairview Ridges Hospital	34 tons	20 tons per 1,000 persons	Commingled materials = 1.5 tons	1 ton per 1,000 persons
St. John Neumann Church	48 yd^3	10 yd^3 per 1,000 persons	Paper, Cardboard = 1 yd^3 Metal, Plastic, Glass = 4yd^3	1 yd^3 per 1,000 persons
Berean Baptist Church	96 yd^3	20 yd^3 per 1,000 persons	Paper, Cardboard = 24 yd^3 Metal, Plastic, Glass = 3 yd^3	5 yd^3 per 1,000 persons

Source: Informal estimates received from respective organizations, 2002

New program directions identified by selected institutions include purchase of recycled office supplies (e.g., copier and printer paper). A majority of the organizations noted that they have entertained few efforts to purchase recycled products, due to concern regarding perceived quality of the products. Many of the participating institutions were willing to change purchasing habits, particularly since the quality of recycled products has improved over the years. Additionally, Independent School District (ISD) 196 is currently participating in an Organic Waste Processing Pilot Project sponsored by the Solid Waste Management Coordinating Board. The pilot will be implemented in several ISD 196 schools and facilities in fall 2002, and will require the separation and placement of organic materials (e.g., food products and napkins) into labeled compostable bags at designated locations throughout the building for collection and composting. Parents, students, and staff will be given the opportunity to participate in educational activities to increase awareness and promote the benefits of organic composting.

BEST PRACTICE COMPARISONS

Without explicit statutory authority, the Twin Cities metropolitan region largely does not provide special outreach to institutions: the majority of interested organizations are assisted by existing business and commercial recycling programs. One best practice jurisdiction, however, specifically targets institutional recycling by developing initiatives to support recycling activities in a variety of organizational settings. The City of Seattle, Washington has initiated two practices with institutions that are especially noteworthy. Seattle sponsors a Medical Industry Waste Prevention Roundtable to exchange ideas

[116] Note that ISD 200 data excludes recycling tonnages collected from Hastings Senior High School.

regarding waste reduction and recycling for those involved in medical institutions. The city also offers special technical assistance to large event venues, campuses, and other institutions to help improve environmental performance. Opportunities may exist in Dakota County and the region to similarly pursue special recycling initiatives with institutions, including interest in convening industry-specific roundtables and other forums to help support and communicate best practice.

INSTITUTIONAL RECYCLING: FINDINGS AND RECOMMENDATIONS

Although Dakota County dedicates few resources specifically towards supporting recycling within institutions in the County, school districts, colleges, hospital clinics, houses of worship, and other organizations located in the County are committed to internal waste abatement practices. The County's role in providing recycling support to institutions is fairly limited; nevertheless, the County should direct educational materials and technical assistance as needed to interested organizations.

INSTITUTIONAL RECYCLING FINDINGS

- **Dakota County directs minimal program resources towards supporting institutional recycling in the County.** Dakota County encompasses nine school districts, all of which are located at least partly within the County, and numerous nonprofit organizations, medical clinics, and houses of worship. The state mandates that all institutional waste must be delivered to processing facilities. For the purposes of waste and recyclables collection, however, these institutions are considered within the commercial-industrial-institutional sector, and little County emphasis is specifically directed towards improving recycling participation and tonnages among institutions. While local government is not responsible for ensuring institutional recycling, other metropolitan area counties (e.g., Anoka, Hennepin, and Ramsey Counties) note limited outreach to large institutions as one component of their commercial sector technical assistance programs.

  Minnesota Waste Wise is currently working with Independent School District 196 on a waste reduction and recycling effort. Because the district is large (33 buildings housing 28,000 students), greater economic incentives to recycle exist. Minnesota Waste Wise is providing technical skills and economic analysis to justify waste abatement practices, while the County is exploring future applications of the analysis in other school districts in the County. While significant opportunities exist to support and improve recycling within Dakota County schools, few opportunities exist to incorporate recycling and source reduction messages into current school curricula, due to tight class schedules.

- **Many large institutions in Dakota County are committed to recycling and have established internal recycling programs.** Based upon the motivation of individual staff, many organizations are interested in recycling and commit resources to implement recycling programs. Ongoing education and technical assistance, however, would help to build awareness and support recycling efforts within this sector.

INSTITUTIONAL RECYCLING RECOMMENDATIONS

- **While the County's role in encouraging institutional recycling is notably small, institutions should be targeted by existing educational and technical assistance programs.** Institutions offer one opportunity for improving recycling rates. The Environmental Management Department should provide education and technical assistance as needed to encourage waste reduction and recycling practices, and to further develop public awareness of environmental and associated waste management issues.

In addition to measures of recycling activity, a major goal of the Environmental Management Department is to "create an environmentally aware community" (*Environmental Management Department Outcome Measurement Plan*, 1998). The Department contributes a significant share of its resources to public education. While the Department does address residents and businesses through periodic educational mailings, public awareness campaigns do not specifically target schools and other institutions in the County.

- **Best practice comparisons suggest several opportunities for Dakota County to pursue special recycling initiatives with institutions.** Metropolitan area counties, including Hennepin and Anoka Counties, largely address institutions as one component of the commercial sector, providing technical assistance and education to interested organizations as requested. The City of Seattle, Washington sponsors a Medical Industry Waste Prevention Roundtable to exchange ideas regarding waste reduction and recycling for those involved in medical institutions. Seattle additionally offers special technical assistance to large event venues, campuses, and other institutions to help improve environmental performance.

  The Dakota County Environmental Management Department -- in conjunction with the Dakota Environmental Review Team, Minnesota Office of Environmental Assistance, SWMCB counties, and local municipalities -- should consider convening industry roundtables to share recycling and waste reduction practices. Dakota County should additionally promote sound waste management strategies and practices at all local events, civic venues, and other large public gatherings taking place within the County.

IN-HOUSE RECYCLING

CURRENT SYSTEM

Characteristics of Dakota County's in-house recycling are as follows:

- Minnesota Statutes §115A.46 and §115A.471 -- the "Public Entities Law" -- require solid waste generated at public facilities, or under the control of public agencies through waste management service contracts, to be processed before disposal,
- The Regional/County Solid Waste Master Plan stipulates that all facilities under County control have established recycling programs by 2000 to collect and recycle four materials -- including office paper and cardboard, when each material comprises a portion of a facility's waste stream,
- Authority for establishing in-house recycling is granted under Minnesota Statute §16B.122 (1990), as amended by law (1991), Chapter 337, Section 3, and by County Board Resolution No. 88-651,
- The Regional/County Solid Waste Master Plan requires Dakota County to maintain an in-house recycling program,
- Participation in the Solid Waste Management Coordinating Board prompted implementation of an Environmentally Preferable Purchasing program (County Policy 2742 Procurement of Recycled Products) in the County with limited success,
- Infrastructure to support recycling within Dakota County buildings and facilities is well-established -- desk side recycling containers are provided by the County to all staff, and distributed via staff recycling liaisons in each Department,
- Recycling practices, however, are not well institutionalized throughout County Divisions, Departments, and among staff,
- The Dakota Environmental Review Team (DERT) was created to provide guidance and leadership within the County for recycling and source reduction initiatives, and
- A pilot project, the Eco-10 Challenge, was implemented in the Western Services Center to educate staff and provide incentives for participating in source reduction activities.

One important area of Dakota County responsibility within recycling is the County's own leadership and initiative in encouraging recycling throughout County buildings and facilities. In-house recycling in Dakota County buildings and facilities was established by County Policy 4301 (In-House Waste Reduction and Recycling) in 1992. While the formal commitment to environmental objectives is clearly evident through stated Dakota County outcomes and policies, the County's in-house recycling activities are not broadly institutionalized or practiced consistently within County Departments and Divisions. Frequently, County staff that participate in waste reduction activities do so based upon an individual commitment to environmental principles, and are perhaps even unaware of County policies. While environmental ethics can not be effectively mandated, County policies and leadership cultivate an organizational culture that supports stated priorities.

The County's Environmental Management Department promotes in-house recycling and source reduction initiatives in the County and purchases recycling bins, working in conjunction with the Departmental Services Unit (centralized purchasing and duplication services) and Facilities Management Department (waste collection and custodial services) to facilitate opportunities to recycle for all staff. Formation of a cross-County staff committee, the Dakota Environmental Review Team (DERT) has been beneficial in providing a staff forum for evaluating current in-house progress. Meeting on a biannual basis, DERT includes County purchasing, parks, and facilities and risk management functions, and was created to develop leadership in the County for implementing broad source reduction and recycling activities. The County's Environmental Management Department convenes and facilitates the DERT, providing technical assistance to County Departments, and monitoring and assessing County progress towards achievement of Regional/County Solid Waste Master Plan outcomes. Further, Dakota County Employee Relations will

be including an in-house recycling component in all new employee orientations in the future. The systematic and ongoing education of County staff at all levels of the organization will help to communicate expectations regarding in-house environmental objectives.

Despite the creation of DERT and collaboration across several County units and Departments to encourage environmentally responsible practices among staff, explicit responsibility for coordination, maintenance, and evaluation of in-house recycling activities nevertheless remains lacking. In order to build consistency of practice among staff, in-house recycling requires systematic program administration, in addition to ongoing, demonstrated commitment from the whole organization. Support from County managers at every level of the organization reinforces County priorities regarding recycling and related in-house policies, and provides accountability to stated County and regional solid waste outcomes.

IN-HOUSE DATA

In Dakota County buildings, individual staff are responsible for collecting recyclables from their respective workstations and disposing of them in centralized containers located at aggregation areas (e.g., copier rooms). When these centralized containers are full, custodial staff transfer the materials to a specified location (e.g., facility loading dock, satellite enclosure) from which the contracted hauler collects the materials, depending upon the building. The materials are then transported to a materials recovery facility for additional sorting and processing, and eventually delivered to an end market. Current estimates of waste and recycling tonnages collected from Dakota County buildings and facilities are presented below in Table V. These estimates are based upon hauling weights determined at metropolitan area landfills and resource recovery facilities, and extrapolated from five Dakota County facility locations. (At present, comprehensive tonnages of materials recycled are available only from document destruction activities.)

Table V. Annual County In-House Waste Disposal and Recycling Estimates, 2002

Material Category	*Amount*		*Amount per Employee per Day*
Waste Materials	183 tons	366,000 pounds	0.668 pounds/employee/day
Paper and Cardboard	88 tons	176,000 pounds	
Metal, Plastic, and Glass	9.67 tons	19,340 pounds	

Source: Estimates from John Alton of Waste Management on February 13, 2002, as requested by Mark LaPointe, Dakota County Facilities Management Department

In accordance with Dakota County's current waste hauling contract, the County is charged by service volumes (number of containers by size emptied per week, regardless of weight or volume), rather than by actual weight of materials collected. Several private hauling firms have been contracted to provide collection services of waste and recyclable materials to County facilities.[117] The majority of County buildings are currently serviced by Waste Management, while a second company, Troje's Trash Pick-Up Service, provides collection services to a smaller proportion of remaining County facilities. As discussed earlier, several County programs are housed in rented space: in-house recycling in these locations

[117] See Dakota County Facilities Management Department: "Request for Quote for Trash and Recycling Services: Dakota County Misc. Buildings 2000 - 2001", Closing Date: April 28, 2000.

depends upon respective building owners and property management companies to provide the opportunity to recycle and to facilitate collection services.[118]

Table W. Dakota County Western Services Center Waste Sort Data: 1995, 1999, and 2001

Discarded Material	*1995*		*1999*		*May 2001*		*October 2001*	
	Weight (lbs)	*% of Total*	*Weight (lbs)*	*% of Total*	*Weight (lbs)*	*% of Total*	*Weight (lbs)*	*% of Total*
Newspaper	17	6%	11	8%	8	3%	7.9	4%
Cans	5	2%	4	3%	5	2%	3.4	2%
Magazines	19	6%	8	6%	15	6%	2.4	1%
Mixed Office Paper	50	17%	7	5%	20	8%	16.4	8%
Single-Sided Paper	42	14%	6	4%	1	0%	8	4%
Plastic/Glass	7	2%	8	6%	5	2%	6.2	3%
Cardboard	10	3%	2	1%	9	4%	1.2	0.58%
Actual Waste Materials	125	42%	69	50%	166	66%	114	55%
Recyclable Materials in Waste	150	51%	46	33%	63	25%	46	22%
Organic Materials	22	7%	19	14%	23	9%	19	9%
Other Materials (e.g., reusable items, furniture)	0	0%	4	3%	0	0%	28	14%
Total Waste Generated *(Total = Actual + Recyclables + Organic + Other Materials)*	297	100%	138	100%	252	100%	206	100%

* *During the October 2001 waste sort, the majority of paper consisted of scraps, half-sheets, and envelopes. Twenty-five pounds of the total waste included a broken piece of office furniture. The bulk of the total waste was from restrooms (paper towels, other wastes), or was fast food waste.*

Source: *Regional/Dakota County Solid Waste Master Plan, 1998 to 2017*

Previously, waste containers were weighed with the use of scales located in the arms of front-end loading trucks: such machinery is no longer widely in use, and accurate weights of collected materials remain elusive. In 1999, rough estimates of in-house recycling tonnages were established based upon a visual assessment of waste container capacities. Current estimates of annual waste disposed and recyclables collected from the Western Service Center in Apple Valley are presented above in Table W. These estimates were derived from waste composition studies conducted at the Western Service Center for waste receptacles only (and not including recyclables containers). Note that the October 2001 waste sort examined both public and Dakota County employee waste streams.

[118] Currently, the City of Farmington provides collection services to the University of Minnesota Extension Service, while various Transportation facilities are serviced by their respective city jurisdictions, including the Cities of Farmington, Hastings, and Rosemount.

Waste composition studies performed at larger Dakota County facilities annually has suggested that while the percentage of recyclable materials in the waste stream has consistently decreased over the past six years, a substantial percentage (22% in 2001) of the waste stream may still be recycled, particularly mixed (8% in 2001) and other paper categories. The four waste composition studies conducted at the Western Service Center additionally point to the significant proportion of organic materials, ranging between 7% and 14% of the total waste stream between 1995 and 2001, included for disposal that may potentially be diverted from the waste stream. Baseline waste composition information compiled by the Dakota County Environmental Management Department highlights the importance of monitoring waste composition information for Dakota County buildings and facilities regularly, for the benefit of evaluating County progress towards achievement of in-house recycling and source reduction outcomes.[119]

RELATED IN-HOUSE POLICIES AND INITIATIVES

PURCHASING AND CONTRACTING

Although central administration of functions such as purchasing, contracting, and in-house recycling may limit flexibility between and among County facilities, Departments, and staff, centralization nevertheless can provide vital consistency and authority to shared programs. Central contracting and purchasing may help to mutually reinforce Countywide environmental principles and objectives. Without central administration, environmentally-preferable decisions are left to individual initiative and the discretion of Department and Division directors and administrative staff. With staff turnover, changing priorities, lack of ongoing communication, individual staff members and Departments alike no longer receive the message that environmentally-preferable purchasing and contracting are objectives of the County, and that services exist to help achieve these objectives.

The National Association of Counties questioned 85 counties representing 39 states regarding in-house environmental purchasing programs as part of their 2001 Operations Survey. Approximately 65% of participating counties report having no environmentally preferred purchasing program in place. Of the 35% of counties who adopted environmental purchasing programs, however, 50% of the programs include a component that purchases recycled products, 33% of the programs purchase energy-efficient products, and an additional 17% of programs purchase less toxic products.[120] A complement to in-house recycling, Dakota County established a policy that maintains environmental standards for purchasing office supplies in accordance with Solid Waste Management Coordinating Board objectives: County Policy 2742 Procurement of Recycled Products. The policy states that Dakota County Departments, agencies, and the Central Purchasing Office comply with, and may require contractors to comply with, environmentally responsible procurement policies, practices, and procedures in accordance with state law and County Board Resolution.[121]

The Departmental Services Unit of Dakota County's Operations Management Department and the Environmental Management Department collaborated to implement a procurement program in which Departmental Services would serve as a central store for purchasing supplies Countywide.[122] Centralized purchasing can improve efficiencies of scale since it allows for greater control of the type and number of items purchased, and results in significant cost savings if items are purchased in bulk at reduced rates. However, County Departments are not required to purchase all supplies and materials through the Departmental Services Unit and may purchase necessary items independently. Items purchased centrally include: computers and software, audiovisual equipment, and office supplies, equipment, and furniture.

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[119] Jennifer Schol, Dakota County Environmental Management Department: "Waste Weights for the WSC and Dakota County Extension and Conservation Center", January 26, 2000

[120] National Association of Counties: *County News Online*, "Counties and the Environment at a Glance" -- Volume 34, Number 5, March 11, 2002.

[121] Authority for this policy is granted under County Board Resolution No. 88-651 and Minnesota Statute §16B.122, as amended by law (1991), Chapter 337, Section 3.

[122] http://dakotanet/Purchasing_new/Purchasing/envmtpurch.htm

The Unit has developed a cost-effective and efficient program for managing surplus and obsolete property (particularly computers and related office equipment), documenting significant savings to the County from environmentally preferred purchases, reuse, and recycling of used items.

The National Institute of Governmental Purchasing conducted a survey targeting Green Procurement Initiatives in July 2001, concluding that lack of awareness of environmental procurement programs has hampered the ability to develop such programs. The survey notes conflicting priorities, decentralization of decision making, and inadequate guidance as factors that create significant challenges in purchasing environmentally preferable goods and services.[123] As purchasing responsibilities have become more decentralized in the County (i.e., tasks are delegated to respective Departments for the benefit of greater flexibility and ease of handling), the Departmental Services Unit currently serves as an informational resource for Departments interested in sourcing particular items for purchase. Neither the Environmental Management Department or the Departmental Services Unit monitor, evaluate, report progress, or enforce the County's environmentally responsible procurement policy. Similarly, although County policy explicitly states that contractors may be required to maintain County waste abatement standards, no identified environmental standards for contracting exist, and contracts in the County do not hold vendors and other business partners accountable. (Contracting is additionally a County function performed independently by individual Departments and programs.) The lack of systematic coordination of purchasing and contracting activities across County Departments and buildings has resulted in environmentally responsible practices based largely upon individual staff motivation, rather than consistent and concerted efforts that support Countywide objectives and goals.

SOURCE REDUCTION

Due to a lack of systematic coordination across all County programs and locations, in-house source reduction activities are largely accomplished by individual staff and Departments committed to waste abatement and greater resource efficiency. One of the largest efforts in improving source reduction is the Eco-10 Challenge[124], sponsored by the Environmental Management Department in 2001. The goal of the challenge was to reduce waste in the Western Service Center by 10% or more during the year, in accordance with regional waste diversion goals. The Environmental Management Department expects to expand the challenge to all County buildings in coming years.

Several activities currently implemented by the County's Departmental Services Unit include:

- County policy dictates that all duplicating orders completed through the central duplication office is subject to two-sided copying, unless specific justification warrant single-sided copying,
- Plastic spiral and three-ring binders (Departmental Services staff will recover the outer surfaces of binders before redistribution) are collected and reused -- as a result of this effort, the County purchases fewer binders on an annual basis (number used annually unknown),
- Paper printed on one side is collected from County Departments, and transformed into routing slips, scratch notepads, and other customized applications (e.g., County Libraries use single-sided scratch paper cut to a predetermined size),
- Unwanted mail is collected from all County offices and sorted by sender (currently, several hundred senders exist). County labels are removed from mailings and attached to postcards requesting that the attached label be deleted from the mailing list and/or that County information be updated appropriately, thus reducing the volume of unwanted mail in the County (volumes unknown, but significantly less than five years previous),
- A program of recycled laser toner cartridge refill and reuse has been in existence, providing a source of recycling and recycled content supplies to County staff and programs,

[123] http://www.nigp.org/research/PastSurvey.htm
[124] http://dakotanet/envmgnt/Eco_10_Challenge.htm

- The County's office supplies vendor collaborates with the Environmental Management Department and Departmental Services Unit to guide Departments towards purchasing recycled content supplies, although final purchasing decisions are left to respective staff,
- All paper purchased for Central Duplicating, as well as most white paper used for convenience copiers and desktop printing, meets or exceeds the statutory requirements of the State of Minnesota for recycled content, and
- The Departmental Services Unit administers reassignment and reuse of obsolete equipment (e.g., computers, desks, monitors, printers, chairs, other types of furniture).[125]

BEST PRACTICE COMPARISONS

The University of Minnesota pioneered a program for in-house, office building recycling that represents best practice. Originally called the "Self-Managed Activities for Recyclables and Trash" (SMART) program[126], this initiative delegates responsibility for centralized disposal of recyclables and waste to individual workers. According to program participants, the SMART program has the potential to increase in-house recycling substantially, as well as reduce the need for custodial services. In the SMART program, recycling containers are grouped together in convenient locations throughout the workplace, often around waste disposal containers, so employees can deposit recyclables in a single trip at one location. Small desk-side recycling containers are provided in individual office cubicles for the purposes of temporary storage, while individual waste containers may be reduced in size. The University reports that centralized grouping of containers and sorting of recyclables by individual workers increases recycling rates from between 30% and 50%, to the 65% to 70% range.

In conjunction with the SMART concept, some programs additionally discontinue waste collection services in individual work areas. In this modified program, staff must transport and dispose of both their own waste and recycling at centralized collection locations.[127] A second alternative includes continuing regular desk-side collection services for recyclable materials only: disposal of waste becomes the responsibility of individual staff. Similarly, the in-house recycling program administered by the State of Minnesota contains some of the features of SMART, but recycling containers for different materials are not necessarily centrally located, and waste collection continues to be provided daily in individual cubicles. The Solid Waste Management Coordinating Board has recommended implementation of in-house SMART programs: Washington County saw an improvement of in-house recycling rates by some 27% due to adoption of the State of Minnesota's in-house recycling program.

Drawbacks for the SMART program include employee resistance to the program: according to the University of Minnesota, customer surveys have shown that approximately 5% to 7% of employees choose not to participate in the program. (Unfortunately, surveys further suggest that higher levels of management tend to represent entrenched resistance to SMART.) Program success relies upon careful preparation and introduction to staff, as well as full cooperation and integration of custodial staff, who

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[125] A recent effort to utilize refurbished and reused modular furniture components resulted in cost savings of over $400,000 for the Dakota County Northern Service Center, while diverting these panel systems from disposal in the waste stream.

[126] This program operates in a variety of organizations, including the University of Illinois, University of British Columbia, University of Washington, Toronto, Ontario, and AT&T in Atlanta, Georgia. The program has been implemented under other names in other organizations.

[127] San Jose described its in-house recycling program, Recycle@Work, as serving 9,500 employees and 80 facilities. Frequency of collection varies from weekly to biweekly, and the program collects newspaper, white and mixed paper, cardboard, computer paper, mixed bottles, and metal cans. Employees receive a 3.5-quart miniature waste container -- instead of the standard 5-gallon waste container -- to discourage the disposal of recyclables, and are provided with a choice of three sizes of recycling containers to encourage desk-side recycling. All employees are required to empty their waste containers into centralized 23-gallon receptacles, as well as their own recyclables into centralized recycling containers.

may be obligated to change work procedures and equipment in order to manage collection. Other important considerations for implementing SMART concepts include:

- Pilot projects are valuable for experimenting with and tailoring appropriate procedures,
- Custodial staff must specifically undergo training to maintain the system,
- Program resistance by a small core of workers should be anticipated,
- Strong endorsement of the program by senior management and administration serve to speed employee acceptance,
- Individual buildings may customize the program to fit their own needs with specific property maintenance staff and differing arrangements for contracting services, and
- A cost benefit analysis of savings by changing the frequency of collection may serve to tailor the program further.

For more than three years, Anoka County has offered an innovative in-house grant program to spur staff interest in source reduction and recycling activities. A total of $25,000 of budgeted general revenue is made available each year for county departments to apply for funding that supports source reduction and resource stewardship over and above regularly budgeted activities. Anoka County staff fill out an application explaining how the proposed activity is an example of source reduction or recycling, and the application is reviewed by a cross-county committee of staff. Examples of funded requests include the purchase of specialized software that makes documents available on the Intranet, park benches made of recycled plastics, the creation of a recycling center at the juvenile detention facility, and purchase of a digital camera. No match is required to access this funding. The fund will be targeted towards supporting sustainable buildings and building design this year.

Using 2000 data as a baseline for Hennepin County's in-house recycling program, the county relies upon a variety of data sources for measures of in-house recycling activity, including weight slips of actual tonnages collected from contracted hauling firms. The in-house program, including both source reduction and recycling, is administered centrally with a single point of staff contact: new employees are given information and brochures at orientation. Contracted by Hennepin County to collect in-house recyclable materials, Project for Pride in Living reports weights for each material stream collected as materials are transported to transfer stations, resource recovery facilities, and/or directly to end markets. Additionally, the Hennepin County Board of Commissioners passed a resolution stipulating that vendors who provide the county with $250,000 or more of services must recycle. Waste reduction activities were added to this resolution in 2001, affecting between 140 and 150 vendors holding contracts of $250,000 or more with the county. Under the auspices of the county resolution, vendors are required to provide reports on waste reduction and recycling activities verified by waste hauling firms on a monthly basis. Hennepin County considers the resolution another opportunity to provide outreach and education to companies and private vendors, including information about the county's Business Waste Reduction Program with contract information.[128]

In Ramsey County, larger facilities maintain contracts with private haulers for collection of both waste and recyclable materials. Bids are reviewed based upon fees charged per specified volume amount, and contracts contain language that requires vendors to report service volumes to County staff.[129] As calculations of container volume multiplied by frequency of service, service volumes only approximate actual amounts of waste discarded by weight, since service volumes assume full containers every time containers are emptied. Service volumes do not take into account partially full containers, or containers that may be relatively more or less heavy due to specific items in the waste stream. While approximate, regular reporting of service volumes nevertheless provides a useful indicator of trends in county waste generation and disposal.

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[128] Hennepin County: "Waste Reduction and Recycling guidelines for County suppliers", excerpted from the *Purchasing Standard Ts&Cs 3.14*

[129] Ramsey County: "Contract and Analysis Services for Saint Paul and Ramsey County, *Request for Bid* -- Request Number: A-PRK292-11", November 2001. Pricing for MSW Removal; Pricing for Recycling Services.

In order to achieve outcomes identified in their Regional/County Solid Waste Master Plan, Ramsey County has worked with seven of their major waste generating facilities to develop practical waste and recycling baseline data. Central waste containers were visually surveyed four times over the course of one year by county staff at the end of the workday on specific days in order to compile qualitative data characterizing waste capacity. The county has not conducted in-house waste composition studies or waste sorts, but will rely on changes from established baseline figures to track future in-house source reduction and recycling activities. Similar to Hennepin County, Ramsey County requires interested vendors to have established recycling programs as a condition of contract, though this stipulation is not regularly monitored or enforced. Additionally, the county stipulates that all documentation submitted to the county should be printed double-sided on recycled-content paper.

Finally, some best practice jurisdictions have considered promoting recycling in public spaces to be one critical strategy for promoting environmental objectives, since recycling in civic areas creates a public consciousness and sets the tone for recycling in other settings. Recycling in public spaces serves primarily as an educational tool to teach about the benefits of recycling and present program guidelines, in addition to increasing the volume of materials recycled. San Jose, California is initiating a Public Area Recycling program this year that provides recycling receptacles in all civic spaces, including parks, streets, and major public facilities. When fully implemented, the city will encourage use of recycling receptacles in privately-owned gathering places.

IN-HOUSE RECYCLING: FINDINGS AND RECOMMENDATIONS

While County policies have been established to guide recycling and related environmental activities in Dakota County, lack of systematic administration and ongoing support for the in-house program has resulted in inconsistent observance of demonstrated priorities. In-house recycling in Dakota County requires centralized management and program promotion, with assistance from County Departments, the cross-County Dakota Environmental Review Team, and individual County managers and staff.

IN-HOUSE RECYCLING FINDINGS

- The County has established an internal recycling policy (County Policy 4301 In-House Waste Reduction and Recycling, 1992) and related in-house program that produces significant benefits. **There is, however, inconsistent compliance with County policy and irregular participation in recycling by County staff, depending largely upon individual motivation.** The County administers a complementary environmentally responsible procurement program (County Policy County Policy 2742 Procurement of Recycled Products) with limited success. County policy requires Departments and employees to recycle, copy documents double-sided, establish central filing systems, reuse file folders, use routing slips and bulletin boards to exchange information, remove individual names from mailing lists, use reusable cups and recyclable containers, and create documents using soy-based ink.

  The Master Plan requires Dakota County to "increase recycling efforts and adjust purchasing decisions to reduce the amount of municipal solid waste generated in its county-operated buildings by 5% by 2003" (Regional/County Solid Waste Master Plan, 1998). Specifically, as part of the Master Plan, Dakota County identified the following commitments:

  - Determine the feasibility of implementing a food waste recycling or reduction program at County facilities,
  - Evaluate and, where feasible, incorporate aspects from the Environmentally Responsible Purchasing Guide into the decision making process and contract specifications for purchasing products for County use,

- Promote the use of eco-printing techniques and practices by all County Divisions/Departments through the existing County Communications Liaison Committee; the Environmental Management Department staff will provide assistance to other County Departments,
- Conduct one waste sort in one County building each year to determine the composition of the waste materials being discarded, and work with the employees in the building to recycle and reduce appropriate materials, and
- Work to purchase products with higher post consumer content (e.g., copy and printer paper, office letterhead).

- **To build consistency of practice among staff, in-house recycling requires systematic attention and continuing commitment.** Dakota County's in-house recycling program will benefit from continuing attention from managers and staff at all levels of the organization, and coordination across Departments and facilities.

  Presently, the Environmental Management Department, in collaboration with other County Departments, promotes in-house recycling and waste abatement -- developing the Eco-10 Challenge, conducting periodic waste and recycling sorts, and facilitating the Dakota Environmental Review Team (DERT) to support environmental outcomes. The Departmental Services Unit of the Operations Management Department supports environmentally preferable purchasing and related initiatives (e.g., central duplication and mailing). An environmentally friendly, sustainable building initiative has been implemented in the County. However, emphasis on these efforts has proven difficult to sustain over time. For example, DERT currently meets only once or twice each year to exchange information and to discuss improvements to County processes. Many County staff do not recognize that there are options on printers linked to their computers to prepare two-sided documents. Support from County managers at every level of the organization and a renewed commitment of staff can and should reinforce County in-house recycling results. With leadership at all levels within the County and individual participation in recycling and environmental purchasing, consistency of practice among staff in pursuing recycling and waste abatement goals can be attained within County Departments and Divisions.

- **Stringent contracts for collection of recyclable materials are one effective method for improving management of in-house recycling programs.** The experience of other counties in the region suggests that stringent contracting for collection of waste and recyclable materials is one way to ensure access to more accurate and consistent trend data for in-house volumes. Based upon the best practice of comparable counties, other strategies, including periodic facility waste composition studies and surveys, may similarly be effective in providing regular estimates of volumes recycled and disposed of within County facilities and buildings.

IN-HOUSE RECYCLING RECOMMENDATIONS

- **Dakota County should rededicate efforts towards consistent and regular promotion of in-house recycling and waste abatement activities, to promote broad awareness and participation among County staff.** Dakota County government leverages a direct impact on recycling through efforts in County buildings and facilities. With involvement and leadership at all levels of the organization, individual participation and consistency in maintaining recycling practices and waste abatement can be attained.

  Renewed efforts within the organization should include consideration of:

  - Clear responsibility and expectations for the implementation of internal recycling and waste abatement efforts,

- Standards for building maintenance that support the recycling of wastes produced in County facilities,
- Ongoing education for County staff and visitors, presented in a variety of formats (e.g., posted signage, presentations to new employees during scheduled orientations, etc.),
- Assistance and technical support targeted to Departments and staff regarding opportunities to purchase environmentally preferable office supplies, and
- The experience of comparable best practice jurisdictions and organizations for adaptation to Dakota County's in-house efforts.

APPENDIX I: EVALUATION FRAMEWORK

The key questions identified are presented in the four tables following for greater clarity. The Recycling Evaluation will focus on addressing questions surrounding recycling program effectiveness, as highlighted in Tables 1 and 2. Specifically, Table 1 targets baseline, overview information about the County's recycling program and its current results, as well as nationally comparable measures of recycling program effectiveness. Table 2 examines the County's involvement in residential, commercial, in-house, and institutional recycling in greater depth, and further targets several factors that may substantially influence recycling rates. Due to the inherent complexity of solid waste management, the Workgroup identified two specific areas of County activity that warrant greater study: these include the County's relationship with the private waste hauler industry, and the County's work in promoting greater environmental awareness through education. Key questions surrounding these two factors are noted in Table 2.

Finally, the Workgroup anticipates that the results of the evaluation study may lend themselves to investigating additional, related topics within solid waste management in the future. These associated topics are outlined in Tables 3 and 4. While Tables 1 and 2 frame the scope of the Recycling Evaluation specifically, Tables 3 and 4 were included in order to document the range of additional questions and discussion areas that may elicit further study after the conclusion of the current evaluation. Specifically, Table 3 outlines a number of broader, strategic questions that target the County's role in contributing to a sustainable environment more generally, and in solid waste management activities more specifically. Table 4 highlights several additional factors that contribute to recycling rates, including alternative strategies for waste management, the relative costs and benefits of offering governmental incentives, the effect of end markets, and the County's role within a larger multi-jurisdictional system governing waste within the metropolitan area.

TABLE X.1. PROGRAM EFFECTIVENESS: *OVERVIEW*	
Focus: Evaluating the County's recycling program and determining the relative effectiveness of the current program.	Overview Questions: • What should the County's recycling target be? • What will the County's additional investment in recycling "buy" with respect to improved recycling rates? • What is the point of diminishing returns regarding the County's investment in recycling? *Internal Analysis* • Is recycling data accurate? What does time series data for Dakota County and the metropolitan area indicate? • What County policies, decisions, and practices either promote/impede recycling rates? • Is the community funding program effective? What is the cause-and-effect mechanism between local community actions and recycling rates? • What makes Dakota County unique with respect to promoting/impeding recycling rates? • How can the County's leadership position in recycling be strengthened? • What outcome measures are most representative of cause and effect, recycling rates vs. actual activities? *External Analysis* • What parameters influence recycling rates most? • How can the County increase its rates? What incentives might encourage recycling? • What are the current trends in recycling? In what direction are recycling programs moving? How do these trends affect the future of recycling in the County? • How might information/recommendations forwarded by existing research studies influence County policy or programs?

TABLE X.2. PROGRAM EFFECTIVENESS: *SECTORS, INTERNAL FACTORS*

Focus: Examining the County's involvement in residential, commercial, in-house, and institutional recycling program areas.	Residential Recycling	• What is the County's role in and commitment to residential recycling? • How should the County assist private citizens and households to increase residential recycling rates? What initiatives might be most effective?
	Commercial Recycling	• How might commercial recycling rates be most accurately measured or estimated? • What is the County's role in and commitment to commercial recycling? • How should the County dedicate efforts to assist private firms to increase commercial recycling rates? What initiatives might be most effective?
	In-House & Institutional Recycling	• What is the County's commitment to recycling within County facilities and buildings? • Would an internal analysis provide a greater return on staff investment? Could internal analysis lead to external implementation?
Focus: Assessing critical, internal factors that significantly influence recycling rates.	Effect of the County's Relationship with the Private Sector	• How do private sector decisions and market forces affect recycling rates? • How do landfill tip fees and other fee structures affect recycling rates? • How does vertical integration in the waste disposal industry influence the County's recycling program? • How does consolidation adversely affect the County's environmental goals and/or established programs? • Should the County take a more active role in collection/processing/disposal of waste, or should the County continue to rely on private industry? • Should the County investigate public collection? Should the County conduct pilot projects to test alternative collection scenarios?
	Effect of the County's Educational Initiatives	• What institutes and maintains behavioral change? • What is the most effective educational approach to stimulate change? In turn, what is the most efficient educational approach? • How might the County coordinate educational initiatives more effectively with other levels of government -- including municipalities, region? • What types of new activities should the County undertake with respect to educational activities?

TABLE X.3. FUTURE CONSIDERATIONS: *STRATEGIC GOAL-SETTING*	
Focus: Identifying the County/EM's environmental and solid waste management priorities.	Overview Questions: *Purpose in Promoting/Protecting the Environment* • What is the County's role in promoting a "Healthy, Sustainable Environment"? • What is the most critical priority or issue presently facing the County and the EM Department? • Where and how should the County concentrate and invest its resources and programmatic efforts? *Purpose in Solid Waste Management Activities* • What is the County's role in solid waste management? • What is the County's true waste management objective -- landfill abatement? • Should the County focus more on alternative waste management strategies -- for example, waste reduction -- than on improving recycling?

TABLE X.4. FUTURE CONSIDERATIONS: *EXTERNAL FACTORS*

Focus: Exploring the larger, external context of solid waste management, and the County's environmental policies and preferences within broader waste management objectives and considerations.	Overview Questions: • Is achieving a higher percentage of recycled material most important, or is increasing levels of participation, and/or expanding recycling within specific sectors? • Is there a need for an additional recycling center to service increasing population centers that are distant from the Eco-Site in Eagan?	
	Effect of Alternate Management Strategies	• What is the "true cost" of recycling, source reduction, and/or waste processing? • How might Tot. cost accounting and life cycle accounting value solid waste management alternatives? • How do source reduction, waste processing, and other management strategies impact recycling rates, environmental objectives?
	Effect of Government Incentives	• How does the free market affect recycling rates in the near and longer term? • How do existing fee structures and private hauler reporting requirements affect recycling rates? • At what point will recycling appear to be a 'profitable' activity for the private sector? • What initiatives or incentives can local government offer to improve recycling rates over the long term? • How does federal legislation that considers waste a 'commodity' impact the effectiveness of local recycling?
	Effect of End Markets	• Is there a specific material that could significantly affect recycling rates? • Does the County prefer specific recycled end products (e.g., glass bottle to glass bottle vs. glass bottle to road aggregate)? • Is the overall quality of recyclable materials most important? Should County educational messages favor single-stream collection?
	Effect of Multi-Jurisdictional Authority	• What is the most effective level of governance for administering and facilitating recycling programs? In turn, what is the most efficient jurisdictional level for management and administration? • How might the County coordinate educational initiatives more effectively with other levels of government -- including municipalities, region, state, and federal levels? • What types of complementary new activities should the County undertake specifically in collaboration with other levels of government?

APPENDIX II: PROGRAM HISTORY

Dakota County's current recycling program resulted from efforts begun in the late 1980s to comply with mandates originating at the State level to end dependence on landfills for the disposal of solid waste and to rely instead on integrated waste management practices, such as recycling. It is important to recall that the County's implementation of recycling programs was not taken independently, but was the result of a strategy outlined in state policy and reflected in local governmental solid waste management plans. In addition, the County's initiative to begin residential recycling service was viewed skeptically by most waste haulers because industry regarded this type of service as an unprofitable undertaking.

The County's efforts have focused primarily on three areas: residential recycling, the County's "in-house" program, and business-institutional recycling. While common elements of the programs have been maintained, features have changed over time and are strongly related to funding policies. An historical perspective of the County's efforts should be viewed as occurring in during five different program phases with each phase related to the level of financial and staff support provided.

Phase I: Start-Up Program (1989 to 1991)

In the late 1980s there were limited opportunities for Dakota County residents, businesses and employees to recycle. In a move to quickly begin efforts and comply with State mandates, the County's early efforts were characterized by a substantial commitment of staff and financial resources. The overall direction of these efforts was outlined in the County's Solid Waste Master Plan and in Dakota County's Recycling Implementation Strategy, both adopted in 1988. The focus of the Solid Waste Master Plan and the Implementation Strategy was primarily on residential recycling. One feature of the Implementation Strategy was that it relied on communities to use their resources to implement and operate local residential curbside programs. The County's financial support allowed communities to provide recycling information to residents and administer recycling activities (administration), pay haulers for recycling collection (operations), and purchase curbside recycling containers for every household (capital costs).

Phase I -- Residential Efforts

Prior to 1989, there were no local County sponsored curbside recycling collections and no recycling processing facilities. Dakota County had more resources than some other metropolitan counties to start countywide programs because the County could draw on the resources from its Landfill Abatement Surcharge Fund, in addition to grants available from the Metropolitan Council. On April 1, 1989, the combination of these factors allowed Dakota County to successfully launched curbside recycling programs in every community and it the rural area. The curbside residential recycling program started in April1989 had a number of critical components: reliance on local haulers and communities, payment to haulers for recyclables collection and to cities for promotion and administration, purchase of recycling containers for every household, and a County sponsored recycling processing facility (the Dakota County Recyclables Collection Center). The County relied on the existing system of haulers to collect recyclable items from their own customers within the framework of the "Targeted Community Recycling Program," which was outlined in the Recycling Implementation Strategy.

The Targeted Community Recycling Program contained minimum standards for frequency of collection and type of materials accepted. The County relied on the existing communities of designate staff as recycling coordinators to administer and promote recycling efforts in individual communities as outlined by its Community Landfill Abatement Funding Policy. Another key feature was the provision of recycling containers to every single family home in Dakota County. The County provided each city with funding (up to $15 per house) to buy and distribute a recycling bin to every home. Finally, the County provided funding to each city to pay haulers that collected residential recyclables up to $1.00 per house per month for this service.

A summary of the County's original grant categories (1989-1991) follows:

- Administration: Communities over 5,000 residents received $0.50 per household per year, or $2,777 per year, whichever was greater. Communities under 5,000 residents received a $277 base, plus $0.50 per household per year.
- Operations: Communities were eligible to receive up to $1.00 per household per month. Communities used these funds to pay haulers for recycling collections.
- Capital Costs: Communities used these funds to purchase residential recycling containers. All communities were eligible for a one-time payment of up to $15.00 per household. At that time, curbside recycling was changing from a three-bin system to a one-bin system that drastically reduced capital costs. This fund was the only category to be carried over from year to year, during 1989 through 1991. Funds left unspent from this category later funded the Special Assistance Grants.

Phase I -- Dakota County Recyclables Collection Center
Another key early element of the County's early efforts was sponsorship of a Material Recovery Facility (MRF) - the Dakota County Recyclables Collection Center (DCRCC). The DCRCC provided a dependable market for curbside recyclable materials collected by haulers. Dakota County obtained a three-year lease (with possible one year extensions) on an industrial structure in Burnsville and paid for remodeling it to function as a MRF. The County also contracted with a recyclables processor, Recycle Minnesota Resources, to operate the facility. As a further inducement to haulers, the County also guaranteed a payment to haulers for the recyclables brought to the DCRCC.

Phase I -- Dakota County In-House Recycling Program
Dakota County implemented a trial office paper recycling program in late 1985. The trial Program's collection was limited to collecting high-grade office paper and operated in only about five County buildings. In 1989, the Program expanded to service all County employees through the provision of desktop cardboard recycling containers. The Program continued to collect primarily high grade office paper, but items like newspaper, computer paper, beverage cans, glass and cardboard also were added. Program collection operations also were standardize collection by incorporating a County collection vehicle and work crews from Community Corrections.

Phase I -- Commercial/Industrial Recycling
The County did not commit resources at this time to commercial, institutional, or multifamily recycling.

Phase II: Intermediate Program (1992 to 1994)
The County's program started in 1989 continued for the next three years with minor changes. By 1991 all homes in the County, including multi-family dwellings, were provided the opportunity to recycle and waste haulers cooperated by providing collection service through the purchase of appropriate collection vehicles and other equipment. The County's official recycling goal was increased from 9% in 1989 to 14% in 1992 and steel/bi-metal cans and cardboard were added to the types of materials accepted by curbside recycling.

In early 1991, the County Board directed the Solid Waste Management Advisory Committee (SWMAC) to develop recommendations for a revised County community recycling funding policy. The new policy, started in 1992 and continued through 1994, consolidated the "operations" payment under the County, allowed communities to apply for "Special Assistance Grants" to purchase additional recycling containers and for innovative projects, and increased community administrative and promotional funding.

Phase II -- Residential Efforts
The revised funding policy coincided sought to standardize components and increase reliance on the private sector for recycling operations. Overall funding to communities were reduced and County staff

assumed some responsibilities previously delegated to communities. The most substantial change involved payment to haulers for collecting residential recyclables. The County's now collected and reported all recycling data also made direct payments to haulers for collecting recyclables. County payments to haulers for recycling collections began at a rate of $25 per ton in 1992, and decreased annually by $5 per ton until the payments were $5 per ton in 1996 and zero in 1997.County payments to haulers would cease after 1996.In 1992, funding to communities also was restricted to only administration and promotional expenses, but communities remained responsible for purchasing, storing and distributing recycling containers to new residents. In 1992, bottle grade plastic bottles were added and in 1993 magazines were included in the list of recyclable materials collected curbside in the Targeted Community Recycling Program.

A summary of the County's grant categories for Phase 2 (1992-1994) follows:

- Community Administrative/Publicity Grants: Communities continued to administer and publicize their recycling programs. Communities 5,000 or more residents were eligible for up to $2.00/HH/year, based on the latest household counts. Communities with fewer than 5,000 residents were eligible for up to $2.00/HH/year, plus a $1,000 base, based on the latest household counts.
- Hauler Payment Program: The County signed contracts with haulers to pay for recycling collections. The payment began at $25.00/ton in 1992 and declined by $5.00/ton every year after 1992. In 1996, the payment was $5.00/ton. The program terminated in 1997.
- Special Assistance Grants: There were $449,678 remaining from the original "capital" funds category, and that was used to fund the Special Assistance Grant program from 1992 through 1994.Special Assistance Grants were used for a variety of projects, including: reusable shopping bags, hauler incentives to collect new materials, and commercial recycling. About $150,000 remained after the last Special Assistance Grant round in July 1994.Communities had until the end of 1995 to complete projects funded by these grants.

Phase II -- Dakota County Recyclables Collection Center
In 1992, the County systematically began reducing its financial support of the DCRCC with the goal of completely privatizing processing and marketing operations in upcoming years. The DCRCC operated at its Burnsville location until the end of 1993, but a lease termination forced re-location of the facility to Rosemount in early 1994. It was at this point that the recycling processing portion of the operation was separated from the public education and residential drop-off activities of the facility. In early 1994, Dakota County sponsored a separate, small residential recycling drop off location at 1705 East Highway 13 in Burnsville. New contract amendments with Recycle Minnesota Resources (RMR) specified termination of County financial support of the recycling processing portion of operations by 1996, although County funding for the recyclables drop-off activity would continue. It should be noted that 1995 represented a high point for recyclable markets and private industry supported discontinuing governmental support of recycling processing.

Phase II -- Dakota County In-House Recycling Program
By 1992, Dakota County's in-house program had been expanded to most, but not all County buildings and desk-side containers distributed to most, but not all County employees. An educational component was started with the identification of employee recycling contacts for almost all County departments. The coordinator's responsibilities were to educate new employees about recycling opportunities, monitor collection of centralized departmental recycling containers, and to coordinate the department's collection schedule with Environmental Management and Community Corrections. Material collected by the County's in-house program was brought to the DCRCC and RMR paid for the recyclables and returned funds to the County for the value of the material. A modest expansion of the Program was made to new County buildings, but no new materials were added. The program's collection operation encountered problems with the reliability of the labor provided by Community Corrections and a decision was made to

terminate this effort and to rely on the waste haulers for County facilities to also provide recycling collection service.

Phase III: Transitional Program (1995 and 1996)
In late 1993, the Solid Waste Management Advisory Committee (SWMAC) recommended that the County Board directed the SWMAC to develop further recommendations for another revision of the County's recycling program. The SWMAC re-instituted its Long-Term Funding Subcommittee in late 1993 and the County Board adopted the Subcommittee's recommendations in early 1994 for implementation in 1995. The recommendations were not as extensive as the first Subcommittee and dealt only with community administrative and publicity funding.

An important operational change that occurred in this period was termination of County support for recycling processing. The DCRCC ended operations at its location in Burnsville because the County's lease on this structure expired at the end of 1993.The County's contractor, Recycle Minnesota Resources (RMR), was able to locate another suitable location in early 1994, but the level of County financial assistance received by RMR began declining in 1994 and ceased at the end of 1996. The County continued to separately fund RMR for the operation of a recyclables drop-off facility in Burnsville.

Another important change in the County's program occurred at the end of 1996 with the termination of direct payments to haulers for the collection of curbside recyclables. By 1996 this payment had dropped to $5 per ton, and ceased entirely by 1997.The payment program had also functioned as an important method for collecting data from haulers. Termination of payments meant another method was required, so the County amended Ordinance 110 to include a hauler data reporting as a licensing requirement starting in 1997.

Phase III -- Residential Efforts
In 1995, the community funding formula was altered to reduce the range in funding amounts between communities. This resulted in slightly less funds for very large and very small cities, but increased funds for the mid-sized cities. The Special Assistance Grant Program was discontinued in 1995 and the remaining funds were returned to the County budget, but a small amount ($20,000) was allocated to a fund Community Innovation Grants. Communities continued to purchase, store and distribute recycling containers to households. Mixed mail was added to the list of materials accepted in curbside recycling as part of the Community Recycling Program and the County's recycling goal was increased to forty-five percent.

A summary of the County's funding features for Phase Three (1995 and 1996) follows:

- Community Administrative/Publicity Grants: Communities with over 5,000 residents were eligible for up to $1.57 per household per year, plus a $5,000 base amount. Communities with less than 5,000 residents were eligible for up to $1.57 per household per year, plus a $500 base amount.
- Special Assistance Grants/Innovation Fund: The SWMAC recommendation reserved about $20,000 from this category (allocated to communities on a per household basis) for a Community Innovation Fund in 1995 and 1996.

Phase III -- Dakota County Recyclables Collection Center and Recyclables Drop-Off
During this period, the County substantially reduced its support of recyclables processing and the County's direction was to increase reliance on the private sector to supply this service. The County continued to receive reports on the amount and types of materials processed by Recycle Minnesota Resources (RMR) at the Rosemount facility, but RMR increasingly handled direct contact with haulers for processing recyclables. The County undertook funding support for the recyclables drop-off center in Burnsville, which gradually became the County's major activity with public and small business contact.

Phase III -- Dakota County In-House Recycling Program
By 1995, collection of office in-house recyclables from Dakota County buildings was entirely by private haulers. Data on the volumes of recyclables collected from County buildings no longer was available because of the switch to private haulers. It appeared that all County buildings and employees were receiving recycling service and the County's focus shifted to the educational component. In 1995 the first of a series of "waste sorts" was undertaken as a promotional activity to increase the program's visibility to employees. Coordinators were contacted on a quarterly basis about program changes and continued to be responsible for educating new employees about recycling opportunities and to supply desk-side containers provided by the Environmental Management Department. Environmental Management staff began to standardize collection receptacles in common areas and in conference rooms.

Phase IV: Mature Program (1997 to 1999)
In 1995, in an effort to provide a predictable funding amount and predictable requirements for communities, the County Board of Commissioners requested that SWMAC provide additional recommendations for again revising the recycling funding. The SWMAC formed a Committee of the Whole, and its recommendations for the 1997 through 1999 funding policies to the County Board were adopted in 1996.The policy provided for uniform policies and funding schedules for a three-year period (1997 to 1999).The funding policy provided for three separate categories of funds: a Base Fund (all communities eligible); an Innovation Fund (optional); and a Container Purchase Fund (optional, to be administered and coordinated through the County).

The Container Purchase Fund represented a departure from the earlier programs because the County now would purchase a uniform residential recycling container and distribute the containers to individual communities as requested. Another important development was the opening in November 1997 of the Dakota County Eco-Site. The facility, located in Eagan, was a cooperative effort between Gopher Resource Corporation and Dakota County to provide one-stop drop-off service to residents for recyclables and household hazardous waste.

Phase IV -- Residential Efforts
Two developments during this period were significant for the residential recycling program. One development was that, for the first time since 1989, communities were provided predictable funding amounts for an extended period of years. The other development was the continued transfer of operational activities from the cities to the County with the County now responsible for purchasing uniform residential recycling containers.

A summary of the County's grant categories for Phase Four (1997-1999) follows:

- Base Fund: Communities with over 5,000 residents are each eligible for a $5,000 base grant, plus $1.60 per household, based on the most recent housing estimates. Communities with under 5,000 residents are each eligible for a $500 base grant, plus $1.60 per household, based on the most recent housing estimates.
- Innovation Fund: A fund was established to sponsor projects that enhance and expand recycling efforts. The fund amount is $18,000, but no single community may receive more than $6,000. Applications for the Innovation Fund must meet stated criteria and fit into the list of eligible expenses.
- Container Fund (County-Administered): A County-administered Container Fund of approximately $25,000 annually was established to provide residential recycling containers. Communities are responsible for storage and distribution, but are eligible to receive a requested number of containers obtained by the County.
- Performance-Based Program: Community program performance continues to be evaluated based on activities required by the County. Communities must meet performance requirements, such as seven presentations to community groups, publication of city-developed promotional

materials, and outreach programs to multifamily residents. Communities are also required to include an evaluation component on city performance and develop their own feedback mechanism.

- Public Education (County-Administered): Dakota County worked cooperatively with communities to publicize solid waste abatement activities. The County produced at least three annual promotional pieces produced, such as the "Green Guide" and sponsored activities that included tours and Earth Day Open House events at the Dakota County Eco-Site, attendance at the annual County Fair, and presentations to school and community groups.

Phase IV -- Dakota County Eco-Site
In November 1997, Dakota County and Gopher Resources jointly opened the Dakota County Eco-Site. This facility effectively combined a household hazardous waste drop-off site with a reuse area, a recyclables drop-off, and an aluminum can redemption center. The facility also accepts recyclable items from local small businesses. The County funded the portion of the operation for recyclables drop-off separately from the household hazardous waste operation and at reduced cost compared to its previous separate drop-off location in Burnsville. Gopher Resources reports quarterly on the amount of recyclable material brought to the facility. The facility's education room also provides space for public outreach activities. The facility represents one of the County's major areas for interacting with the public and small businesses.

Phase IV -- Dakota County In-House Recycling Program
In 1997 through 1999, collection of office in-house recyclables from Dakota County continued by private haulers. Environmental Management staff equipped new County buildings, such as libraries, and new employees with appropriate recycling receptacles and worked cooperatively with staff recycling coordinators. The County continued its focus on the educational component. In 1999, Environmental Management Department staff conducted another "waste sort" as a promotional activity modeled after the effort conducted in 1995. Coordinators continued to be contacted on a quarterly basis about program changes and outreach efforts were made directly to County departments.

Phase V: Current Program (2000 to 2002)
The SWMAC recommend another revision to the community funding policy for 2000.The original SWMAC goal was to develop a funding policy to cover multiple years, but it agreed to recommend a transitional policy only for 2000 pending approval of the Regional/Dakota County Solid Waste Management Master Plan. Once the Plan was approved by the County Board, a multiple year funding policy was proposed to coincide with the term of the current Master Plan. The current community funding program was approved in 2000 for the funding period 2001 through 2004 (four years). The time frame corresponds to the time frame for the current Regional/Dakota County Solid Waste Management Master Plan. The Master Plan is due for revision in 2004.

The most current changes in the County's recycling efforts were the result of SWMAC recommendations made in early 1999, and again in 2000.The original SWMAC 1999 goal was to recommend a policy to cover multiple years, but a transitional policy only for 2000 was suggested instead, pending approval of the Regional/Dakota County Solid Waste Management Master Plan. The County Board and Minnesota Office of Environmental Assistance (MOEA) gave final approval to the Master Plan by mid-1999. In 2000 the SWMAC proposed a multiple year funding policy to coincide with the term of the Plan. The funding element for the current program was approved in 2000 for the period 2001 through 2004 (four years) and corresponds to the timeframe for the adopted Regional/Dakota County Solid Waste Management Master Plan. The Master Plan is due for revisions in 2004.

Perhaps the most significant departure in the current overall County program compared to previous years was that County and city recycling goals were modified to conform to the objectives listed in the Regional/Dakota County Solid Waste Management Master Plan. There was increased emphasis on

implementing an evaluation method that measures program effectiveness and provide government leadership in purchasing and reduction activities. The Innovation Fund was reconfigured and became a fund for Sustainable Environmental Grants. The amount allocated for grants to communities was increased to $40,000 per year.

Phase V -- Residential Efforts
The details of the current residential recycling program have changed little from immediately preceding efforts. Under the auspices of the current program, communities are provided with an established amount of funds until 2004 at about the same level as before, and the primary responsibilities for cities remain the administration of local recycling programs and publicity and promotion of the programs.

A summary of the changes in the County's grant categories for Phase Five (2000-2004) follows:

- Sustainable Environmental Grants: This grant continues to be for projects that enhance and expand recycling efforts, but emphasis is placed on activities that demonstrate governmental leadership. Approximately $40,000 is available, but no single community may receive more than $10,000. Another change from previous grants is that communities may receive up to seventy percent of the requested grant amount at the start of the project. Applications for Sustainable Environmental Grants must meet stated criteria and fit into the list of eligible expenses.
- Container Fund (County-Administered): A County-administered Container Fund is systematically increased, starting in 2001, from its original 1997 amount of $25,000 to account for increased household growth in the County. The amount in 2001 was $26,000 and for 2002 was $27,000.
- Performance-Based Program: Communities must continue to meet performance requirements, such as seven presentations to community groups, publication of city-developed promotional materials, and outreach programs to multifamily residents. A change for is that the requirement for an evaluation component on city performance and develop their own feedback mechanism is now required every other year.

Phase V -- Dakota County Eco-Site
The level of activities occurring at the Eco-Site has gradually increased. The amount of material has brought to the Eco-Site has risen and the list of items accepted at the facility expanded to include telephone directories, fluorescent lamps, propane gas cylinders, and mercury thermometers. A program was established in 2000 to allow small businesses to bring fluorescent lamps to the Eco-Site and in 2001 a new Very Small Quantity Generators (VSQG) program was started for small business generators of hazardous waste. The facility's public outreach activities have nearly doubled with the promotion of tours by County staff.

Phase V -- Dakota County In-House Recycling Program
The County's in house office recyclables program continued to expand as Environmental Management staff equipped new libraries and other County buildings with recycling receptacles and worked with individual departments to increase recycling participation. In 2000 and 2001m, Environmental Management Department staff conducted "waste sorts" as a promotional tool to increase visibility for the in-house program. There has been additional emphasis on governmental leadership with the promotion of the Environmental Preferable Purchasing Guide (EPPG) to in increase the County's purchase of recycled content materials. In 2000 the Dakota County Environmental Review Team, consisting of a cross section of departmental representatives, was formed to coordinate in-house waste reduction and recycling activities. In 2001, a pilot "Eco-10 Challenge" was begun at the Western Service Center to emphasize waste reduction approaches in the County.

APPENDIX III: REGIONAL/COUNTY PLANNING

Regional/Dakota County Solid Waste Master Plan 1998 to 2017

Regional Vision

A sustainable community seeks a better quality of life for current and future residents by maintaining nature's ability to function over time. It minimizes waste, prevents pollution, promotes efficiency and develops local resources to revitalize local economies. The waste management system is a component of the infrastructure of a sustainable community. Therefore, solid waste will be managed by technologies and methods that support sustainable communities and environments. The solid waste hierarchy, with its associated goal of protecting the state's land, air, water, and other natural resources and the public health, is central to attaining the objectives of sustainability and appropriate solid waste management.

Regional Goals

1. To manage waste generated in the metropolitan area in a manner that will protect the environment and public health and that will conserve resources.
2. To manage the region's waste in an integrated waste management system in accordance with the hierarchy in order to minimize landfilling.
3. To manage the region's waste in a cost-effective manner and to strive to minimize the potential liability of the citizens, businesses and taxpayers in the region.
4. To encourage generators to take responsibility for the environmentally sound management of their waste.
5. To allocate solid waste management system costs equitably among those who use or benefit from the system.

Table Z.1. Regional Recycling Policies

Regional Recycling Policies (Section 5.2.2.)

A. It is the policy of the region that state, county, local governmental units, and school districts will serve as leaders in recycling. These units of government will implement strategies to aggressively:
   - Maximize internal recycling efforts through continuous improvement and performance reporting;
   - Make purchasing decisions for commodities and construction materials that promote resource conservation and environmental protection; and
   - Maximize the recycling of nonMSW wastes. (Goals 2, 4)

B. Recycling will be integrated into all relevant aspects of regional, county, and local government decision making including, but not limited to, local land use comprehensive plans, and zoning and building ordinances. (Goals 1, 2)

C. The state and region will actively promote the benefits of and opportunities to recycle, and educate consumers so they understand the link between what they buy and what they set out on the curb. "Buy Recycled" will be emphasized. (Goal 1)

D. Government should continue to partner with the private sector to provide quality, convenient, efficient, and sustainable recycling programs. (Goals 4, 5)

E. The region will maintain its commitment to recycle at least 50% annually (including yard waste and source reduction credits) of MSW through 2003.The state, region, and counties will seek to continually improve recycling efforts by:
   - Evaluating and enhancing existing residential recycling programs and services in cooperation with local units of government and recycling collectors; and
   - Increasing efforts to identify and expand opportunities for commercial recycling programs and services. (Goals 1, 2)

F. The state and region, in consultation with affected parties, will emphasize the use of research in the development of plans, development of performance measures, and evaluation of recycling. In particular, research-based analyses should be used to:
   - Develop performance indicators and measure progress;
   - Target specific materials for recycling;
   - Target specific waste generators for promotion of recycling; and
   - Identify public policy actions. (Goals 1, 3, 5)

G. Recycling is viewed as an economic development opportunity for the region, and the further development of recycling programs should be considered in an economic development context. (Goals 3, 5)

H. While recognizing that market conditions are variable, the region and waste industry should assure, to the extent possible, a stable recycling collection system. The industry should engage in business practices that promote stability. The state should consider actions to assure markets for recyclables so that recyclables that are collected are recycled. The state and region will:
   - Strongly encourage multiple markets to provide a diversity of market opportunities; and
   - Assure a stable supply of quality materials for recycling markets. (Goal 5)

I. Market development is the responsibility of the state. The state will continue to promote the development of diverse markets for recyclables. (Goal 1)

Source: *Metropolitan Solid Waste Management Policy Plan, 1997 to 2017*

Table Z.2. Intermediate Recycling Outcomes for the Region

Intermediate Recycling Outcome #1

By 2003, 80% of the region's businesses that generate old corrugated cardboard or office paper waste will regularly practice reduction.

Regional Implementation Strategies

The regional implementation strategies for this section are consistent with the Source Reduction Intermediate Outcome #2 strategies. Note that where strategies for source reduction are set forth, recycling will be encouraged if reduction is not possible.

Dakota County Negotiated County Outcomes

- Implement a phased business recognition program.
- Support eco-printing techniques and practices (e.g., using soy inks, recycled content paper and recyclable paper).

Intermediate Recycling Outcome #2

The region will target materials, collection and marketing strategies that result in the collection and recycling of the most materials for recycling at the least possible cost.

Regional Implementation Strategy

Working with municipalities and private service providers, the region will assess the efficiency and effectiveness of city and county recycling programs and explore funding options and innovative programs, in order to identify opportunities that will allow the region to achieve and sustain at least a 50% recycling rate.

Dakota County Negotiated County Outcomes

- Promote the use of drop-off sites and continue to fund the County Eco-Site recycling and household hazardous waste drop-off site.

Intermediate Recycling Outcome #3

The growth in the recycling industry will keep pace with the rate of overall economic growth in Minnesota and will reflect the changing market needs resulting from a change in the composition or quantity of materials found in the waste stream. The region will act as a leader in the procurement of products with recycled content.

Regional Implementation Strategies

1. The region will conduct research by:
    - Working with the OEA to identify current and future market needs for materials collected in the region.
    - Identifying the impact that changes in the quantity, quality and type of waste available for recycling will have on collection programs.
2. The region will undertake education and other strategies as appropriate that target city and county economic development staff who are in regular contact with businesses and who can promote the benefits of recycling and purchasing products with recycled content.
3. The region will work with trade associations or industry by:
    - Assisting the OEA with its efforts to work with manufacturers to promote the use of recycled materials in products.
    - Working with targeted industries to encourage the use of recycled paper.

Dakota County Negotiated County Outcomes

- Promote the "buy-recycled" message to all County waste generators and public entities, emphasizing recyclables as a resource or asset, not a waste.
- Consider leasing County property for solid waste purposes.

Source: *Regional/Dakota County Solid Waste Master Plan, 1998 to 2017*

Dakota County Environmental Management Department

Mission: Provide Environmental quality for the well being of the community.

Vision Goal: A net gain in environmental quality will be achieved as development continues.

Mission Goals:
- To achieve a sustainable, healthy environment
- To ensure that State and Federal mandates are met

Department Goals:
- To protect and enhance the environment of the community
- To create an environmentally aware community

Recycling

Each County will gather information about the level and type of service, price of service, quality for service and service performance by 2000 for use in analysis of local recycling efforts. (Completed)

Principal Recycling Outcome

Collectively, the region will achieve at least a 50% MSW recycling rate (including a 3% source reduction and a 5% yard waste credit) every year, through 2003.

Dakota County will:
- Work with public and private sectors to maintain household recycling rates at 1997 levels.
- Add a material to list of Countywide materials required for collection when shown to be technically and economically feasible.
- Focus its efforts on food waste recycling (e.g., Endres Processing and animal farmers).

Intermediate Recycling Outcomes:
1. By 2003, 80% of the region's businesses that generate old corrugated cardboard or office paper waste will regularly practice reduction.
2. Region will target materials, collection, and marketing strategies that result in collection and recycling of materials at least possible cost.
3. Growth of recycling industry will keep pace with overall economic growth of Minnesota.

Dakota County will:
- Implement a phased business recognition program.
- Support eco-printing techniques and practices.
- Promote the use of drop-off sites and continue to fund the County Eco-Site recycling and household hazardous waste drop-off site.
- Promote the "buy recycled" message to all County waste generators and public entities, emphasizing recyclables as a resource or asset.
- Consider leasing County property for solid waste purposes.
- Work with the Metro East Development Partnership and local economic development entities to increase awareness of the recycling industry and the opportunities for growth by pursuing such industries.

Dakota County Recycling Strategies:

- Exhibit strong environmental education focus, promote management alternatives for food waste, develop an annual press release addressing these alternatives, and continue Green Guide and appropriate updates.
- Request input from hauler representatives, Solid Waste Management Advisory Committee, and local communities, relative to adding another material to the Countywide materials required for collection.
- Support phased business recognition program through provision of approved $6,000 innovation grant funds.
- Evaluate and incorporate aspects of Environmentally Responsible Purchasing Guide and contract for purchasing products for County use.
- Promote eco-printing techniques through the County Communications Liaison Committee; Environmental Management staff will assist other County departments.
- Work with other five SWMCB counties to develop a protocol and criteria for gathering recycling service info for use in analysis of local recycling efforts.

    - Conduct one waste sort in one County building each year.
    - Ensure recycling programs are established in all facilities under its control by 2000.
    - Purchase products with higher post consumer content.

Table AA.1. County Curbside Recycling Tonnages, by Community, 1996 to 2001

Community	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*
Apple Valley	3,121.83	3,819.07	3,729.28	3,749.53	2,935.25	3,409.50
Burnsville	3,943.31	4,293.57	4,091.78	4,101.47	4,048.21	4,201.24
Eagan	4,818.56	5,452.12	5,099.03	4,584.62	4,702.55	4,902.94
Farmington	625.75	831.66	960.12	939.80	1,174.53	1,326.80
Hastings	1,380.98	1,514.71	1,499.70	1,521.92	2,837.47	1,487.96
Inver Grove Heights	1,352.08	1,809.55	2,052.41	2,257.28	2,488.26	2,311.39
Lakeville	2,019.61	2,807.48	3,328.80	3,497.36	3,130.95	3,641.02
Lilydale	22.21	35.83	11.37	18.50	99.26	8.90
Mendota	7.90	14.60	7.01	10.92	90.06	* NA
Mendota Heights	1,115.10	1,200.78	1,163.21	1,190.07	1,523.40	1,087.83
Rosemount	958.01	1,091.21	1,199.12	1,488.83	907.27	1,062.00
Rural Areas	992.06	971.74	887.33	1,073.09	1,304.26	1,253.33
South St. Paul	1,677.88	1,543.87	1,556.42	1,415.89	2,287.35	2,178.57
Sunfish Lake	42.25	46.16	47.28	40.51	174.11	18.37
West St. Paul	858.71	1,341.76	1,254.29	1,253.42	1,359.51	1,384.82
County Total	22,936.24	26,774.11	26,887.15	27,143.20	29,062.44	28,274.67

** The tonnage of recyclable materials collected in the City of Mendota in 2001 is subsumed within the total tonnage of materials collected for the City of Mendota Heights during the same year. As a result, city-specific data is not available for Mendota for 2001. The volume of materials recycled increased by more than 1,000% between 1996 and 2000, presented as the total percentage change over the data years available.*

Source: Dakota County Environmental Management Department; Dakota County Local Solid Waste Staff

Table AA.2. County Curbside Tonnage Percentage Change, by Community, 1996 to 2001

Community	*1996-1997 Change*	*1997-1998 Change*	*1998-1999 Change*	*1999-2000 Change*	*2000-2001 Change*	*1996-2001 Change*
Apple Valley	22.33%	-2.35%	0.54%	-21.72%	16.16%	9.21%
Burnsville	8.88%	-4.70%	0.24%	-1.30%	3.78%	6.54%
Eagan	13.15%	-6.48%	-10.09%	2.57%	4.26%	1.75%
Farmington	32.91%	15.45%	-2.12%	24.98%	12.96%	112.03%
Hastings	9.68%	-0.99%	1.48%	86.44%	-47.56%	7.75%
Inver Grove Heights	33.83%	13.42%	9.98%	10.23%	-7.11%	70.95%
Lakeville	39.01%	18.57%	5.06%	-10.48%	16.29%	80.28%
Lilydale	61.32%	-68.27%	62.71%	436.54%	-91.03%	-59.93%
Mendota	84.81%	-51.99%	55.79%	724.65%	* NA	* 1040.00%
Mendota Heights	7.68%	-3.13%	2.31%	28.01%	-28.59%	-2.45%
Rosemount	13.90%	9.89%	24.16%	-39.06%	17.05%	10.85%
Rural Areas	-2.05%	-8.69%	20.94%	21.54%	-3.90%	26.34%
South St. Paul	-7.99%	0.81%	-9.03%	61.55%	-4.76%	29.84%
Sunfish Lake	9.25%	2.43%	-14.32%	329.80%	-89.45%	-56.52%
West St. Paul	56.25%	-6.52%	-0.07%	8.46%	1.86%	61.27%
County Total	16.73%	0.42%	0.95%	7.07%	-2.71%	23.28%

** The tonnage of recyclable materials collected in the City of Mendota in 2001 is subsumed within the total tonnage of materials collected for the City of Mendota Heights during the same year. As a result, city-specific data is not available for Mendota for 2001. The volume of materials recycled increased by more than 1,000% between 1996 and 2000, presented as the total percentage change over the data years available.*

Source: Dakota County Environmental Management Department; Dakota County Local Solid Waste Staff

Table AA.3. Metropolitan Area Recycling and Waste Generation Rates, 1991 to 2001

Year		Anoka	Carver	Dakota	Hennepin	Ramsey	Scott	Washington	Metro Average
1991	*Tot. Recycled*	90,443	18,074	112,411	617,438	198,736	30,402	44,342	1,111,846
	Tot. MSW	226,000	41,500	275,500	1,439,500	620,500	52,500	122,500	2,778,000
	% Recycled	40.02%	43.55%	40.80%	42.89%	32.03%	57.91%	36.20%	40.02%
1992	*Tot. Recycled*	97,071	22,601	114,360	659,258	263,973	30,480	50,031	1,237,774
	Tot. MSW	230,314	45,082	282,880	1,369,945	550,412	54,163	155,203	2,687,999
	% Recycled	42.15%	50.13%	40.43%	48.12%	47.96%	56.27%	32.24%	46.05%
1993	*Tot. Recycled*	100,113	24,896	123,923	676,992	277,213	29,548	57,143	1,289,828
	Tot. MSW	241,324	50,219	302,176	1,392,449	588,887	63,662	150,376	2,789,093
	% Recycled	41.48%	49.57%	41.01%	48.62%	47.07%	46.41%	38.00%	46.25%
1994	*Tot. Recycled*	111,235	27,517	138,119	686,981	298,931	25,283	66,631	1,354,697
	Tot. MSW	255,285	56,588	322,008	1,443,347	601,658	58,883	157,523	2,895,292
	% Recycled	46.57%	51.63%	45.89%	50.60%	52.68%	45.94%	45.30%	49.79%
1995	*Tot. Recycled*	95,263	26,345	119,176	561,794	256,209	36,856	56,721	1,152,364
	Tot. MSW	246,654	60,523	293,738	1,340,798	588,380	78,746	153,950	2,762,789
	% Recycled	46.62%	51.53%	48.57%	49.90%	51.54%	54.80%	44.84%	49.71%
1996	*Tot. Recycled*	100,613	33,818	131,574	577,621	266,707	49,956	58,416	1,218,705
	Tot. MSW	253,939	69,889	311,387	1,471,643	635,368	78,678	173,499	2,994,404
	% Recycled	47.62%	56.39%	50.25%	47.25%	49.98%	71.49%	41.67%	48.70%
1997	*Tot. Recycled*	113,972	35,698	137,587	571,562	273,930	54,156	70,861	1,257,766
	Tot. MSW	268,824	71,801	315,337	1,441,689	663,391	95,434	189,300	3,045,777
	% Recycled	50.40%	57.72%	51.63%	47.65%	49.29%	64.75%	45.43%	49.30%
1998	*Tot. Recycled*	120,968	38,905	148,417	577,914	276,731	71,828	69,786	1,304,549
	Tot. MSW	281,531	78,834	367,579	1,488,698	682,980	120,534	195,019	3,215,176
	% Recycled	50.97%	57.35%	48.38%	46.82%	48.52%	67.59%	43.78%	48.57%
1999	*Tot. Recycled*	123,034	41,860	155,668	588,053	285,449	60,950	69,536	1,324,550
	Tot. MSW	292,105	87,092	380,315	1,518,660	716,158	114,493	188,243	3,297,065
	% Recycled	50.12%	56.06%	48.93%	46.72%	47.86%	61.23%	44.94%	48.17%
2000	*Tot. Recycled*	139,872	42,844	161,892	594,110	304,991	66,248	84,075	1,394,032
	Tot. MSW	308,350	86,342	385,588	1,560,256	760,883	123,492	197,716	3,422,626
	% Recycled	53.36%	57.62%	49.99%	46.08%	48.08%	61.65%	50.52%	48.73%
2001	*Tot. Recycled*	138,514	27,704	157,992	590,597	276,423	*No Data*	76,182	1,267,412
	Tot. MSW	313,315	71,272	394,713	1,603,573	760,702	*No Data*	179,516	3,323,091
	% Recycled	52.21%	46.87%	48.03%	44.83%	44.34%	*No Data*	50.44%	46.14%
Avg. Recycling Rate		47.41%	52.58%	46.72%	47.23%	47.21%	53.46%	43.03%	47.40%

Source: Minnesota Office of Environmental Assistance: *SCORE* and *Waste Certification Reports*, 1991 to 2000; Dakota County Environmental Management Department: recycling and waste generation volumes, 1990 and 2001; Solid Waste Management Coordinating Board: 2001 County MSW Managed Summary Report

APPENDIX V: SINGLE-STREAM RECYCLING

Background

Source-Separated Curbside Collections and Source-Separated MRFs
In the early and mid-1980s many Twin Cities municipalities and counties implemented residential recycling programs. These programs uniformly were traditional "source-separated" curbside recycling programs. Early programs instructed residents to not only the separated items for recycling from general MSW, but also required that residents further separated recyclables into distinct categories for collection. The justification for this further separation was driven by the low tolerance of local markets for contamination in recyclables and the lack of sophisticated mechanical devices at local Material Recovery Facilities (MRFs) to separate co-mingled materials. Early recycling efforts should also be categorized as "low tech" in other aspects as well. Residents often were instructed to simply use paper grocery bags as their recycling containers and collection vehicles often were modified pick-up trucks pulling trailers with bins for the various separated materials. Furthermore, many programs collected only a limited number of recyclable materials. For example, some programs restricted collections only to newsprint, three colors of glass containers (separated by type - clear, brown and green), aluminum and tin cans, and neatly bundled cardboard. Generally, most programs allowed aluminum and tin cans to be mixed together in the same bag, but other start up programs limited collections only to clear class or to aluminum cans only.

By the late 1980s and early 1990s most city and county programs adopted a significant improvement to their collection operations with the addition of standardized curbside recycling bin. Bins generally were distributed to residents at little or no charge and were a very important step in facilitating collection procedures. The bins provided visibility for the programs and offered residents an incentive to participate. The bins also aided the operators of collection vehicles by identifying and containing recyclable items for curbside collections. Residents, however, continued to be instructed to use paper bags to segregate different types of materials within curbside bins.

Changes: Commingling and Plastics

About this time (1992-94), two changes started to occur that modified program operations – limited commingling of materials and the addition of plastics to collections. Extensive separation of recyclables into many categories limited participation, was awkward to communicate, and became an obstacle to some residents. Collection of many different separated items took too much time for the operator of the collection trucks and haulers began exploring ways to speed up collections. Many haulers began allowing limited commingling and instructed residents to divide material into three separate categories: paper, glass, and cans. For residents, commingling materials meant that aluminum and tin cans were placed in one bag, all colors of glass placed in another bag, and newsprint placed in a third bag. Residents continued to place bundled cardboard, tied with twine, alongside the bin. The addition of plastic containers (generally bottle-grade plastics -- "containers with a neck" -- HDPE and PETE) was welcomed by residents, but caused operational problems for haulers. Some haulers instructed residents to place plastics in a fourth bag, while other haulers allowed plastic containers to be mixed with either cans or glass. Haulers dealt with commingled items (like all colors of glass mixed together, or cans mixed with plastic bottles) by requiring truck operators, when collecting stops, to separate these items along side the truck. An operator might have to separate mixed colors of glass containers into separate color categories or pick plastic bottles out of a bag holding primarily metal cans.

Commingled Materials Recovery Facilities

Concurrently, national hauling firms were exploring methods to improve MRF operations. If centralized mechanical systems could separate commingled materials, then truck operators would not be required to

spend time at each stop hand-separating items, like glass or plastic, and collection efficiencies could increase. The addition of other materials to curbside collection programs also was driving improvements to MRF. By the mid-1990s, magazines and mixed residential paper were included in the list of items collected in curbside programs. In the Twin Cities, by the mid and late 1990s, national hauling firms had upgraded their MRFs specifically to handle commingled recyclable materials by installing additional conveyor sorting lines, air classification systems, and rotating size-specific trammels. In addition, end markets, like paper and glass companies, added and improved their separation equipment so that more material, even with contamination, was acceptable as feedstock than ten years earlier. In part, end markets were responding to the large increases in the amounts of curbside recycled material available, and had come to the realization that current curbside collection methods and MRF processing operations unavoidably were producing recyclables with increased levels of contamination.

Two-Stream System

By 2000, national companies and many local haulers were informing residents that a "two-stream" system was now in place. Residents were instructed to separate recyclables into two major categories: all paper fibers (newsprint, magazines, mixed paper, and phone directories) in one bag, and all containers (all colors of glass, aluminum and tin cans, and "bottle-grade" plastic containers) in a second bag. Residents continued to place these materials in their standard curbside recycling bin and place bundled cardboard, tied with twine, alongside the bin. Haulers approached the collection of the two-stream commingled items in different ways, usually by modifying existing trucks by adding automated loaders and dividing its collection compartments into only two sections. Truck operators were required to still manually move recycling bins from the curb, but then had to simply dump the paper fiber portion into the appropriate hopper and then dump the container portion into the other hopper. Overall efficiencies increase because operators needed to perform little hand-separation of recyclables while loading the truck.

Contamination Levels

The original low-tech curbside recycling collections and MRF operations were labor intensive, but did result in recyclable material with a low level of contamination and a low level or residual (unusable) materials. A traditional source-separated, curbside collection and MRF operation, like SuperCycle's in St. Paul in the late 1990s, might result in less than 2% or 3% residual material and provided very high quality material for end markets. The reliance by national firms on MRFs to mechanically separate materials and the shift to the "three-stream" and "two-stream" collection systems resulted in higher final levels of residuals. Exact figures are difficult to obtain and depend on what is considered recyclable material and the end use. Generally, local MRFs handling material collected by the "two-stream" system claim residual rates of 8% to 10%. Also, no information currently is available on the percent of material sent to end markets from these MRFs is rejected because of excess contamination. In the case of glass, it is clear that a declining percent of containers that enter commingled MRFs is acceptable to manufacturers to make new glass containers. The process used by commingled MRFs often results in a mixed color cullet that may find secondary uses (such as sandblasting), but likely is used often only as supplementary cover at landfills.

Current System and Expected Changes

In 2002, the established recycling system for most metropolitan communities, with the exception of Minneapolis and St. Paul, is reliance on weekly collection, with the two-stream collection, using an open 18 gallon curbside recycling bin and with processing of the collected recyclables occurring at a commingle MRF operated by the national hauling firms. This system has provided acceptable service in recent years, but now is encountering a number of limitations.

Recycling Rates Are Stagnating
Although measurements are not precise, in the last four or five years it is apparent that the level of recycling participation and the volume of recyclables collected in the metro area have stagnated. While total yearly amounts have increased, the recycling growth rate only is about equal to the growth rate in population and households. The amount of MSW generated in the last few years, however, has increased faster than population and households.

Recent research is showing that recycling programs could potentially collect greater amounts of recyclable materials, but are constrained by a number of factors. National hauling firms attribute one factor to the reliance by recycling programs on outmoded collection technology. The national hauling firms also are motivated by another important issue – the desire to reduce the cost of collecting residential recyclables. National hauling firms are actively seeking solutions to recycling collection cost and have a past model to imitate that was successful when they faced a similar challenge with Municipal Solid Waste (MSW) collection.

The MSW Example
About fifteen years, similar cost and efficiency issues existed with residential MSW collection. Haulers remedied these problems with a combination of automated collection technology and improved residential MSW containers. In the late 1980s, the typical local MSW hauler collected residential stops using a rear-loader compactor garbage truck and residents placed MSW out for collection in a plastic, or galvanized metal, 32-gallon garbage can. The collection procedure relied on manual lifting of sometimes heavy, unsecured cans into the hopper of the truck. The procedure often was slow, messy, and occasionally dangerous. By 2002, haulers almost universally switched to a system of semi or fully automated collection vehicles that mechanically hoist a heavy-duty plastic, enclosed garbage cart into the truck's hopper. The present system is safer for operators and cost hauling firms less in workers compensation insurance. The system allows operators to service more stops in a workday and reduces operating costs for the hauling company. The covered, wheeled garbage carts come in a variety of capacities, reduce litter and debris, appear clean and orderly, and are received well by residents.

Hauling firms are proposing similar answers today to the challenge of making recycling collections more efficient and effective. Their interest is primarily economic, but these efforts also promise to increase the collected amount of residential recyclables.

Single-Stream Solution
The approach to upgrading recycling collection methods inherently is more complex than dealing with MSW collections because a further concern is the processing and marketing issue for recyclables. Locally, Waste Management Inc. (WMI) begun a "single-stream" collection method and is expected to heavily advocate for this system throughout the metro area. This method is new to the Twin Cities area and represents a significant change at a number of levels. Although other areas in the United States have implemented the "single-stream" system, the Twin Cities area is unique in terms of climate, hauler mix, and resident experience with recycling programs.

Description of Local Effort: Brooklyn Park and the Hennepin Recycling Group
Waste Management's local version of the "single-stream" system is comprised of: 1) automated collection vehicles, 2) covered, wheeled recycling carts, 3) instructions to residents to commingle all recyclable materials in their carts, and 4) construction of a new "super MRF" to process the collected recyclables. All four items must be in place to successfully switch a community to the single-stream system and each item has features that affect the performance of the overall system.

1.) *Collection vehicle.* It appears the vehicles used for recycling collections by Waste Management in their current effort in Brooklyn Park and the Hennepin Recycling Group (HRG -- Crystal, New

Hope, and Brooklyn Center) are exactly the same as comparable vehicles used for MSW collections. The vehicles are side-loading, fully automated trucks with dual drive. Normally one operator is required and the vehicle, with modest compaction effort, has 4 to 5 tons capacity. This vehicle represents the most efficient collection method currently available for either MSW or recyclables, but it has limitations. Its capacity is less than large rear load high compaction truck and its operation is limited in high-density urban communities with narrow alleys, low-hanging overhead power and telephone lines, and over-hanging trees and shrubs. Snow banks and ice can also provide obstacles to this type of collection vehicle. The single-stream system is adaptable to other collection vehicles, however. A semi-automated vehicle, with a hydraulic lifter (either side or rear loader), can perform the same collection role although with slower service per stop.

2.) *Collection carts.* At its own expense (about $40 per cart), Waste Management provided every house in Brooklyn Park and the HRG with a green, covered and wheeled, 64 gallon plastic recycling cart manufactured by Cascade Industries. WMI also arranged for assembly and delivery of the carts. The carts were delivered unassembled, so WMI had the carts to be assembled directly on the delivery trailers.. Approximately 40,000 carts were distributed over a three-month period (November 2001 through January 2002). Residents were instructed to keep their existing curbside recycling bins but not to use the bins as the primary container for recyclables after January 2, 2002. Other issues that arose included: resident concerns that the carts were too big, or too small, or that no storage space for the cart was available in the garage or on the property. WMI responded to cart size issues by exchanging the standard cart with one of a different size (38 gallon or 96 gallon) to residents upon request.

3.) *Instructions to residents.* For the previous dozen years residents in Brooklyn Park and HRG had a weekly, source-separated program using curbside recycling bins. Over the years, residents had been instructed initially to separate recyclable items into multiple categories and, in recent years, into the two-stream separation system. The switch to the single-stream system required adjustments. After January 2002 residents had to use the large recycling cart for their recyclable material and carefully place the cart in a specified location and facing a specified direction for pickup. Residents also were instructed to place all recyclable items, totally mixed together and loose, in the new recycling cart. Finally, residents were told that collections would be every other week instead of weekly. These instructions were a big departure from previous directions, but it was apparent that most residents welcomed the changes and found the new system easy to use.

An important factor appears to be the acceptance of the large, covered, wheeled cart for recycling. The cart makes the transport and storage of recyclables to curb a less difficult job for residents. Removing the requirements to segregate material by type for collection seems to have encouraged residents to recycle more items and a wider variety of items. The long recycling background for many residents contributed to a low level of contamination. Residents were accustomed to placing minimize contamination of recyclables in curbside bins and continued that practice with the recycling carts.

4.) *Super MRF.* In 2001 and 2002, WMI constructed a "super MRF" to process material collected from single-stream programs. The super MRF is the most critical element in switching Brooklyn Park and the HRG cities from a multi-sort to a single-stream system because no other comparable facility previously existed in Minnesota. Without this facility, the material collected in single-stream programs could not be separated into marketable recyclables. The new super MRF is designed specifically to process a commingled recyclables stream and also now is the largest MRF in the U.S. and has the most advanced sorting technologies. The super MRF was scheduled to officially open in early January 2002, but the opening has been delayed while the facility undergoes "shakedown" operations. Commingled material currently is being processed on a limited basis.

Why Government Should be Concerned: Pros and Cons
The single-stream program appears to offer significant advantages over existing multi-sort programs relying on the traditional curbside recycling bins. The issue requires close examination, however, before government should take a position on changing existing programs.

- Pros: Increased collector efficiency results in lower hauler operating cost, and
  Increased participation and collection amounts.

- Cons Lower hauler costs may not translate into cost savings to residents or municipality, and
  Net collection amounts may not increase because of increased contamination and the loss of glass in the MRF process.

Problem Statement

Background
Although measurements are not precise, in recent years it is apparent that the levels of recycling participation and volume of recyclables collected in the metro area have stagnated. While total yearly amounts have increased, the recycling growth rate only is about equal to the growth rate in population and households. The amount of MSW generated in the last few years, however, has increased faster than population and households. Recent research is showing that recycling programs could potentially collect greater amounts of recyclable materials, but are constrained by a number of factors. National hauling firms attribute one factor to the reliance by recycling programs on outmoded collection technology and are advocating a switch to a "single-stream" system. National hauling firms also additionally motivated by the desire to reduce the cost of collecting residential recyclables.

In 2000, some municipalities implemented changes in the collection portion of their curbside recycling programs. These communities replaced the traditional 14 or 18-gallon curbside recycling container with a 64 gallon, lidded, wheeled recycling cart. In addition, the standard two or multi sort collection method for household recyclables was replaced by a "single" sort procedure in which all types of recyclable items (paper, glass, plastic, and metal) are commingled in the recycling cart. These changes are expected to have significant impact on a range local recycling related issues.

It is important to note that the current method of measuring collection amounts by local curbside recycling programs and progress toward SWMCB's waste abatement goals rely solely on the reported amount of material picked up collection vehicles. It does not take a "mass balance" approach that also measures the amount of collected material that is lost and does not go to an end market due to contamination or due to residuals produced during processing. In order to evaluate the affects of a potential switch from the current system to a single-stream collection system, a measurement of these components also must occur.

Issues
Some issues with a proposed switch to a single-stream collection system specifically include the following:

1. **Compatibility.** Most existing local recycling collection systems are mainly two-stream and multi-sort collections. Can a single-stream system co-exist in the metro area with the current systems? Will introduction of a single-stream system cause confusion with the public concerning government sponsored promotional and educational efforts?

2. **Compliance with the SWMCB's Solid Waste Master Plan Goals.** Will the single-stream system's net result be that less material is actually recycled and progress toward the 50% recycling goal is eroded?
3. **Competition and consolidation.** Will national firms use the single-stream recycling collection system to gain an unfair competitive advantage over local small haulers? Will this render small haulers uncompetitive and increase consolidation of the local waste hauling industry and promote domination of the market by two or three national firms?
4. **Glass contamination.** Glass has been identified as a problem material with the single-stream collection system and with the processing of commingled materials. Container glass collected in the single-stream system becomes broken mixed color cullet, unusable by the local end user (e.g., Anchor Glass). Will a switch to the single-stream system eliminate the supply of usable glass cullet to Anchor Glass and threaten its viability as a local large employer?
5. **Containers.** Many local counties and cities supply curbside recycling containers to residents at little or no charge. Will a switch to the single-stream system render this type of container obsolete and will the expectation of residents be that government will be expected to supply households with single-stream recycling carts as substitutes for the recycling bins?
6. **Contract inflexibility.** In cities that contract for recycling collection, will the switch to a single-stream collection system lock these communities into a single contractor because other firms can not compete and it becomes impossible to switch residents back to a multi sort system?
7. **Public education.** Will there be resistance or confusion by the public if there is a switch to the single-stream system and will the switch result in more contamination in recyclables because of the similarity to MSW collection and because the truck operator does not have the opportunity to visibly check for contaminants before loading the truck?
8. **Cost.** Will the switch to single-stream collection systems result in higher costs to residents and governments?
9. **Reporting.** Will reporting requirements on recycling collections to government be affected by a switch to a single-stream collection system?

Statutory Conflicts

There appear to be no statutory conflicts if haulers choose to switch to a single-stream collection system. Current state law and county ordinances address a number of issues like requiring haulers to offer recycling service to customers, reporting requirements, and prohibitions against mixing materials collected in a recycling program with MSW. Neither state law nor local ordinances specify the manner is which a hauler might collect recyclable items from customers.

Local and National Trends

Locally, the cities of Brooklyn Park, Brooklyn Center, Crystal, and New Hope have totally switched to the single-stream collection system as of January 2002. The St. Paul Neighborhood Energy Consortium (NEC) conducted a pilot program in selected neighborhoods for a four-month period in late 2001, but has since discontinued the single-stream pilot collection program. In February 2002, the Waste Management Inc. proposed switching to a single-stream collection system in the City of Hastings. The decision to modify the existing contract between Hastings and Waste Management is still pending. Nationally, a variety of single-stream collection systems have been tried or are operating in east and west coast locations. The most current version of the single-stream system, as operated by Waste Management, is gaining acceptance in parts of California. Overall, nationally there are about 10,000 curbside recycling programs and approximately 200 operate a single-stream system. Nationwide, there are about 3000 Material Recovery Facilities (MRFs) functioning and around 87 MRF are accepting materials that is provided with a single-stream system.

System Participants

Local municipal contacts for the single-stream collection system are the recycling coordinator (Marilyn Corcoran – 763-493-8006) for the cities of Brooklyn Park and the HRG (Brooklyn Center, Crystal, and New Hope) and the director and project director (Susan Hubbard and Tim Brownell – 651-222-7678) for Eureka Recycling. Waste Management Inc. (WMI) is the only waste and recycling firm involved in the single-stream collection system in the Twin Cities metropolitan area.

Potential Impact on Local Government Public Education Materials

It is limiting to view public education materials produced by local governments as simply providing residents with instructions on when, what, and where to recycle discarded household materials. Recycling education occurs at a number of levels. A primary message conveyed is to motivate residents to separate items from the MSW for recycling and to explain the "why" of recycling. After residents become accustomed to the habit of recycling, it is necessary to provide other levels of education like feedback on program changes or to alert residents of contamination problems. The current two-stream, or multi-sort programs using an open curbside recycling bin allow the collection truck operators to observe the bins contents and provide feedback to residents. In the single-stream system using a closed recycling cart, this opportunity for feedback and education is lost.

Potential Impact on Amount of Material Recycled

The impact of total material recycled with the single-stream system compared to the current collection systems is an issue of substantial debate. There is agreement that the system must be examined in its entirety –collection and processing component. The amount of contamination and residuals apparently increase as recyclable material is commingled. The amount of participation and the amount of material collected also apparently increases when systems, like the single-stream system, become easier and simpler for residents to use. The focus of the disagreement on how much recycling increases with the single-stream system currently centers on two areas. First, how much does resident participation and the recyclable volume collected increase due to switching to a single-stream system. Brooklyn Park and HRG preliminary figures show as much as a twenty percent overall increase in volumes. The St. Paul NEC's test program also revealed increases, although not as large, in its single-stream pilot. The exact figures on the amount of these increases require further analysis. The second area that is in dispute centers on the efficiencies and effectiveness of the new MRFs at separating commingled material into marketable components.

Super MRF

In 2001 and 2002, WMI constructed a "super MRF" to process material collected from single-stream programs. The super MRF is a critical element in switching from multi-sort systems to a single-stream system because no other comparable facility previously existed in Minnesota. Without this facility, the material collected in single-stream programs could not be separated into marketable recyclables. The new super MRF is designed specifically to process a commingled recyclables stream and also now is the largest MRF in the United States and has the most advanced sorting technologies. The super MRF was scheduled to officially open in early January 2002, but the opening has been delayed while the facility undergoes "shakedown" operations. Commingled material currently is being processed on a limited basis.

Potential Impact on Marketability of Recyclables Collected

This issue relates to how much the total volume of recyclables increase. If additional recyclable items are collected, but less of these items are marketable, then it is questionable whether volumes truly increase. This issue can only be resolved by researching results from MRFs that handle single-stream materials. Eureka Recycling's recent study has revealed residual rates from some of these resource recovery facilities as high as 35%, but WMI is claiming much lower residual rates at its new materials recovery

facility located in Minneapolis. It probably will be necessary to observe a series of test runs at Waste Management's super MRF that involve a mass balance approach where total input, output and residuals can be measured carefully. A clear problem with the single-stream collection approach appears to be container glass. In current collection programs, approximately 10% to 12% of the volume collected is glass. Almost all this glass is broken and mixed after being processed at a commingled materials recovery facility and is not usable by traditional glass markets, like Anchor Glass in Shakopee. Additionally, crushed glass acts as a contaminant for other materials at commingled materials recovery facilities, such as paper and aluminum, and is abrasive to sorting machinery.

Ideas on How Region Might Proceed

The Solid Waste Management Coordinating Board needs to establish agreement on the net gain achieved in recycling if the current two and multi-stream systems are changed. In particular, residual rates for operating resource recovery facilities need to be determined. Costs should also be examined if the system is changed and how these costs should be paid for.

APPENDIX VI: DEMOGRAPHIC ANALYSIS

In the process of determining whether recycling behavior is associated with certain demographic factors, a statistical analysis was performed using the Dakota County 2001 Residential Survey. The survey asked 700 Dakota County residents 14 questions concerning recycling and household waste reduction. For the purposes of this report, an analysis was completed only for questions 22 through 30 of the survey. The nine questions were selected based upon their association with recycling behavior. Each resident surveyed is required to answer, "always", "sometimes", "rarely", "never", or "don't know/refused to answer" to each of the questions. Towards the end of the survey, each resident was also asked a series of demographic questions concerning current homeownership status at present residence, age, education level, household income, and gender. These five factors and the nine survey questions are the variables used in the statistical analysis to determine associations apparent between recycling behavior and demographic characteristics.

Summary of Analysis:
The results show that no individual recycling behavior or sets of behaviors are associated to any particular demographic factor(s). However, we found that a there are some recycling behavior-demographic factor associations worth mentioning.

Homeownership Status (Owner/Renter)
Based on the Chi-Square test, there is an association between residence type and seven of the nine demographic variables. The following variables that have no association with residence type are purchases made by the household because the product has less packing or because it was particularly made from recycled materials. In observing the data, the following conclusions become evident:

- Renters, always switch to less hazardous cleaning products more often than expected.
- Homeowners compost yard/food waste, fix broken items, and use rechargeable batteries more often than expected.

Although an association does not exist, the tables do show that:

- Homeowners purchase items because it has less packing as often as expected, however, purchases of products made from recycled materials are less than expected by chance.
- Additionally, renters are more likely to purchase products made from recycled materials more frequently than would be expected.

Age Category
According to the analysis, eight recycling behavior activities do vary with age. The only activity that does not vary with age is the purchasing of products made from recycled materials. Points of interest include the following:

- 18 to 24 year olds rarely or never composted much more frequently than expected.
- 25 to 34 year olds composted about as often as expected.
- 34 to 44 year olds and 45-54 year olds composted more often than expected.
- 55 to 64 year olds and those older than 64 composted less frequently than expected.

Although purchases of products made from recycled materials does not vary with age, there are some points to mention:

- 18 to 24 year olds always purchase products made from recycled materials as often as anticipated.
- 25 to 34 year olds rarely purchase products made from recycled materials more often then anticipated.
- 35 to 44 year olds always purchase products made from recycled materials more frequently than anticipated.

- 45 to 54 year olds and 55 to 64 always purchase products made from recycled materials less often than anticipated by chance.
- 65 year olds and over purchase products made from recycled materials less frequently than anticipated, however this same category also reports rarely or never purchase products made from recycled materials more than anticipated.

Level of Education

There are six recycling behaviors associated with education level. The actions not associated with different levels of education are the purchasing patterns of products made from recycled materials, how often the household reduces the number of times they use fertilizer and/or weed killer on the lawn, and how frequently they use rechargeable batteries. According to the crosstab tables, certain observations become apparent:

- Residents achieving high school graduate, vocational/technical college graduate, some college, and post-graduate educations always compost yard/food waste more often than expected.
- In contrast, residents with less than high school and college graduates always compost yard/food waste less than would be expected.
- It is important to note that the only education level that does not always less often than expected bring household hazardous waste to a collection site or event is residents who are college graduates.

Even though there exist no association between the variables below, some conclusions still become visible:

- Dakota County residents with an education level less than high school, high school graduate, and vocational/technical college graduates report never purchasing products made from recycled materials more frequently than expected.
- While residents who are college graduates and post-graduates always purchase products made from recycled materials more often than expected by chance.
- The education level that always reduce the number of times they use fertilizer and/or weed killer on the lawn more often than expected are citizens with less than high school education and post-graduates.
- Lastly, Dakota County citizens with an education less than high, high school graduates, and vocational/technical college graduates never use rechargeable batteries more often than expected; in contrast, citizens with some college, college graduates, and post-graduates never use rechargeable batteries less often than expected.

Household Income

Recycling activities that do vary with household income are: composting food/yard waste, fixing broken items, purchasing products that have less packing, reducing the number of times fertilizer is used, bringing household hazardous waste to a site, using rechargeable batteries, and switching to a less hazardous cleaning product. On the other hand, the purchasing preference of a household in relation to buying a used item and buying items made from recycled materials does not vary with a household's income. A couple of interesting points are:

- Household income levels of $50,000 and over more frequently compost food/yard waste than would be anticipated.
- Income levels of $49,999 and under are more likely to never fix a broken item to continue its usage than expected, while income levels between $50,000 and $99,999 are always more likely to always fix a broken item to continue its usage than expected.

Some interesting conclusion regarding the recycling behaviors that do not vary with income is as follows:

- Households with incomes less than $25,000 and between $50,000 and $99,999 always purchase used items more frequently than anticipated by chance, while income levels

between $25,000 and $49,999 and $100,00 and over never purchase used items more often than anticipated.
- The only income level that always purchase products made from recycled materials more frequently than would be expected is $75,000 to $99,999.

Gender

According to Chi-Sq tests, gender does not play a very significant role in a number of recycling behaviors: frequency of purchasing used items and items made from recycled materials, composting of yard/food waste, fixing broken items to continue its usage, reducing the number of times fertilizer and/or weed killer is used on the lawn, and the frequency of bringing household hazardous waste to a collection site or event. A few recycling actions that do vary according to gender are: purchasing behavior of items because it has less packaging, use of rechargeable batteries, and switching of hazardous cleaning products to one that is less hazardous. The data tables draw some evident conclusions:

- Females are more likely than expected to purchase items because it has less packaging and switch to less hazardous cleaning products more than anticipated, while males are the opposite.
- However, males always use rechargeable batteries more often than anticipated.

In contrast, the following behaviors do not vary by gender, but are worth addressing:

- Females would more frequently than expected by chance to purchase used items, to fix broken items to continue its usage, and to bring household hazardous waste to a collection site or event.
- Males are more likely to compost yard/food waste than anticipated.
- In addition, males are also more likely to always reduce the number of times fertilizer and/or weed killer is used on the lawn more than expected. However, according to the tables, males rarely or never purchase items made from recycled materials more frequently than expected.

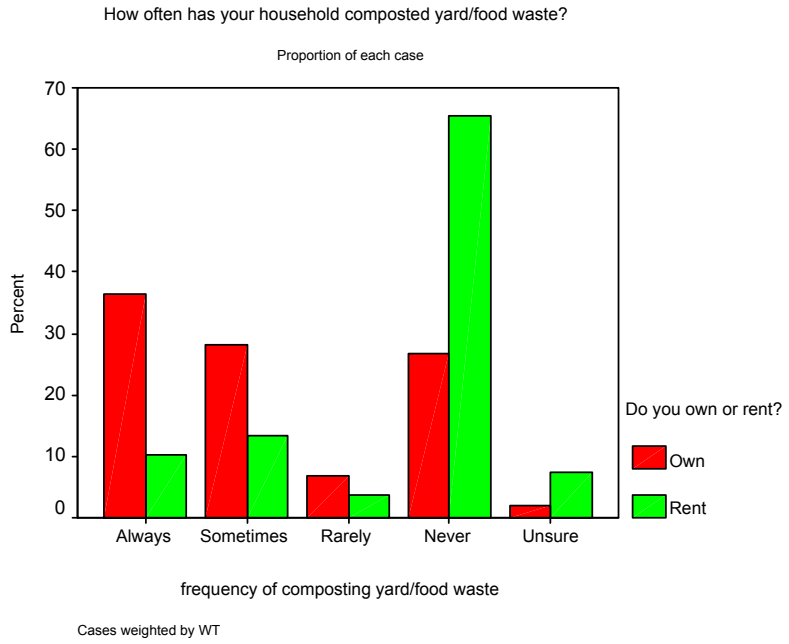
This analysis and the above conclusions are drawn from the responses of Dakota County citizens in the 2001 Residential Survey. Individual tables, chi-square tests, and graphs are discussed following.

Homeownership Status (Owner/Renter)

Null hypothesis: No difference in composting behavior exists between residence type.
Alternative: Composting frequency varies with residence type.

Crosstab

			22. During past twelve months, how often has your household composted yard waste or food waste?					
			Always	Sometimes	Rarely	Never	Unsure	Total
134. Do you own or rent your present residence?	Own	Count	226	175	42	167	12	622
		Expected Count	207.9	164.4	40.0	193.7	16.0	622.0
		% of Total	32.3%	25.0%	6.0%	23.9%	1.7%	88.9%
	Rent	Count	8	10	3	51	6	78
		Expected Count	26.1	20.6	5.0	24.3	2.0	78.0
		% of Total	1.1%	1.4%	.4%	7.3%	.9%	11.1%
Total		Count	234	185	45	218	18	700
		Expected Count	234.0	185.0	45.0	218.0	18.0	700.0
		% of Total	33.4%	26.4%	6.4%	31.1%	2.6%	100.0%



The Chi-Sq statistic is significant at the alpha 0.05 level, supporting the alternative hypothesis. In observing the data table, two conclusions become apparent:

- Homeowners compost slightly more frequently than would be expected.
- Renters compost much less than would be expected.

This result may be related to the fact that homeowners have much more control over their ability to compost than renters – they can make the decision to purchase and construct a compost bin, whereas renters may not have that privilege. In addition, it is likely that a higher proportion of homeowners are directly responsible for lawn care, which generates compostable yard waste.

Null hypothesis: No difference in purchasing behavior of used items exists between residence type.
Alternative: Purchasing frequency of used items varies with residence type.

Crosstab

			23. During past twelve months, how often has your household purchased a USED item...?					
			Always	Sometimes	Rarely	Never	Unsure	Total
134. Do you own or rent your present residence?	Own	Count	54	339	114	112	2	621
		Expected Count	54.2	331.4	114.6	117.3	3.6	621.0
		% of Total	7.7%	48.5%	16.3%	16.0%	.3%	88.8%
	Rent	Count	7	34	15	20	2	78
		Expected Count	6.8	41.6	14.4	14.7	.4	78.0
		% of Total	1.0%	4.9%	2.1%	2.9%	.3%	11.2%
Total		Count	61	373	129	132	4	699
		Expected Count	61.0	373.0	129.0	132.0	4.0	699.0
		% of Total	8.7%	53.4%	18.5%	18.9%	.6%	100.0%

The Chi-Sq statistic is significant at the alpha 0.05 level, supporting the alternative hypothesis. Some interesting points are as follows:

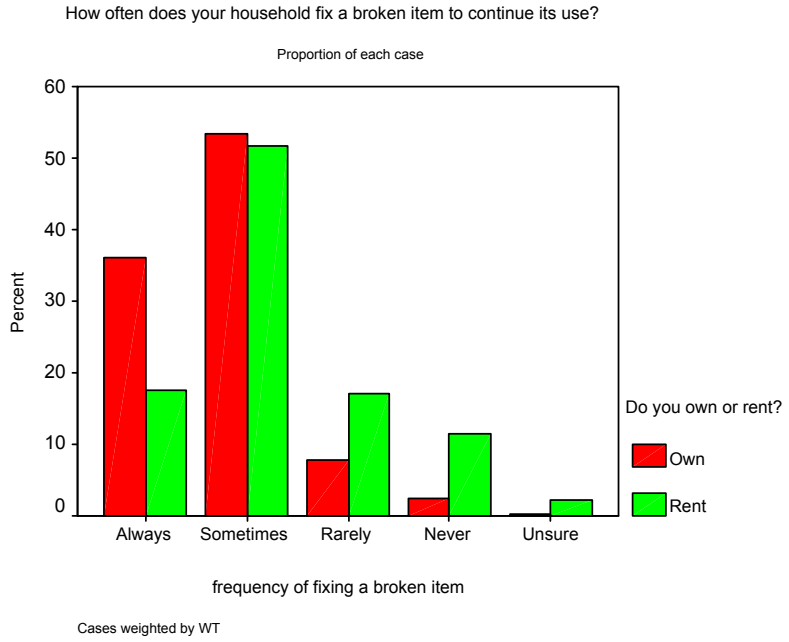
- Homeowners always purchase used items as often as anticipated.
- While renters rarely or never purchase used items more than expected.

Keeping in mind that searching for a used item does take some considerable amount of time and that homeowners are probably older and less mobile, they are able to spend the time to search for used items through the newspaper ad or garage sale, whereas the renting population probably consist of tenants who are younger and more mobile. In addition, homeowners have quick and trouble-free access to neighborhood garage sales and exchanges, which contributes to the purchasing of used items.

Null hypothesis: No difference in the frequency of fixing a broken item exists between residence type.
Alternative: Frequency of fixing a broken item varies with residence type.

Crosstab

			24. During past twelve months, how often has your household fixed a broken item to continue its use?					
			Always	Sometimes	Rarely	Never	Unsure	Total
134. Do you own or rent your present residence?	Own	Count	224	333	49	16	1	623
		Expected Count	211.5	331.5	55.1	22.2	2.7	623.0
		% of Total	32.0%	47.5%	7.0%	2.3%	.1%	88.9%
	Rent	Count	14	40	13	9	2	78
		Expected Count	26.5	41.5	6.9	2.8	.3	78.0
		% of Total	2.0%	5.7%	1.9%	1.3%	.3%	11.1%
Total		Count	238	373	62	25	3	701
		Expected Count	238.0	373.0	62.0	25.0	3.0	701.0
		% of Total	34.0%	53.2%	8.8%	3.6%	.4%	100.0%



The Chi-Sq statistic is significant at the alpha 0.05 level, supporting the alternative hypothesis. The following results are evident:

- Homeowners are more likely to fix a broken item to continue its usage more frequently than would be expected by chance.
- Renters on the other hand, fix a broken item to continue its usage less often than expected.

This result may be related to the age and mobility of homeowners and renters. As mentioned in the previous analysis, homeowners are more likely to be older and less mobile, while renters are younger and often mobile. Therefore, homeowners could afford to spend the time to fix an item, whereas renters may not have that privilege. In addition, many renters are probably tenants of multifamily units, which may limit their working space to fix the item, therefore can cause the renters to fix broken items less frequently.