

Money Talks in Minnesota

The Link between the Economy and the Environment

by Wayne Gjerde and Tina Patton

Voluntary market-based approaches

to recycling, pollution prevention, and resource conservation are being used successfully in the United States and other countries to both protect the environment and promote economic growth. The public and private sectors have together developed technologies and business models that use resources more efficiently. This, in turn, helps create new jobs, foster economic development, and protect public health and the environment. The new philosophy for this era of fiscal responsibility and economic emphasis in environmental issues can be summed up as “Environmental innovation promotes economic growth.” Recognizing these dual drivers, in 1987 Minnesota began using voluntary market-driven approaches to recycling, pollution prevention, and resource conservation. Though this article focuses primarily on recycling, other environmental efforts, such as waste reduction and pollution prevention, demonstrate their value in similar ways.

ENVIRONMENTAL INNOVATION PROMOTES ECONOMIC GROWTH

The U.S. Recycling Economic Information Study,¹ released in 2001, provided the first national picture of the economic benefits of recycling. Minnesota, among other states and regional entities, participated in the study by conducting economic modeling of recycling companies and their impacts on local economies. The study showed that, nationwide,

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56,000 recycling establishments employed 1.1 million people, generating an estimated annual payroll of US\$37 billion and US\$236 billion in revenues (see Table 1). In addition, the 1.1 million jobs were generally paid above the national average.

In Minnesota, the results of this study were used to help promote recycling efforts to legislative decision-makers and the public. Estimates of the state’s recycling manufacturers found that in 2004 they provided 9000 direct jobs and accounted for 15,000–19,000 direct, indirect, and induced employment in the state (see Table 2). Comparing the 2004 to the 2000 data, Minnesota’s value-added recycling manu-

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facturing industry continues to be a growing and vibrant sector of the economy. The number of jobs has increased by 3.4% during this four-year period. This is a good indicator of the strength of this sector, since the manufacturing sector, as a whole, lost jobs over the past five years. The recycled plastic lumber industry sector, in particular, continues to experience strong competitive growth and is responsible for significant economic activity in the state.

In January 2005, the Minnesota Office of Environmental Assistance (now the Minnesota Pollution Control Agency) completed a study funded by the U.S. Environmental Protection

Table 1. Estimates of direct economic activity (annual payroll and estimated receipts are in US\$1000; throughput is in thousands of tons^a).

Data Type	Recycling Collection	Recycling Processing	Recycling Manufacturing	Reuse and Remanufacturing	Industry Total
Establishments	9247	12,051	8047	26,716	56,061
Employment	32,010	160,865	759,746	169,183	1,121,804
Annual payroll	956,875	3,826,360	29,181,749	2,747,498	36,712,482
Estimated receipts	1,974,516	41,753,902	178,390,423	14,182,531	236,301,371
Estimated throughput ^a	191,082	191,082	157,545	N/A	N/A

^aThroughput is amount of recovered material recycled and includes manufacturing scrap sent for recycling. It excludes materials prepared for fuel use and in-house process scrap returned to the manufacturing process. Throughput estimates are summed to avoid triple counting at collection, processing, and manufacturing stages.

Agency (EPA) looking at the financial strength of recycling haulers, processors, marketers, and manufacturers nationwide.² The intent of the study was to foster investment in recycling. The participating companies were evaluated based on a number of financial measurements. In general, most of the companies showed good survivability, and as a group, demonstrated excellent value creation. Recycling companies also measured at the top of the scale for growth opportunities. Additional equity investment is still needed, however.

RESOURCE CONSERVATION AND RECOVERY

Recycling, as well as other resource conservation activities, is increasingly valuable to the economy. What was once thought to be worthless—waste material—now has substantial value. For example, compare the cost of making a new aluminum can from virgin materials with the cost of making it from recycled aluminum cans (which uses approximately 95% less energy³), and you'll quickly see why many recycling advocates are touting the idea of "waste as a resource."

The Resource Conservation and Recovery Act (RCRA) charges federal, state, and local governments with the protection of human health and the environment and conserving "valuable material and energy resources." Waste reduction and reuse should be implemented as front-line methods of material and energy conservation. Recycling also conserves energy and valuable virgin materials and saves valuable materials from being landfilled.

In 1999, the Minnesota Office of Environmental Assistance commissioned a life-cycle analysis to quantify resource conservation and greenhouse gas emission reduction benefits from integrated solid waste management in Minnesota.⁴ This study was one of the first to demonstrate

benefits calculator, which allows communities to demonstrate the environmental value of recycling.⁵ The following are examples of some of the results of implementing the environmental benefits calculator in Minnesota.

Saving Natural Resources

It's a simple concept: when recycled rather than virgin material is used to make a product, it helps conserve our nation's natural resources. Using NRC's environmental

Table 2. Minnesota's recycling manufacturers: jobs and dollars (US\$).

Economic Activity Indicator Associated with Minnesota's Value-Added Recycling Manufacturers	Based on Reported Employment	Based on Total Estimated Employment
Direct jobs at the companies	6499	9003
Estimated indirect jobs impacts on local suppliers statewide, unadjusted for displacement effects	2595	3057
Estimated induced jobs Long-term effects on personal income and consumer spending, localized and statewide	5475	7200
Total estimated jobs	14,870	19,260
Total estimated wages and salary disbursements:	\$560 million	\$760 million
The monetary remuneration of employees, including compensation of officers, commissions, tips and bonuses, and receipts-in-kind that represent income to the recipient		
Total estimated tax revenue on direct jobs:	\$46 million	\$64 million
Business/personal state income taxes, sales tax, excise tax and miscellaneous taxes, real estate taxes, and business taxes		
Total estimated value-added activity:	\$1.09 billion	\$1.29 billion
Contribution to Gross State Product analogous to GDP (gross domestic product), output excluding the intermediate inputs (primarily compensation and profit)		
Total estimated gross economic activity:	\$2.35 billion	\$2.98 billion
Amount of production in total sales, includes intermediate goods purchased as well as value-added (compensation plus profit)		

Source: Scenarios calculated using the Regional Economic Models Inc. (REMI) Minnesota Forecasting and Simulation Model, December 2004, Minnesota Office of Environmental Assistance, Wayne Gjerde.

Table 3. Natural resource savings from recycling steel in Minnesota, 2003.

Tons of ferrous steel recycled	290,915
Pounds of iron ore saved per ton steel recycled	2500
Pounds of coal saved per ton steel recycled	1400
Pounds of limestone saved per ton steel recycled	120
Tons iron ore saved	363,644
Tons coal saved	203,641
Tons limestone saved	17,455
Total tons resources saved	584,739

Calculated using the NRC Environmental Benefits Calculator. Data source from the Steel Recycling Institute.

benefits calculator, Minnesota estimates that, in 2003, the state saved 585,000 tons of raw materials by recycling steel (see Table 3) and almost 6 million trees by recycling newspaper, mixed paper, and office paper.

Saving Energy

Through recycling alone, in 2003 Minnesota saved nearly 34 trillion BTUs of energy in one year, enough to power 321,000 homes. Table 4 shows the energy savings produced for each type of material recycled. The amount saved would power more households in one year than the total number of households in Minneapolis and Saint Paul combined. For example, glass bottle manufacturers use more energy melting together raw materials to make new glass than they do re-melting recycled bottles. In fact, the glass industry estimates that for every 5% cullet (i.e., recycled glass) they recover and reuse, they reduce their natural gas use by 1%. At a time when natural gas prices are skyrocketing, recycling is looking even better than before.

Reducing Pollution

Recycling used materials to manufacture new products often requires less processing than using traditional methods, resulting in fewer emissions because the material is already in a form close to final production. In addition, the

extraction of virgin materials often requires more heavy equipment than the collection of recyclable materials, and transportation distances are often shorter because recyclable materials can be collected in most neighborhoods, whereas virgin materials must be extracted at the source. All of these factors combine to create a net reduction in pollution when recycling is implemented. In 2003, it is estimated that recycling reduced overall air emissions (excluding carbon dioxide and methane) in Minnesota by more than 40,500 tons and waterborne wastes by 6700 tons. Carbon dioxide and methane, well-known greenhouse gases, account for almost 2 million tons of unwanted air emissions avoided because of recycling. Table 5 provides more detail.

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Table 4. Energy savings from recycling in Minnesota, 2003.

Recyclable Commodities	Tons Recycled	Energy Use if All Recycled (million BTU)	Energy Use if All Disposed (million BTU)	Net Energy from Recycling Compared to Disposal (million BTU)	Household Equivalent (houses/yr)
Aluminum cans	28,687	-5,437,021	10,845	-5,447,866	-51,786
Steel cans	40,775	-814,122	-248,121	-566,001	-5380
Mixed metals	26,971	-2,160,655	12,841	-2,173,496	-20,661
Ferrous scrap metal	290,915	-5,808,467	-1,770,251	-4,038,216	-38,386
Glass	109,326	-232,363	39,904	-272,267	-2588
HDPE	2737	-51,983	-5761	-46,222	-439
LDPE	1058	-25,497	-2227	-23,270	-221
PET	4529	-100,562	-4221	-96,340	-916
Mixed plastics (HDPE, LDPE, and PET)	36,197	-765,183	-54,006	-711,177	-6760
Unclassified plastics	2776	-58,683	-4142	-54,541	-518
Corrugated cardboard	335,093	-4,356,738	-197,596	-4,159,142	-39,536
Magazines/third-class mail	38,084	-26,112	-11,636	-14,477	-138
Newspaper	189,714	-3,127,616	-123,201	-3,004,415	-28,559
Office paper	45,600	-459,695	-31,888	-427,807	-4067
Phonebooks	2309	-27,549	-1499	-26,049	-248
Mixed paper	198,471	-2,768,937	-107,488	-2,661,449	-25,299
Other uncategorized paper	75,455	-501,990	-45,515	-456,476	-4339
Dimensional lumber	94,577	55,606	-63,965	119,571	1137
Food scraps	160,894	93,962	10,126	83,836	797
Other recyclables	642,883	-10,122,481	-313,483	-9,808,998	-93,241
Total	2,327,051	-36,696,085	-2,911,284	-33,784,801	-321,148

Calculated using the NRC Environmental Benefits Calculator. Data source from the EPA Revised "WARIM" model, August 2004.



Table 5. Reduced air emissions and waterborne wastes by recycling in Minnesota, 2003.

Air Emissions	Reduced Emissions Due to Recycling (ton)	Waterborne Wastes	Reduced Emissions Due to Recycling (ton)
Aldehydes	334.0	Acid	156.3
Ammonia	4.7	Ammonia	59.4
Carbon dioxide (CO ₂)	1,922,188.8	BOD	338.5
Carbon monoxide	16,427.7	COD	935.8
Chlorine	28.5	Cyanide	2.4
Hydrogen fluoride	111.2	Dissolved solids	3496.6
Lead	3.9	Fluorides	65.5
Hydrogen chloride	57.6	Iron	-40.5
Metals	154.5	Metal ion	99.2
Hydrocarbons	4245.4	Oil	29.5
Methane	49,084.6	Phenol	1.5
Nitrogen oxides	6297.2	Sulfuric acid	0.4
Other organics	579.0	Suspended solids	1573.1
Particulates	6749.4		
Sulfur oxides	5592.6		
Total	2,011,858.9	Total	6717.7
Total (excluding CO₂ and methane)	40,585.5		

Data from Franklin Associates⁶ and Richard A. Denison.⁷ These figures are based on an average ton of recycled commodities and statewide totals for recycled paper, plastic, glass, and metals are used to generate the estimates. Air and water emissions vary considerably in their level of toxicity and other environmental impacts.

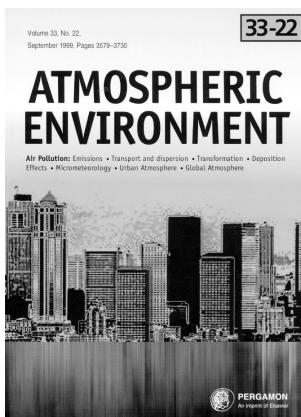
THE ECONOMY AND THE ENVIRONMENT ARE INTRICATELY LINKED

The need for policies and decisions that incorporate economic and environmental concerns are crucial in our efforts as a nation to maintain a quality standard of living that is sustainable for future generations. In this era of ever-decreasing supply and increasing demand and costs for natural resources, we need to make choices at the public- and private-sector levels that are economically sustainable and fulfill the vision of RCRA by sustaining the environment as well. Lawmakers should continue to support local recycling manufacturers and other environmentally conscious companies. Investors should focus on the strengths of environmental companies. And as individuals, we can all make purchasing choices that support our local and global economies and the environment. The beauty of it is that we don't have to choose between a healthy economy and a healthy environment—we can have both. **em**

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