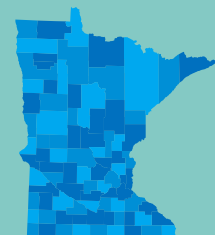


April 2024

Economic Activity Associated with Minnesota's Value-added Recycling Manufacturing Industry

Minnesota's value-added recycling manufacturing industry adds significant value — \$10.2 billion — to our state's economy. In addition to keeping valuable materials out of the solid waste disposal system, recycling also conserves and reuses resources, creating new businesses and jobs in the process.



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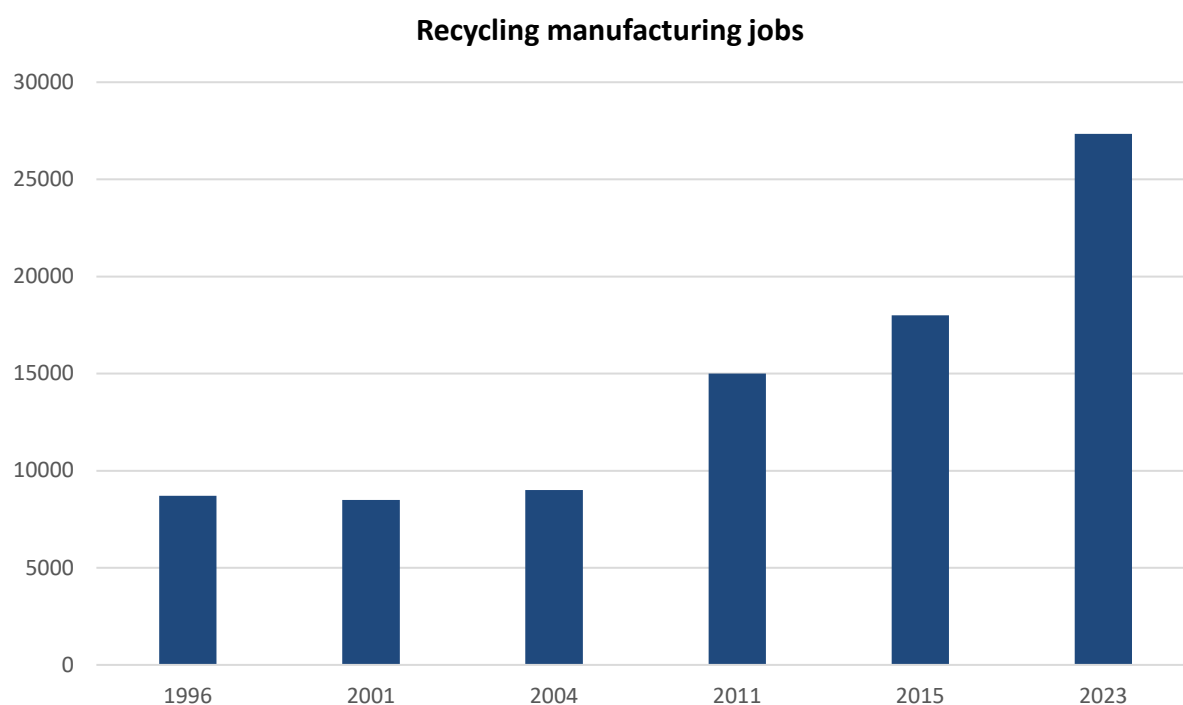
Minnesota's value-added recycling manufacturers

Minnesota's recycling programs do an excellent job of keeping valuable materials out of the solid waste disposal system. However, recycling is more than just an alternative to waste disposal. It also conserves and reuses resources, creating new businesses and jobs in the process.

Minnesota's recycling industry adds significant value to our state's economy.

Minnesota's value-added recycling manufacturing industry continues to be a stable, growing, and vibrant sector of the economy. Since 1996, the recycling manufacturing industry has added more than 15,000 jobs to Minnesota's economy. Jobs remained steady between 1996 and 2004 and have increased from 2011 through 2023 (Figure 1).

Figure 1. Recycling manufacturing direct jobs 1996-2023. Data sourced from DATA AXLE, Manta Directory, NAICS Association, company websites, and conversations with businesses. Scenarios calculated using Regional Economic Models, Inc. (REMI) Minnesota Forecasting and Simulation Model, 1996--2023, Minnesota Pollution Control Agency (MPCA), Wayne Gjerde.

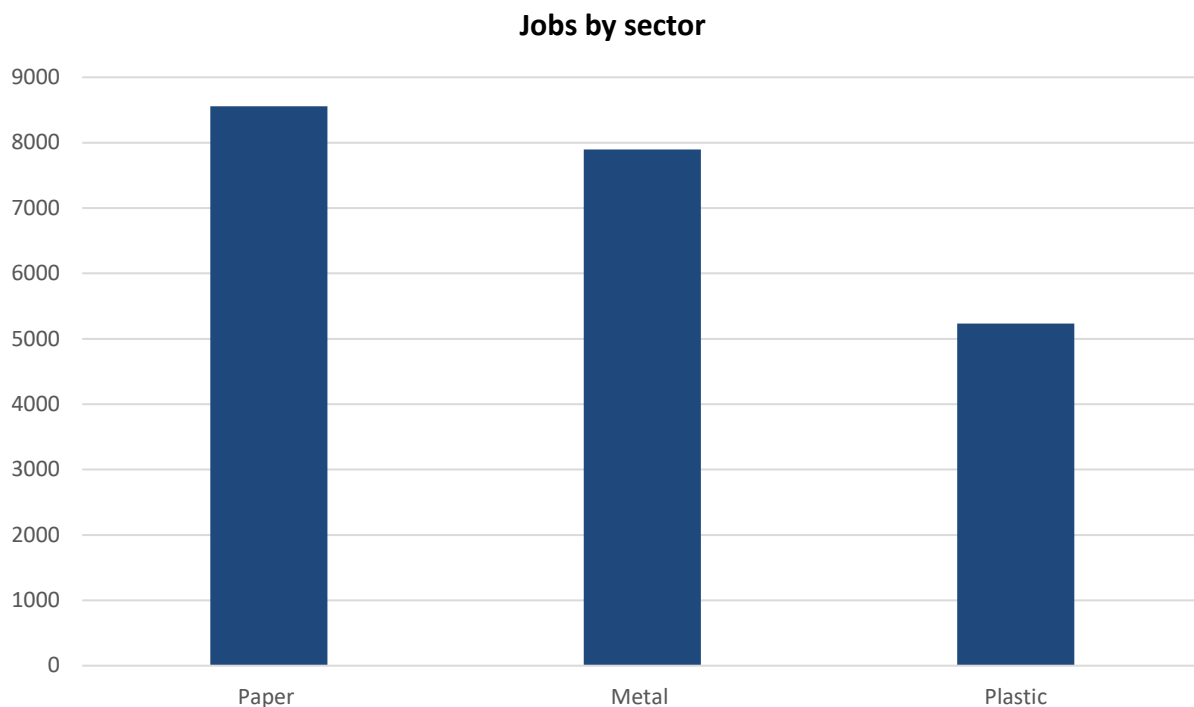


The largest sector of the value-added recycling industry is made up of manufacturers who use recycled paper, post-consumer paper, and old corrugated cardboard (OCC) as a raw material source to make boxes and paper products. Smurfit WestRock located in St. Paul and Liberty Paper located in Becker are major companies using this feedstock. Much of their raw material—recycled paper and OCC—comes from Minnesota recyclers. The second largest sector using recycled feedstock includes aluminum casters and steel and brass foundries. Their source of material comes from metal salvage including appliances and automobiles and from curbside material including aluminum and steel cans. The third largest sector using recycled feedstock is plastic recyclers (Figure 2).



Finished paper coming off a paper line.

Figure 2. Recycling manufacturing direct jobs by sector. Data sourced from DATA AXLE, Manta Directory, NAICS Association, company websites, and conversations with businesses. Scenarios calculated using Regional Economic Models, Inc. (REMI) Minnesota Forecasting and Simulation Model, 1996--2023, MPCA, Wayne Gjerde.



Minnesota's recycling manufacturing industry generated an estimated gross economic activity of \$10.2 billion in 2023. Recycling manufacturing businesses generated an estimated \$565 million in state tax revenue on jobs and employed an estimated 27,348 people in direct jobs in 2023. These jobs in turn support another estimated 49,895 indirect and induced jobs. Altogether, these 78,233 direct, indirect, and induced jobs pay an estimated \$7.96 billion in wages (Table 1).

Table 1. Jobs and economic output associated with Minnesota's value-added recycling manufacturers in 2023.

Category	Twin Cities metro area	Greater Minnesota	Statewide
Direct jobs at companies using recycled materials in the product manufacturing process	15,354	11,994	27,348
Estimated indirect jobs at companies that supply materials and services to companies that produce a final product	19,842	7,813	27,655
Estimated induced jobs at companies as a result of money spent by employees and companies in the marketplace for products	15,429	7,801	23,230
Total estimated jobs (FTE) including direct, indirect, and induced jobs for Minnesota's value-added recycling manufacturers	50,625	27,608	78,233
Total estimated wages and salary disbursements. The monetary remuneration of employees, including compensation of officers, commissions, tips, and bonus and receipts-in-kind that represent income to the recipient	\$5 billion	\$2.96 billion	\$7.96 billion
Total estimated tax revenue on direct jobs personal state income taxes, sales tax, excise tax, and miscellaneous taxes	\$355 million	\$210 million	\$565 million
Total value-added activity: The value a company gives its product or service before offering the product to customers. Contribution to gross state product similar to gross domestic product, output excluding all goods purchased to manufacture products as well as wages and profit	\$6.6 billion	\$3.6 billion	\$10.2 billion
Total output: Can also be thought of as sales or supply. The amount of production, including all goods purchased to manufacture products as well as wages and profit	\$15.1 billion	\$8.71 billion	\$23.89 billion

Data sourced from DATA AXLE, Manta Directory, NAICS Association, company websites, and conversations with businesses. Scenarios calculated using Regional Economic Models, Inc. (REMI) Minnesota Forecasting and Simulation Model, June 2023, MPCA, Wayne Gjerde.

Lost economic opportunity of unrecycled material

In 2021, 1 million tons of recyclable material went to landfills and incinerators. This represents a lost economic opportunity of \$6.2 billion (Table 2). The amount and percentage of material going to disposal has been relatively consistent since 1996 when records were first kept (Figures 3, 4). Since 1996, Minnesota has landfilled and incinerated 26.5 million tons of recyclable material worth \$3.4 billion (Figure 5).

Table 2. Lost opportunity associated with recyclable material that was not recycled in 2021. This table presents an estimate of the lost economic opportunity in a single year that could be realized if this material were to be recycled.

Category	Twin Cities metro area	Greater Minnesota	Statewide
Estimated direct jobs at companies using recycled materials in the product manufacturing process	8,992	7,017	15,999
Estimated indirect jobs at companies that supply materials and services to companies that produce a final product	12,147	4,608	16,757
Estimated induced jobs at companies as a result of money spent by employees and companies in the marketplace for products	9,571	4,299	13,870
Total estimated jobs (FTE) including direct, indirect, and induced jobs for Minnesota's value-added recycling manufacturers	30,710	15,924	46,626
Total estimated wages and salary disbursements. The monetary remuneration of employees, including compensation of officers, commissions, tips, and bonus and receipts-in-kind that represent income to the recipient	\$3.1 billion	\$1.6 billion	\$4.7 billion
Total estimated tax revenue on direct jobs personal state income taxes, sales tax, excise tax, and miscellaneous taxes	\$220 million	\$114 million	\$334 million
Total estimated value-added activity: The value a company gives its product or service before offering the product to customers. Contribution to gross state product similar to gross domestic product, output excluding all goods purchased to manufacture products as well wages and profit	\$4.13 billion	\$2.05 billion	\$6.18 billion
Estimated total output: Can also be thought of as sales or supply. The amount of production, including all goods purchased to manufacture products as well wages and profit	\$9.38 billion	\$5.09 billion	\$14.47 billion

Data sourced from DATA AXLE, Manta Directory, NAICS Association, company websites, and conversations with businesses. Scenarios calculated using Regional Economic Models, Inc. (REMI) Minnesota Forecasting and Simulation Model, June 2023, MPCA, Wayne Gjerde.

Figure 3. Tons of recyclable material sent to disposal per year since 1996. Source: SCORE data, and MPCA waste composition studies (1994, 2001, 2013).

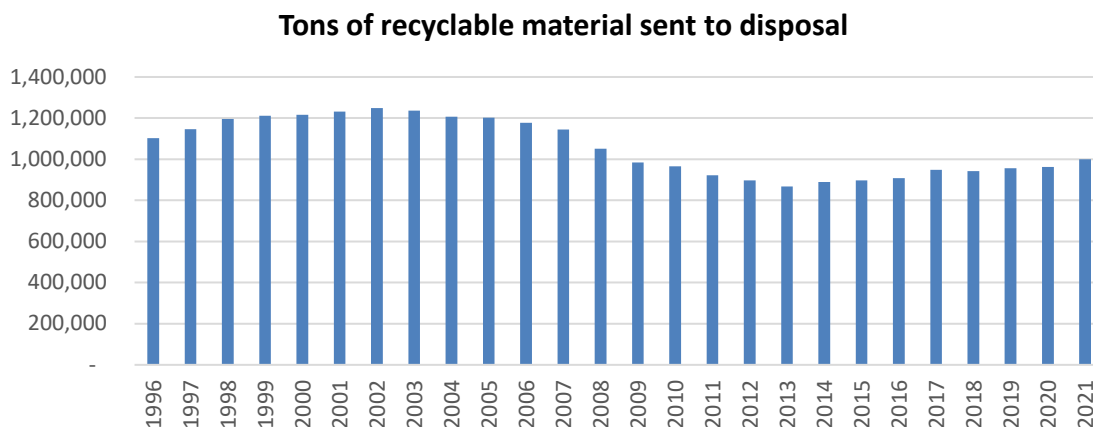
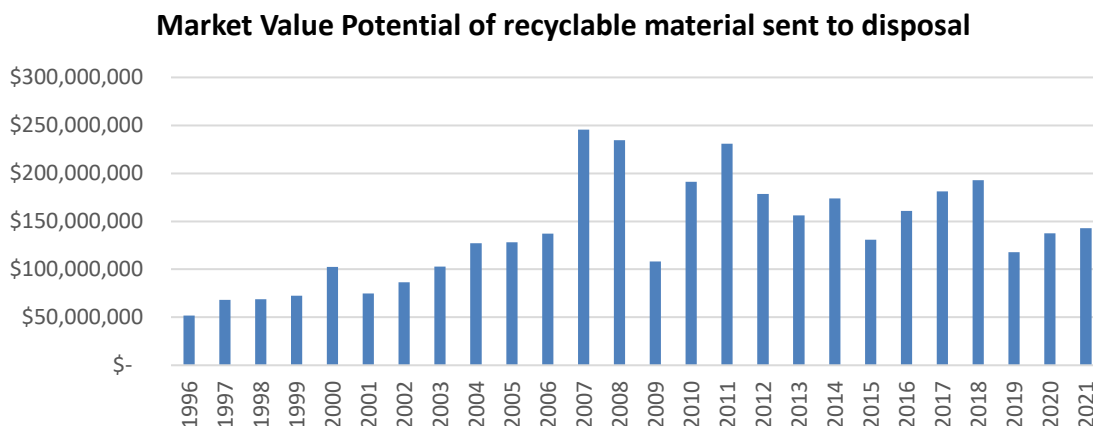


Figure 4. Recyclable material as a percentage of waste composition since 1996. Source: SCORE data, MPCA waste composition studies (1994, 2001, 2013).



Figure 5. Market Value Potential of recyclable material sent to disposal since 1996. Source: SCORE data, MPCA waste composition studies (1994, 2001, 2013), SEMREX, RecyclingMarkets.net, Eureka Recycling, Strategic Materials, MPCA historic pricing knowledge



Recycling facility closures lead to lost economic opportunity.

While Minnesota's recycling economy continues to grow, the industry is vulnerable to consolidation and other factors that can lead to facility closure. Between 2022 and 2023, Minnesota lost three major facilities resulting in a lost opportunity of \$397 million. Replacing these facilities could cost nearly \$1 billion.

Table 3. Estimated lost jobs and economic output in 2023 associated with facility closures in 2022 and 2023. This table is an estimate of the jobs and economic output that were unrealized in 2023 as a result of the closures of Gerdeau Ameristeel, WestRock OCC mill, and Ball Rexam aluminum can plant.

Category	Twin Cities Metro Area	Greater Minnesota	Statewide
Estimated direct jobs at companies using recycled materials in the manufacturing process to produce products	-710	0	-710
Estimated indirect jobs at companies that supply materials and services to companies that produce a final product	-1155	-57	-1212
Estimated induced jobs at companies as a result of money spent by employees and companies in the marketplace for products	-1157	-165	-1322
Total estimated jobs (FTE) including direct, indirect, and induced jobs for Minnesota's value-added recycling manufacturers	-3022	-222	-3244
Total estimated wages and salary disbursements. The monetary remuneration of employees, including compensation of officers, commissions, tips, and bonus and receipts-in-kind that represent income to the recipient	-\$172 million	-\$34 million	-\$198 million
Estimated total estimated tax revenue on direct jobs personal state income taxes, sales tax, excise tax, and miscellaneous taxes	-\$10.13 million	-\$2.0 million	-\$12.13 million
Total estimated value-added activity: The value a company gives its product or service before offering the product to customers. Contribution to gross state product similar to gross domestic product, output excluding all goods purchased to manufacture products as well as wages and profit	-\$363 million	-\$33 million	-\$397 million
Estimated total output: Can also be thought of as sales or supply. The amount of production, including all goods purchased to manufacture products as well as wages and profit	-\$900 million	-\$61 million	-\$961 million

Data sourced from DATA AXLE, Manta Directory, NAICS Association, company websites, and conversations with businesses. Scenarios calculated using Regional Economic Models, Inc. (REMI) Minnesota Forecasting and Simulation Model, June 2023, MPCA, Wayne Gjerde.

Minnesota’s compost industry generated an estimated gross economic activity of \$21.4 million in 2023. Compost businesses generated an estimated \$730,000 in state tax revenue on jobs and employed an estimated 116 people in direct jobs in 2023. These jobs in turn support another estimated 81 indirect and induced jobs. Altogether, these 248 direct, indirect, and induced jobs pay an estimated \$8.2 million dollars in wages (Table 4).

Table 4. Jobs and economic output associated with Minnesota’s compost industry in 2023

Category	Twin Cities Metro Area	Greater Minnesota	Statewide
Estimated direct jobs in the compost industry	43	73	116
Estimated indirect jobs: Impacts on local suppliers statewide, unadjusted for displacement effects.	14	20	34
Estimated induced jobs: Long-term effects on personal income and consumer spending, localized and statewide.	21	26	47
Dynamic employment: includes investment, export demand, and government	27	24	51
Total Estimated FTE: direct, indirect, induced, and dynamic job in the compost industry	105	143	248
Total estimated wages and salary disbursements. The monetary remuneration of employees, including compensation of officers, commissions, tips, and bonus and receipts-in-kind that represent income to the recipient	\$4.5 million	\$3.7 million	\$8.2 million
Total estimated tax revenue on direct jobs personal state income taxes, sales tax, excise tax, and miscellaneous taxes	\$309,000	\$421,000	\$730,000
Total estimated value-added activity: The value a company gives its product or service before offering the product to customers. Contribution to gross state product similar to gross domestic product, output excluding all goods purchased to manufacture products as well as wages and profit	\$8.8 million	\$12.6 million	\$21.4 million
Estimated total output: Can also be thought of as sales or supply. The amount of production, including all goods purchased to manufacture products as well as wages and profit	\$18.4 million	\$29.6 million	\$48 million

Data sourced from DATA AXLE, Manta Directory, NAICS Association, company websites, and conversations with businesses. Scenarios calculated using Regional Economic Models, Inc. (REMI) Minnesota Forecasting and Simulation Model, June 2023, MPCA, Wayne Gjerde.

Environmental benefits of recycling

The recycling efforts of Minnesota residents and businesses are improving our environment every day. The results are clear: cleaner air and water, avoided material consumption, avoided energy consumption, more forested land and open space, and reduced greenhouse gases.

Recycling in Minnesota conserves energy and reduces greenhouse gas emissions. The 1,919,000 tons of paper, glass, metals, plastic, and other material recycled in 2022 resulted in the avoidance of an estimated 4,662,609 metric tons of CO₂ emissions.

This is equivalent to one of following:

- Removing annual emissions from 970,000 passenger vehicles
- Conserving 215 million gallons of gasoline
- Conserving electricity use from 774,000 homes for one year

Recycling in Minnesota conserves natural resources and reduces energy use, air pollution, and water pollution. Recycling recovers valuable material that would otherwise be lost to disposal. By using recycled materials instead of trees, metal ores, minerals, oil, and other raw materials harvested from the earth, recycling-based manufacturing conserves the world's scarce natural resources and avoids the environmental impacts of sourcing raw materials. For example, recycling steel cans and other mixed metals in Minnesota in 2022 reduced the need to source more than 445,000 tons of raw material for making steel (SCORE Report 2022).

In most cases, it takes less energy to make a product from recycled material than from newly mined or harvested raw material. For example, it takes 95 percent less energy to make an aluminum can using mostly recycled aluminum than using fully virgin aluminum. The energy savings and greenhouse gas emissions reduction associated with recycling is important to combat climate change and reduce environmental impacts.

