



SPOTLIGHT ON WISCONSIN'S MANUFACTURING SECTOR

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INTRODUCTION

In 2015, the Great Lakes Regional Pollution Prevention Roundtable (GLRPPR) began a project to analyze data from U.S. EPA's Toxics Release Inventory (TRI) and Greenhouse Gas databases and the Census Bureau's County Business Patterns Database to determine the impact of manufacturing on the economy and environment of the six states in U.S. EPA Region 5. This fact sheet summarizes findings for Wisconsin's manufacturing sector (NAICS 311-337) in 2015.

ECONOMY AND TRI EMISSIONS

According to TRI data (2015), the paper manufacturing sector was the highest emitter, followed by the primary metals industry. Paper manufacturers had the fourth highest payroll, fifth highest number of employees, and twelfth highest number of establishments among manufacturing sectors. The primary metals sector ranked eleventh in payroll size, tenth in number of employees, and fourteenth in number of establishments. This indicates that the paper manufacturing and primary metals sectors may contain larger but fewer facilities that have a greater impact on emissions than sectors with a greater number of relatively smaller facilities. Meanwhile, the fabricated metal products sector had the most establishments and ranked fourth in TRI emissions.

Figure 1 compares the significance of chemical emissions and economic impact of specific industry sectors.

2015 DATA SUMMARY

Number of TRI Entries: 2,468
Number of TRI Facilities: 804 (based on TRI ID)
Number of GHG Facilities: 67
Number of P2 Entries (TRI): 211
Number of P2 Entries Reporting Reductions: 109
Total CO_{2e} Releases: 10,080,013 metric tons
Total On and Off-Site Releases: 26,068,263 lbs.
Chemical Emissions Rank: 5th of 6 Great Lakes states

RELEASES

	Total	Highest Emitter
Air	9,810,022 lbs.	Paper
Land	2,587,991 lbs.	Food
Water	3,773,905 lbs.	Food
Off-site	9,896,344 lbs.	Primary metals
CO _{2e}	10,080,013 metric tons	Paper

TOP FIVE INDUSTRY SECTOR EMITTERS

TRI	GHG
1. Paper	1. Paper
2. Primary metals	2. Nonmetallic minerals
3. Food	3. Chemicals
4. Fabricated metals	4. Primary metals
5. Chemicals	5. Petroleum

TOP FIVE CHEMICAL RELEASES

1. Nitrate compounds
2. Methanol
3. Zinc compounds
4. Hydrochloric acid
5. Manganese compounds

WISCONSIN IS THE TOP EMITTER IN:

TRI	GHG
• Paper	• Paper
	• Printing
	• Machinery

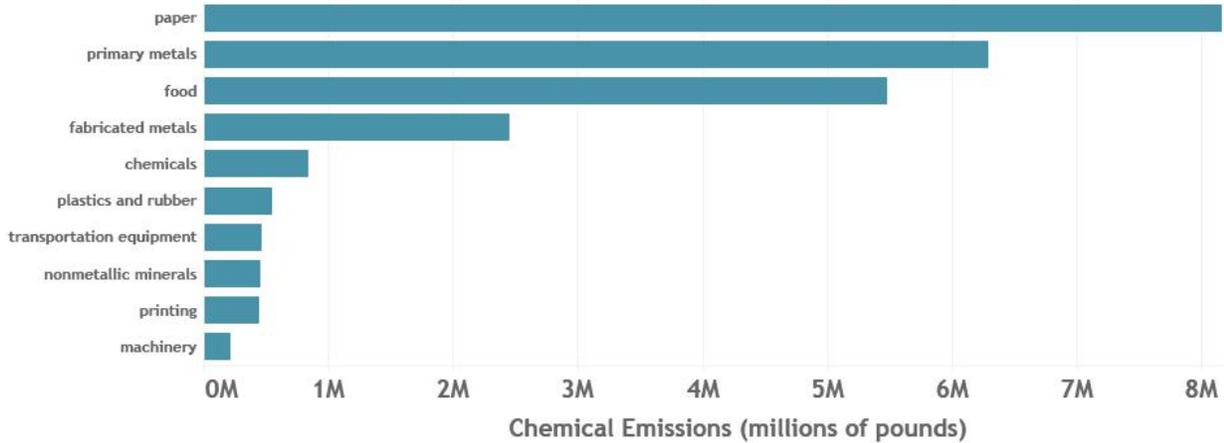
SECTORS WITH THE GREATEST EMISSIONS REDUCTIONS (IN POUNDS)

1. Paper
2. Chemicals
3. Food
4. Fabricated metals
5. Plastics and rubber

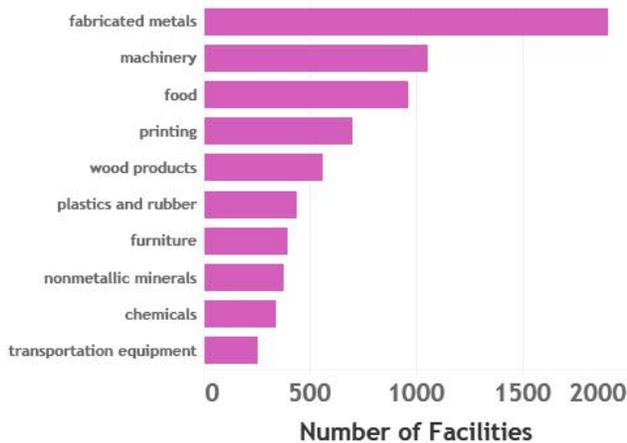
Figure 1: Chemical Emissions and Economic Impact of Selected Industry Sectors in Wisconsin

The paper and primary metals sectors had the highest emissions, and most likely consist of fewer, very large facilities. The machinery industry had a very high economic impact, but was tenth in toxic emissions. Both the food and fabricated metals sectors rank in the top five in both emissions and economic impact.

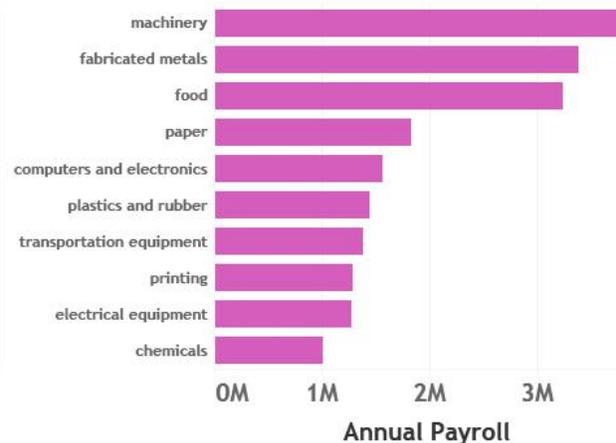
Top 10 in Chemical Emissions (2015)



Top 10 in Number of Facilities (2015)

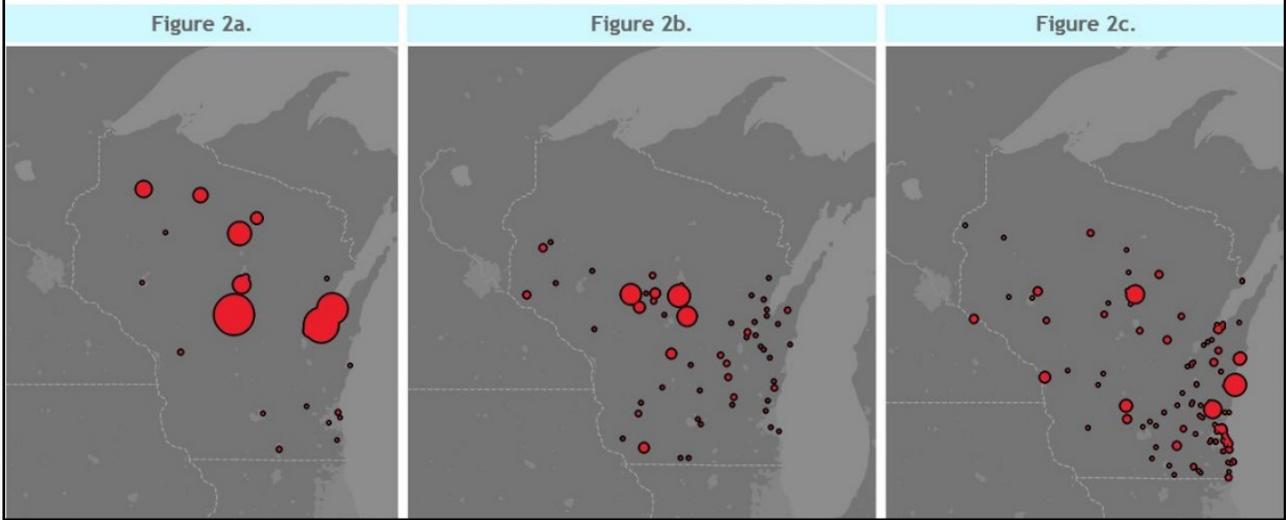


Top 10 in Annual Payroll (2015)



Figures 2a, 2b, and 2c show the distribution of communities that have paper manufacturing facilities (a), food manufacturing facilities (b), and fabricated metal facilities (c) with TRI chemical releases of greater than 0 pounds in 2015. Circle sizes indicate the relative amount of the releases in pounds for the corresponding sector. Circles may represent more than one facility in that geographic location, which makes patterns easier to identify. For example, paper manufacturers are located primarily in the northern and central parts of the state and generally report larger chemical emissions. Food manufacturers with higher emissions are centered in the north-central part of the state, with smaller emitters scattered throughout the southern part of the state. Finally, fabricated metal facilities appear to be distributed throughout Wisconsin, with more and larger emitters concentrated in the southeast corner.

Figure 2: Distribution of Wisconsin Facilities in the Paper Manufacturing sector (2a), the Food Manufacturing sector (2b), and the Fabricated Metals sector (2c) (TRI, 2015).



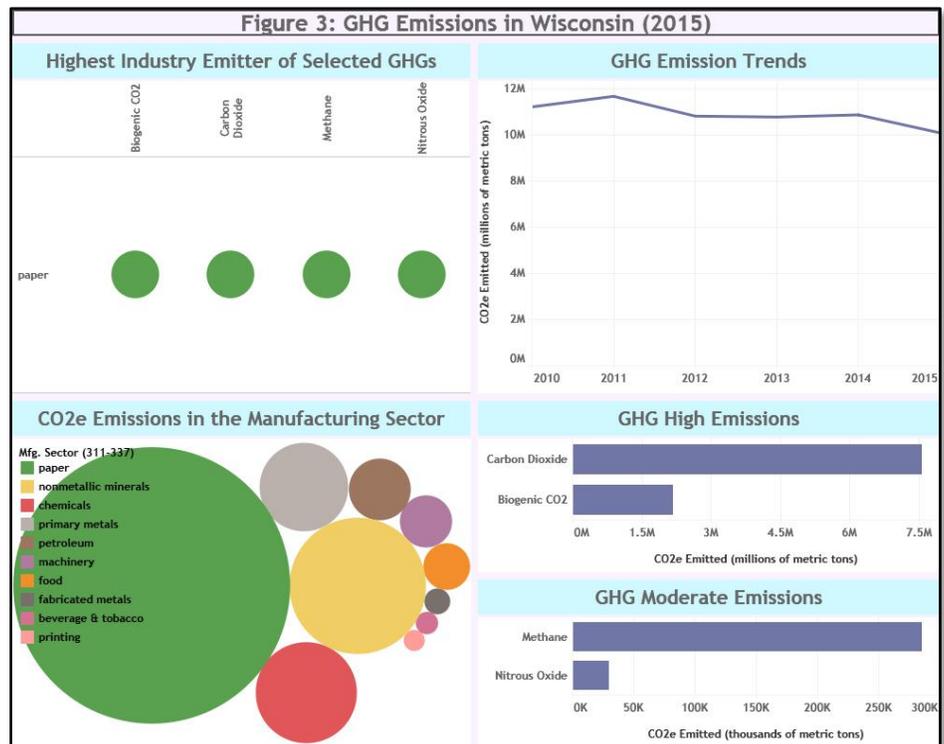
GREENHOUSE GAS (GHG) EMISSIONS

Wisconsin’s manufacturing sector ranked last of the region’s six states in overall GHG emissions in 2015. Every Region 5 state reported a decrease in GHG emissions from 2014 to 2015. Wisconsin’s share of that decrease was approximately 780,516 metric tons of CO₂e.

The top five GHG emitters were the paper, nonmetallic minerals, chemicals, primary metal, and petroleum industries. Wisconsin was the highest GHG emitter of all Region 5 states in the paper, printing, and machinery industries.

The paper industry was the highest emitter of carbon dioxide. Carbon dioxide accounts for nearly all GHG emissions in the state. They were also highest in biogenic CO₂, methane, and nitrous oxide. Overall, the paper industry was responsible for about 62% of the state’s reported GHG emissions.

Figure 3 shows several different visualizations of Wisconsin’s greenhouse gas emissions data.



POLLUTION PREVENTION (P2) PRACTICES

The TRI reporting program includes an optional reporting section where companies can report which pollution prevention practices they used to reduce specific chemicals. Facilities report the activity implemented and the method by which this P2 opportunity was identified using designated codes (W and T codes). Facilities can also choose to describe these activities or other measures taken to reduce toxic chemical releases using a free-text data entry field on the TRI reporting form. Under the Pollution Prevention Act, TRI facilities report a production or activity ratio that typically compares production in the current year with the prior year. For a chemical used in the generation of electricity, for example, the production ratio for that chemical reflects the annual change in number of kilowatt hours produced. Using this ratio, year-to-year changes in waste management quantities can be viewed within the context of production, which can help gauge whether reductions were the result of reported source reduction activities (EPA, 2016). Except where noted, the discussion of P2 practices in this fact sheet is based on actual reported releases and reductions, rather than the values normalized for production.

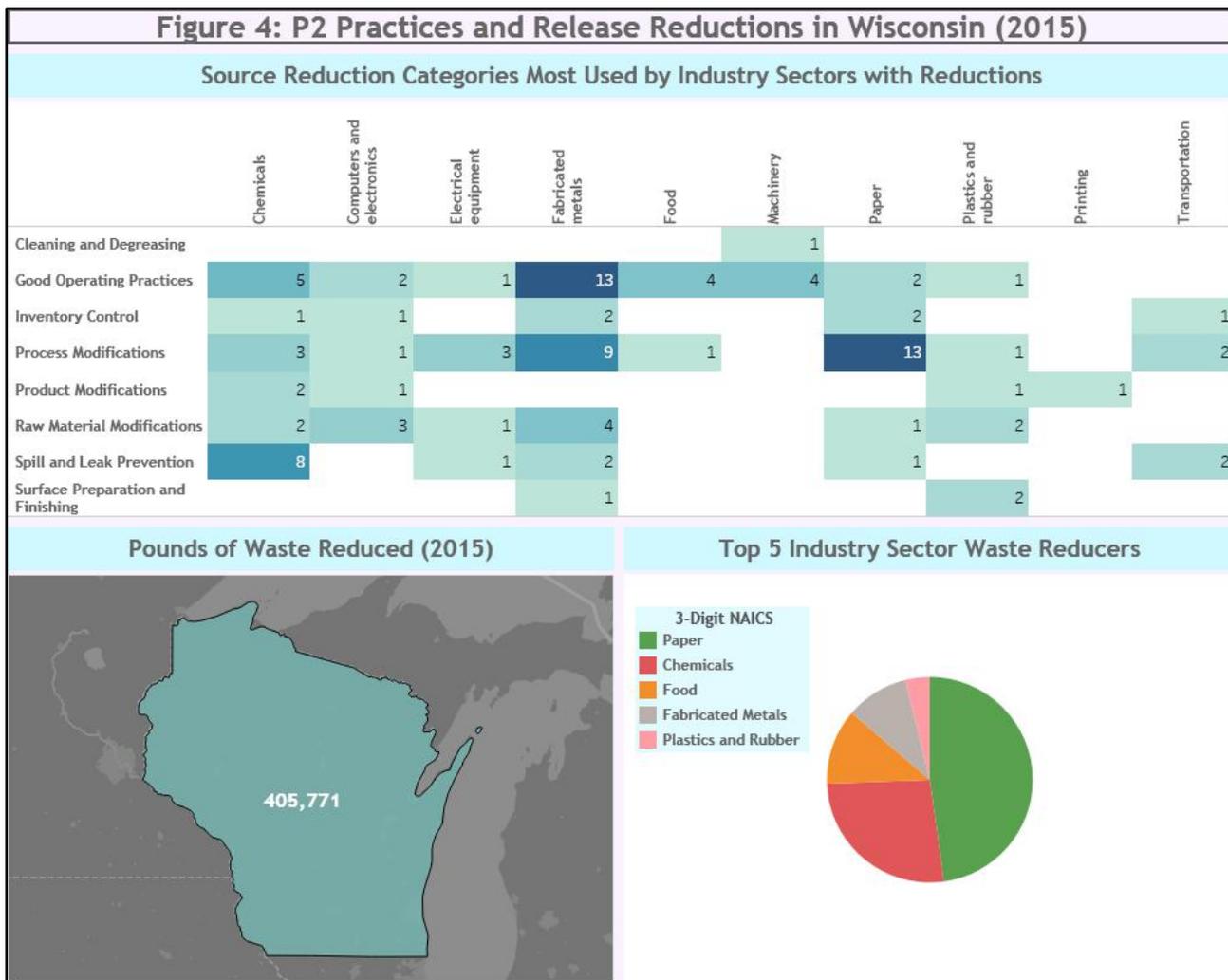
Based on the TRI P2 data entries with reported reductions, process modifications (W50 through W58) and good operating practices (W13 through W19) were the most effective P2 practices or practice combinations for Wisconsin companies reporting in 2015. Spill and leak prevention (W31 through W39) and raw material modifications (W41 through W49) were the third and fourth most commonly reported practices by companies with reductions. According to Ranson et al. (2015), the pollution prevention technique that most effectively reduces emissions is raw material modifications.

The most common process modification reported by Wisconsin companies was “other process modifications” (W58), followed by “modified equipment layout or piping” (W52). Facilities also reported good operating practices, such as “improved maintenance scheduling, recordkeeping, or procedures” (W13) and “other changes in operating practices” (W19). Several companies also reported using spill and leak prevention, such as “implemented inspection or monitoring program of potential spill or leak sources” (W36). Those facilities reporting raw material modifications mentioned “substitution of raw materials” (W42) as the most prevalent source reduction technique.

Of the six Region 5 states, Wisconsin was fifth in the number of pounds of toxic emissions reduced at just under 406,000 pounds. As shown in **Figure 4**, the top five manufacturing industry sectors in reductions of toxic emissions (in order) were paper, chemicals, food, fabricated metals, and plastics and rubber. Four of these sectors (paper, food, fabricated metals, and chemicals) also ranked in the top five waste emitters. However, the primary metals industry, second highest in emissions, ranked sixth in the number of pounds reduced.

The top five chemicals reduced (highest numbers of pounds) were hydrochloric acid, sulfuric acid, ammonia, nitrate compounds, and toluene. Reductions of hydrochloric acid and sulfuric acid were 90,000 and 70,000 pounds, respectively. TRI P2 data indicate that these reductions were associated with one Wisconsin paper mill. Reductions of ammonia and toluene were between 40,000 and 50,000

pounds and associated with several different industries. Nitrate compounds were associated primarily with the food industry.



The most notable trend in Wisconsin’s 2015 P2 data is the gap between the numbers of pounds of waste reduced by paper and chemical manufacturing facilities together compared with the other industry sectors (see pie chart in Figure 4). Paper manufacturing facilities reduced 181,973 pounds of emissions, which is about 45% of the total reductions reported statewide. In 2014, that sector reduced only 16,168 pounds and was the fourth highest reducer that year. The next highest number of pounds reduced was 101,329 pounds in the chemical industry, which accounted for about 25% of total reductions.

One Wisconsin paper mill accounted for about 90% of the sector’s total reductions, primarily by decreasing their emissions of hydrochloric and sulfuric acids. The facility reported using “other process modifications” (W58) as a P2 practice, specifically citing the retirement of their solid fuel boiler as a reason for the reductions. When

The paper manufacturing industry subsector with the most pounds reduced in 2015 (164,695 pounds) was Paper (except Newsprint) Mills (NAICS 322121).

hydrochloric acid and sulfuric acid waste quantities were normalized relative to production for this company, the number of pounds reduced was lower, indicating that production-related events accounted for a portion of the reported reductions.

A converted paper product manufacturer reduced emissions by 14,738 pounds, primarily by decreasing their releases of N-methyl-2-pyrrolidone and toluene. The facility reported using “other process modifications” (W58) and “changing their production schedule to minimize equipment and feedstock changeovers” (W14) as P2 practices. They stated that they are continually trying to perfect their coating wheel process. In previous years, they reported using LEAN management tools to identify and group like product runs, reducing changeover cleaning with solvents. When N-methyl-2-pyrrolidone and toluene waste quantities were normalized relative to production, the number of pounds reduced was higher, indicating that reduced emissions may have been due to the use of pollution prevention techniques.

A paper bag and coated and treated paper manufacturer reduced toluene emissions by about 15% by substituting raw materials in their process (W42). No further details were given in 2015, but in 2013, they stated that they used low-toluene adhesives when these adhesives met performance standards. When toluene waste quantities were normalized relative to production, the number of pounds reduced was slightly lower but still significant.

The chemical manufacturing sector reduced emissions by 101,329 pounds in 2015, which ranked them second in the state. Two miscellaneous chemical product and preparation manufacturing facilities under the same parent company accounted for almost half of the total emission reductions in this sector, primarily through reduced ammonia releases. They reported using “modified equipment, layout, or piping” (W52) and “other changes in spill or leak prevention” (W39) as P2 practices. They stated that a team of employees was formed to address the improved capture of fugitive emissions around their mixing operations. Additional intake vents and housings were added as secondary containment features to collect fugitive emissions and route them to the scrubbers. When ammonia waste quantities were normalized relative to production at these facilities, the number of pounds reduced was lower, indicating that a portion of reduced emissions was due to production-related events.

A paint and coating manufacturer reduced toluene emissions by 40% by using a variety of P2 practices, including “other changes in operating practices” (W19), “other changes in inventory control” (W29), and “changed product specifications” (W81). Specifically, they mentioned reducing purchases of toluene for use as a clean-up solvent and increasing recycling of toluene. When toluene waste quantities were normalized relative to production, the number of pounds reduced was lower but still significant.

The food manufacturing industry contributed to about 11% of the state’s overall emission reductions in 2015. One dry, condensed, and evaporated dairy product manufacturer was responsible for about 72% of these reductions, primarily by reducing emissions of nitrate compounds. The facility reported using “improved maintenance scheduling, recordkeeping, or procedures” (W13) and “changing the

production schedule to minimize equipment and feedstock changeovers” (W14). No additional information was provided. When nitrate compound waste quantities were normalized relative to production, the number of pounds reduced increased, indicating that reduced emissions may have been due to the use of pollution prevention techniques.

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FOR MORE INFORMATION

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