Spotlight on U.S. EPA Region 5's Fabricated Metal Product Industry

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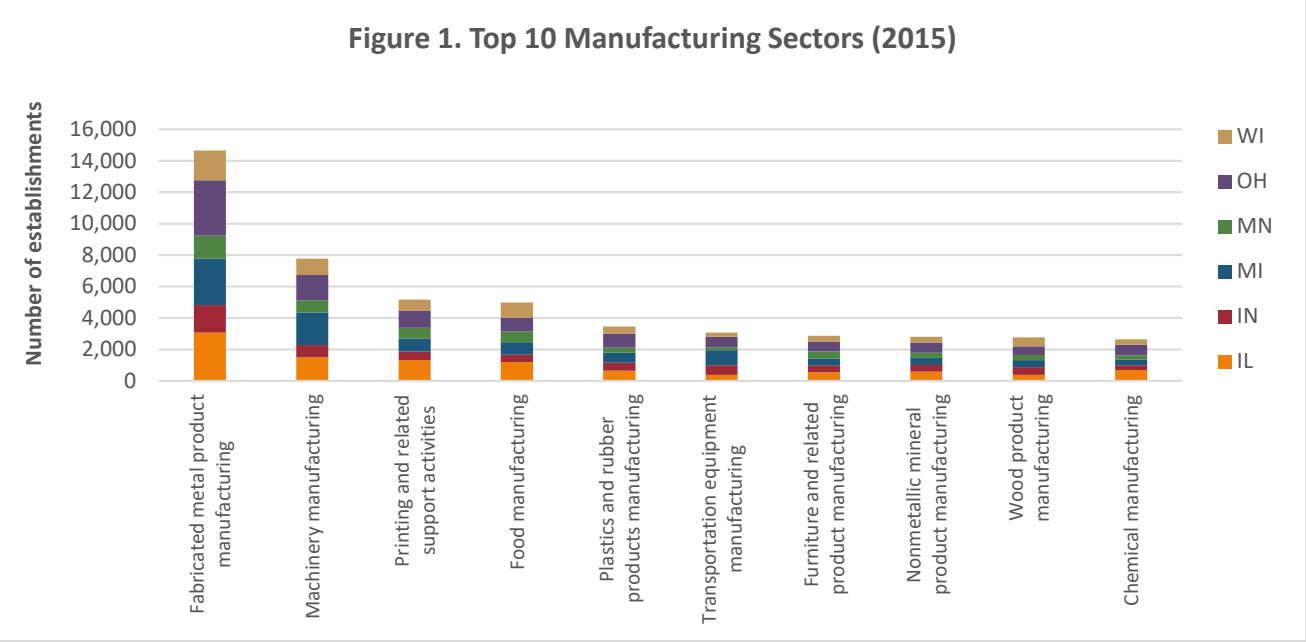
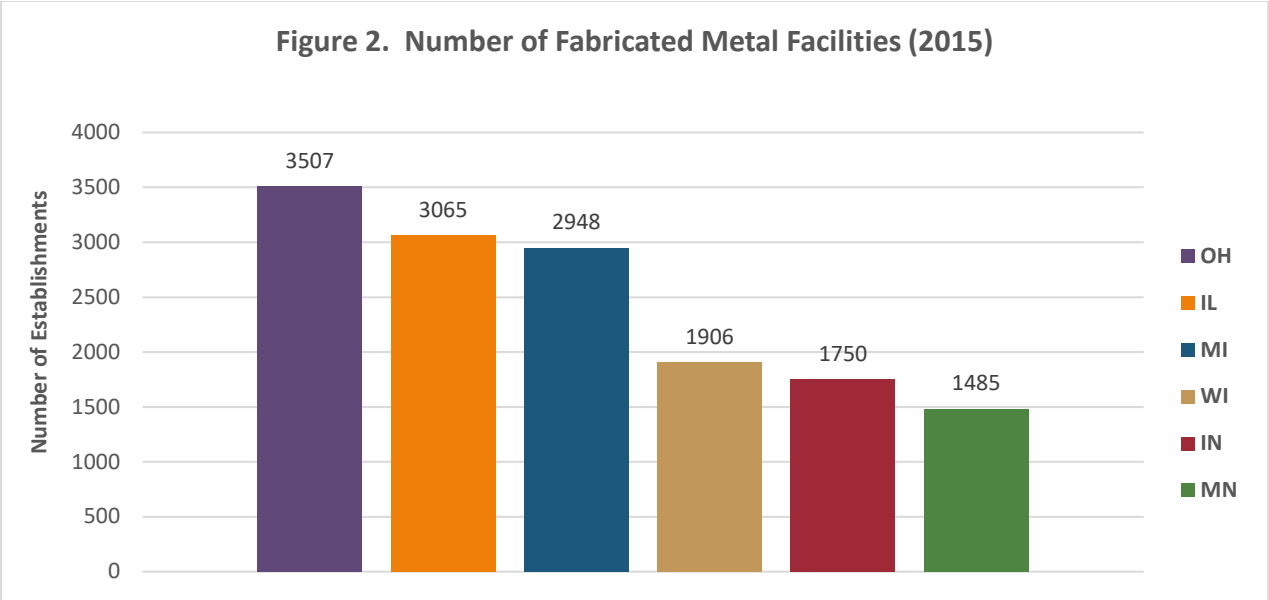
Introduction

In 2015, the Great Lakes Regional Pollution Prevention Roundtable (GLRPPR) began a project to analyze public data sets to determine the impact of manufacturing on the economy and environment of the six states in U.S. EPA Region 5. The goal of this project was to use the analyzed results to assist pollution prevention technical assistance programs (P2 TAPs) with targeting their assistance efforts. This fact sheet summarizes preliminary findings related to the fabricated metal product industry (NAICS code 332).

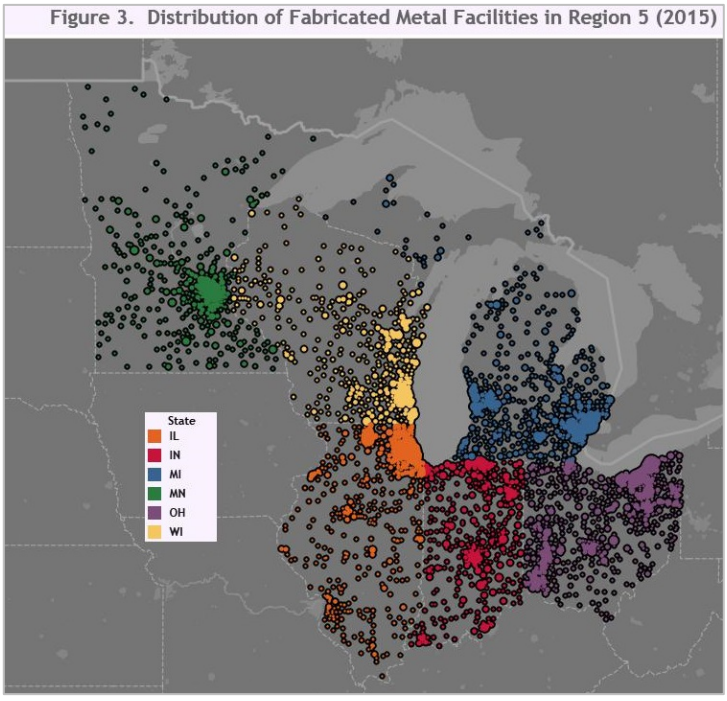
Economic Impact

According to 2015 County Business Patterns data, the fabricated metal product industry is the most prevalent type of manufacturing facility in the region. **Figure 1** shows the top 10 most prevalent manufacturing sectors in the region.





Fabricated metal manufacturers represent a significant portion of the annual payroll of manufacturing industries in the region. In 2015, the 20 manufacturing sectors analyzed as part of this study employed almost 2.9 million people and accounted for over $161 million dollars in annual payroll. Of that total, companies in the fabricated metal product manufacturing sector spent over $22 million to employ over 443,000 workers (County Business Patterns, 2015). Figure 2 shows the number of fabricated metal establishments per state in 2015, and Figure 3 shows the distribution of facilities by zip codes in 2015.

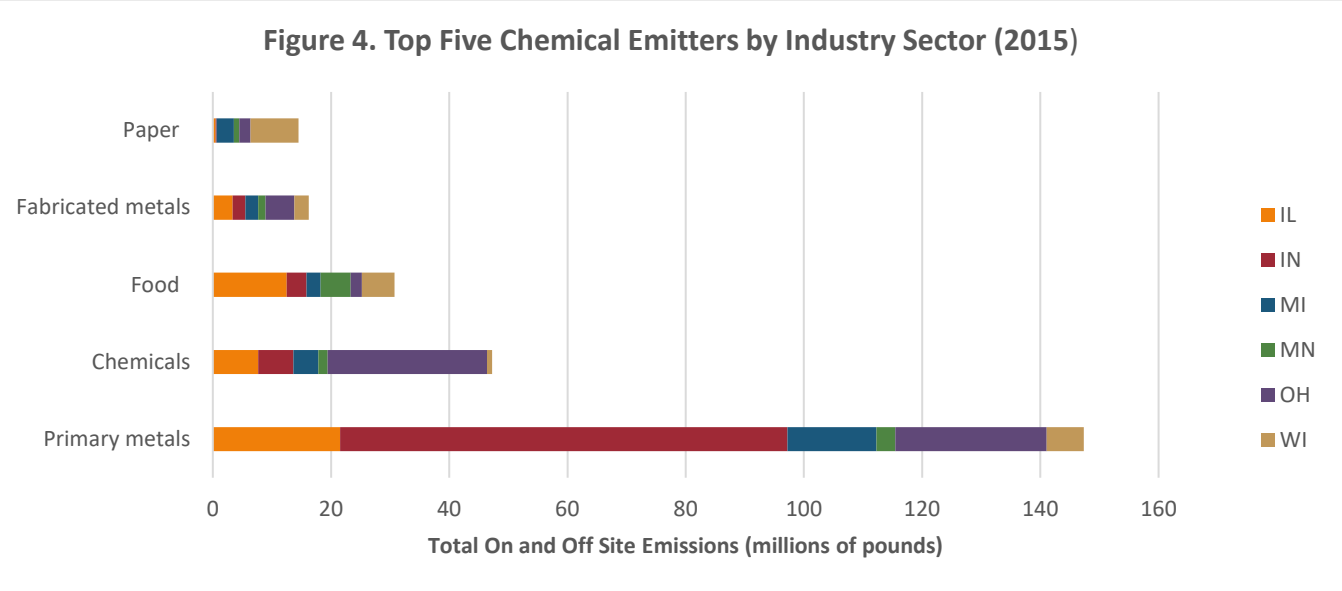


P2 TAPs can have an impact on this important economic sector by targeting efforts to prevent or reduce pollution at its source. Companies can avoid expensive investments in waste management or clean-up efforts if they change their operations so that they do not produce waste. Although companies may balk at the initial investment that a change in technology or procedure requires, TAPs can help them to see how much money they will save if they view the situation from a long-term perspective. This cost savings in the production process and waste management can translate to more money for increased research and development of new products, higher wages, and perhaps even more jobs.

Emissions

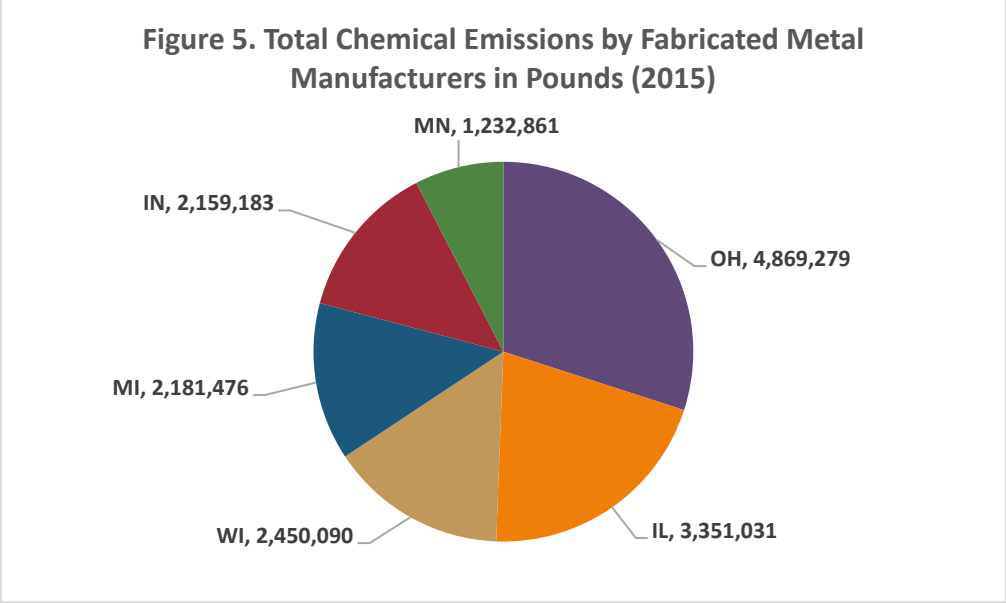
Chemical Emissions Overview

The fabricated metals industry is a significant source of chemical emissions. Toxics Release Inventory (TRI) data analyzed from the years 2009-2015 from U.S. EPA Region 5 indicated that the fabricated metals industry has a major impact on the environment. Only the primary metal, chemical, and food processing industries had higher chemical emissions rates. **Figure 4** shows the highest emitting industries and illustrates how the states compare in each sector in 2015.



The fabricated metals industry ranked third out of 20 industry sectors in chemical emissions in Ohio and Minnesota when looking at the years 2009-2015 together. This industry sector fell anywhere from fourth to sixth in the remaining states when compared with other manufacturing sectors. Ohio led the fabricated metal industry in chemical emissions in all seven years. Approximately 4,869.279 pounds of chemicals were emitted by the fabricated metal industry in Ohio in 2015. Illinois followed with 3,351,031 pounds emitted.

To get a better idea of the actual impact of the fabricated metal industry in each state, we also looked at how large the industry sector is and how much it contributed to each state's total emissions in 2015. In all six states, the fabricated metal product manufacturing industry accounted for 23 to 27% of all manufacturing facilities (2015). In Illinois, Michigan, and Ohio, this industry sector accounted for between 6 and 7% of all chemical emissions. In Minnesota and Wisconsin, the fabricated metals industry accounted for a somewhat higher percentage of all emissions, 8.5 and 9%, respectively. These data suggest that TAPs in Wisconsin especially may want to target this sector so that they are more in line with the percentages of states that have more fabricated metal facilities (IL, MI, and OH) but a lower environmental impact. There was one outlier state in this analysis. In Indiana, the fabricated metals industry accounted for only 2% of all chemical emissions, probably due to the fact that such a large percentage (about 76%) of the state's emissions originate from the primary metal sector. **Figure 5** shows the chemical emissions from the fabricated metal products sector in all states in the region in 2015.

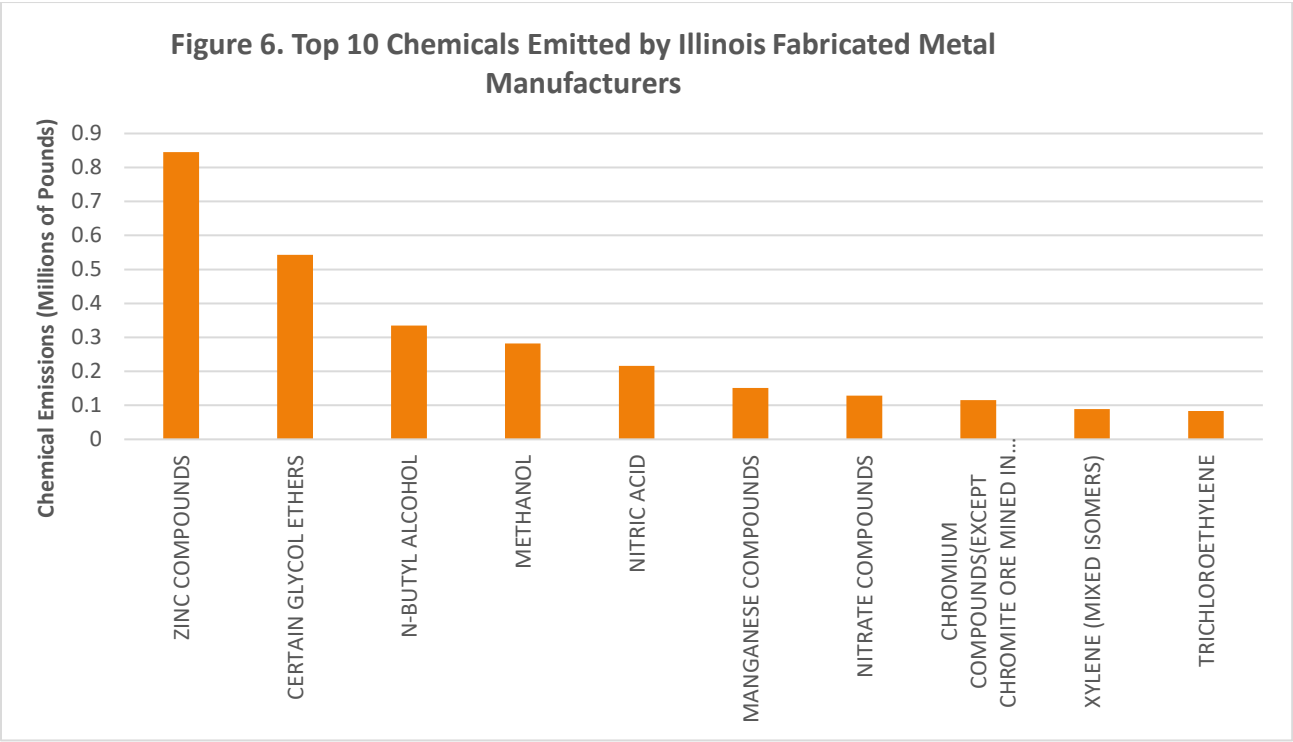


Chemical Emissions by State

In Illinois, zinc compounds were the most emitted chemical by the fabricated metal industry (845,584 pounds), primarily through off-site transfers, followed by:

- certain glycol ethers (542,992 pounds emitted), primarily to air;
- n-butyl alcohol (334,997 pounds emitted), primarily to air;
- methanol (281,792 pounds emitted), primarily to air; and
- nitric acid (216,407 pounds emitted), primarily through off-site transfers.

Figure 6 shows the top 10 chemicals released by the fabricated metal industry in Illinois in 2015.



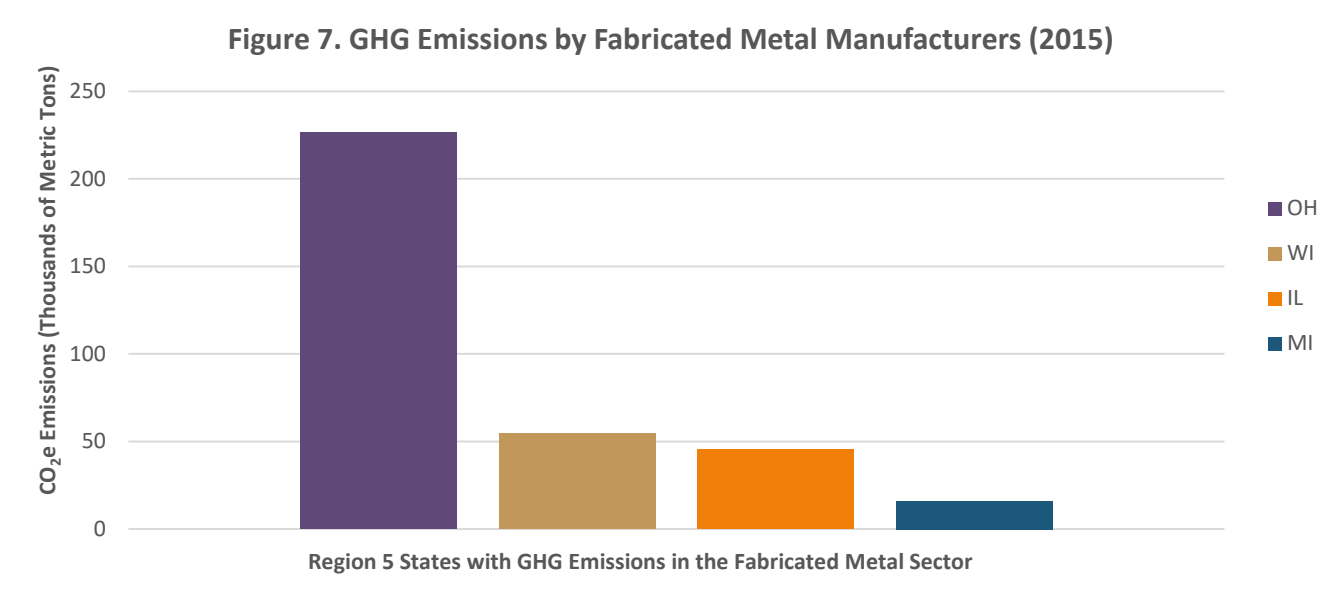
The most prevalent chemicals emitted in the other five states in Region 5 in 2015 (TRI, 2015) are summarized below:

- **Wisconsin:** zinc compounds primarily to off-site transfers, followed by certain glycol ethers to air, and zinc (fume or dust) to off-site transfers.
- **Michigan:** zinc compounds primarily to off-site transfers, followed by barium compounds and chromium compounds, also to off-site transfers.
- **Indiana:** zinc compounds primarily to off-site transfers, followed by certain glycol ethers to air, and n-butyl alcohol to air.
- **Ohio:** zinc compounds primarily to off-site transfers, followed by certain glycol ethers to air, and n-butyl alcohol to air.
- **Minnesota:** n-butyl alcohol primarily to air, followed by certain glycol ethers to air, and zinc compounds to off-site transfers.

Based on this analysis, the most prevalent chemicals emitted in the fabricated metal industry in the Great Lakes states are zinc compounds through off-site transfers and certain glycol ethers and n-butyl alcohol to air. Almost all states (except for Michigan and Wisconsin) listed these three chemicals in their top four emissions. P2 TAPs may be able to use these findings to target technical assistance efforts to fabricated metal product manufacturers. For example, in Illinois in 2015, the fabricated metal product manufacturing industry released its most prevalent pollutant (zinc compounds) to off-site transfers. Therefore, Illinois' P2 TAPs might want to focus on how best to target source reduction efforts for this chemical. At the very least, perhaps facilities can begin by finding ways to re-use and recycle zinc waste in their production process.

Greenhouse Gas Emissions

U.S. EPA Envirofacts data from 2015 on greenhouse gas (GHG) emissions in Region 5 indicated that the fabricated metal products industry released the 10th most carbon dioxide equivalents (CO_2e) to the air out of 16 manufacturing industries for which the U.S. EPA reported data (in NAICS codes 311-337). **Figure 7** shows the GHG emissions reported by Region 5 states in 2015.



These data indicate that fabricated metal processing industries in Ohio released the highest amount of CO_2e in the region. This can be partially explained by the fact that there are more fabricated metal product

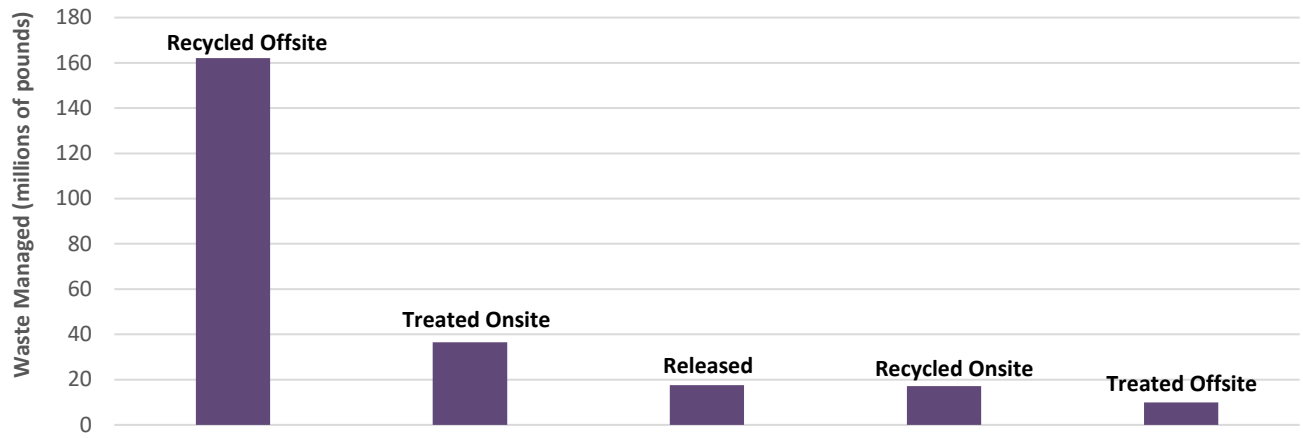
manufacturing facilities in Ohio than in any other state in the region. The next highest state in number of facilities (Illinois) had over 400 fewer establishments in this category. **Fabricated metal facilities in Indiana and Minnesota reported *no GHG emissions.*** These states have fewer facilities (roughly between 1,750 and 2,000 fewer than Ohio) in this industry category; there may be no facilities meeting the GHG reporting threshold. However, this statistic may still indicate an opportunity for P2 TAPs in other states to investigate whether there are specific practices or policies used by fabricated metal manufacturers in Indiana and Minnesota to reduce their CO_2e emissions. If so, they can share this information with facilities within their borders.

Managing Wastes

Waste Management Practices

Analysis of waste management methods shows that the region's fabricated metal manufacturers are most likely to recycle their waste offsite. Companies recycled 162,153,495 pounds of waste offsite in 2015. The next most frequent management technique was onsite treatment (36,463,755 pounds). **Figure 8** illustrates waste management methods used by the fabricated metal industry (NAICS 332) in U.S. EPA Region 5 during 2015.

Figure 8. Most Common Waste Management Methods in the Fabricated Metal Industry in Region 5 (2015)



Pollution Prevention 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 that of the prior year. For a chemical used in energy generation, 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.

The three chemicals most commonly emitted by Region 5 fabricated metal manufacturers in 2015 were zinc compounds, certain glycol ethers, and n-butyl alcohol. Specific industries that most often reported the release of

zinc compounds were the “electroplating, plating, polishing, anodizing, and coloring” industry and the “metal coating, engraving (except jewelry and silverware), and allied services to manufacturers” industry. TRI data for Region 5 from 2009-2015 indicated that the P2 practice most commonly employed to reduce emissions of zinc compounds was improved maintenance scheduling, recordkeeping, or procedures (W13). The second most common P2 practice was modifying equipment, layout, or piping (W52). Also important were instituting recirculation within a process (W51) and improving procedures for loading, unloading, and transfer operations (W32). Specific P2 practices cited included lowering the concentration of zinc used in the plating baths, replacing zinc anodes with insoluble carbon anodes, upgrading coating control hardware and software, and recirculating zinc-rich de-mister collection water from on-site wastewater treatment back into the electrolyte tank for reuse.

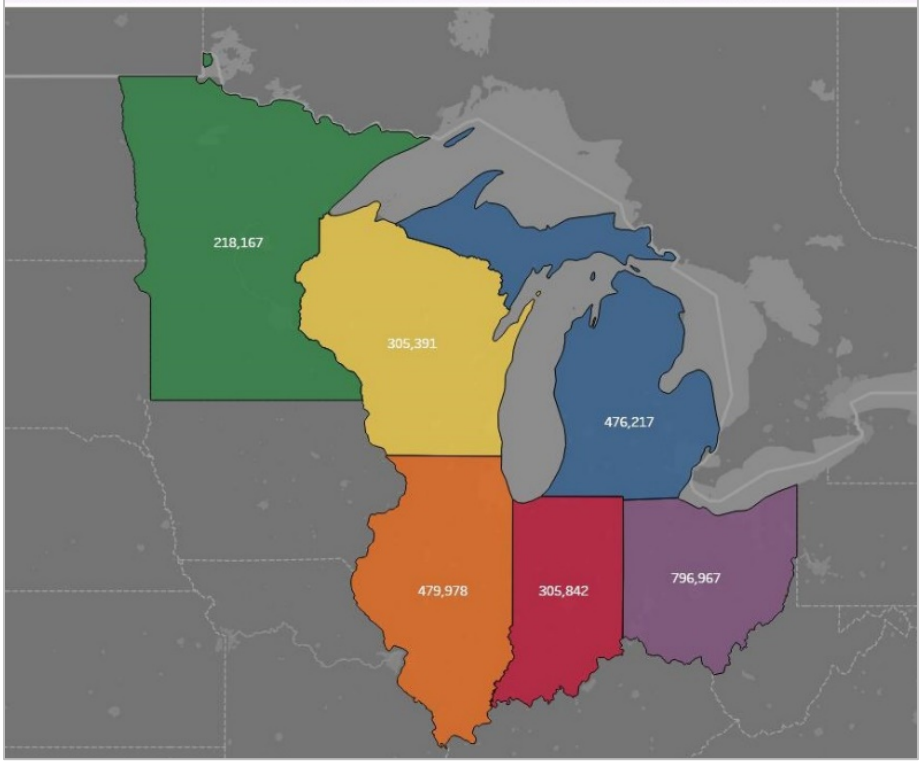
Specific industries most often reporting the release of certain glycol ethers were the “metal can manufacturing” and the “other metal container manufacturing” industries. The P2 practice most commonly employed to reduce emissions of certain glycol ethers was improved maintenance scheduling, recordkeeping, or procedures (W13). The next most common P2 practices were the substitution of coating materials (W73) and modifying equipment, layout, or piping (W52). Specific P2 practices reported included reducing overuse of varnish by improving application with a narrowed gravure roll and reducing inside spray usage by more frequent equipment maintenance. The Minnesota company using this technique realized a 4% release reduction from 2009 to 2010. A facility in Ohio switched to using UV coatings for their products; these contain no glycol ethers and resulted in a 23% reduction in emissions from 2013 to 2014. When waste quantities were normalized relative to production for certain glycol ethers at both of these companies, the number of pounds reduced actually increased, indicating that emission reductions may have occurred as a result of pollution prevention practices at these facilities. Some facilities also reported working with suppliers to reformulate their paints and coatings to reduce the amount of glycol ethers in their products.

Specific industries most often reporting the release of n-butyl alcohol were the “metal can manufacturing” and the “electroplating, plating, polishing, anodizing, and coloring” industries. Again, the P2 practice most commonly employed to reduce emissions of n-butyl alcohol was improved maintenance scheduling, recordkeeping, or procedures (W13); no specific P2 practices were cited in this category. One Minnesota company reported changing from a spray coating to another system (W75), specifically converting their liquid coating operations to a powder painting process. They cited a 52% reduction in n-butyl alcohol emissions from 2009 to 2010. When waste quantities were normalized relative to production for n-butyl alcohol at this facility, the reductions in waste actually increased, which indicate that emission reductions may have occurred as a result of pollution prevention practices.

From 2009 to 2015, there were 726 TRI P2 entries showing release reductions in Region 5 states in the fabricated metal product industry sector. This represented data from approximately 227 facilities. These facilities reported a reduction of 2,582,563 pounds of toxic emissions. **Figure 9** shows how those release reductions break out by state; Ohio had the highest reductions in toxic emissions in this industry sector.

Specific subsectors reporting the highest reductions in releases were the “electroplating, plating, polishing, anodizing, and coloring” industry followed by the “metal coating, engraving (except jewelry and silverware), and allied services to manufacturers” industry. The most common P2 source reduction category reported by companies in the fabricated metal sector was that of “Good Operating Practices,” with “improved maintenance scheduling, recordkeeping, or procedures” (W13) being the most commonly reported P2 practice.

Figure 9. Release Reductions in the Fabricated Metal Sector (2009-2015) (in pounds)



Conclusion

The fabricated metal manufacturing industry has a large impact on both the economy and the environmental quality of states in the Great Lakes region. Although manufacturers in this sector are already using a variety of pollution prevention techniques, more can be accomplished to reduce emissions. Technical assistance programs can be a valuable resource to the fabricated metal manufacturing industry as it continues to find new ways to incorporate pollution prevention techniques into its processes and reduce emissions. By studying these data and comparing them across states, P2 TAPs may be able to identify practices used by companies in another state that can be applied to fabricated metal manufacturers in their own state. David Liebl of the University of Wisconsin's Solid and Hazardous Waste Education Center has authored a strategy for P2 TAPs that are interested in leveraging this data (Liebl, 2015).

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For More Information

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