

# Final report (October 2015- September 2016) for Pollution Prevention Information Network for the Great Lakes Regional Pollution Prevention Roundtable

**Submitted to U.S. Environmental Protection Agency**

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GREAT LAKES REGIONAL  
POLLUTION PREVENTION ROUNDTABLE

GLRPPR

# Contents

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GLRPPR Staffing Updates .....	1
Presentations and Publications.....	1
Outcomes from Previous Grant Years .....	1
National Activities .....	2
Assess Needs.....	3
Foster Collaboration & Broaden Impact.....	3
Develop & Deliver Training.....	4
Regional Activities.....	6
Foster Collaboration .....	6
Help TAPs Solve Problems .....	7
Analyze Regional Data and Develop Visualization Tools for TAPs.....	8
Develop Finding Aids & Share Information.....	9
LibGuides.....	9
Web Site and Social Media .....	9
E-mail Newsletters .....	10
Roundtable E-Mail List .....	10
Publication Downloads .....	12
Appendix A: Tableau Dashboard Examples .....	13
Greenhouse Gas Emissions in Region 5 States .....	13
P2 Practices in Region 5 States .....	15

The Great Lakes Regional Pollution Prevention Roundtable (GLRPPR) aims to strengthen environmental sustainability programs for the benefit of businesses, organizations, and government agencies throughout the Great Lakes regions of the U.S. and Canada. It accomplishes this by developing and promoting information tools and facilitating networking and training among pollution prevention technical assistance providers and companies. The Illinois Sustainable Technology Center (ISTC) is the host agency for GLRPPR. ISTC is a division of the Prairie Research Institute at the University of Illinois at Urbana-Champaign.

This report details GLRPPR's cooperative work with U.S. EPA Region 5, state pollution prevention technical assistance programs, and other P2Rx Centers under the Pollution Prevention Information (PPIN) grant program, which funds the P2Rx National Network. GLRPPR has been a member of P2Rx since that organization was established in 1997. GLRPPR partners with the other regional P2Rx centers on specific projects and on the general shared goal of improving networking and information dissemination among pollution prevention professionals nationwide.

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## GLRPPR Staffing Updates

Suma Vangala graduated in December 2015 and ceased work on the project. GLRPPR was unable to find another student to continue her work during the project period. Phyllis Bannon-Nilles retired from the State Universities Retirement System on April 29, 2016. She returned to work on September 12, 2016. ISTC's web developer left the organization in April 2016. Due to IT reorganization within the Prairie Research Institute, ISTC's parent organization, the position remains unfilled. This lack of institutional support has led GLRPPR staff to begin evaluating alternatives that require less programming expertise, which will most likely result in a platform migration in a future project year.

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## Presentations and Publications

In addition to GLRPPR's ongoing communication efforts, GLRPPR Executive Director Laura Barnes writes articles and gives presentations that contribute to GLRPPR's visibility as an organization. During this project period, she presented the following:

Barnes, Laura L. (2016). "Utilizing Public Data to Identify Technical Assistance Targets." Presented as a webinar for the Environmental Sustainability Resource Center (ESRC) Slides and webinar recording available at <http://www.glrppr.org/meetings/#data>.

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## Outcomes from Previous Grant Years

In March 2016, Jean Waters from P2RIC followed up with attendees of and presenters at the 2015 Triple Regional Pollution Prevention Roundtable to determine whether attendees changed their practices as a result of things that they learned at the conference.

John Steir and Ken Grimm, who conducted the craft brewery training, reported the following:

- Ohio EPA conducted two workshops in Cincinnati due to high nitrogen and phosphorus discharge in the water system from a handful of larger craft brewers. One workshop was held in conjunction with annual Ohio Craft Brew Week in Athens and another smaller one was held in Cincinnati in

August. Ohio EPA developed best management practices and is working on a fact sheet for craft breweries.

- There were several contributions made to the PPRC-led Brewery Topic Hub.
- John Steir provided assistance to Idaho DEQ with wastewater P2 ideas. Ken Grimm made the connection to Idaho DEQ.
- MnTAP promoted small brewery outreach by supporting an intern with the Antea group. The intern contacted breweries in Minnesota, compiled data for the national database, and worked with John Steir to conduct several on site assessments and then took that information out on his own. MnTAP has the intern [slides](#) and [project summary](#) available on their web site.
- Michigan is working on a similar program to Minnesota.

Other survey respondents also reported positive outcomes as a result of the conference.

- Based on a recommendation from Myla Kelly, MnTAP participated in the Tribal Lands Forum held in Minneapolis as an exhibitor. Unfortunately there were few tribal representatives from Minnesota at the event.
- During the conference, one of the innovative technical assistance practices reported by a Region 7 TAP involved shooting short videos of technical assistance clients discussing how they implemented their P2 projects. MnTAP subsequently developed a series of short case study videos with companies that participated in their Safer Products that Work project. Laura Babcock, MnTAP's Executive Director, reported that the brainstorming at the conference helped MnTAP connect the dots to come up with a way to deliver small bites of training to companies who are more inclined to learn visually, rather than from a manual or a fact sheet. The videos and other project materials are available on the [MnTAP web site](#).
- The Schlafly brewery sustainability director has a different job. They reported that they are continually working on improvements in their processes but they did not attribute any specific environmental outcomes to the training held at their facility.
- Two manufacturers who attended the P2 and Lean training reported they benefited from the workshop but were unable to devote resources to making changes in their operations at this time.
- The Green Business Engagement National Network (GBENN) is moving forward with a national meeting at the Missouri Botanical Garden (MoBot) in October 2016. The connections for this event were made at the Triple Regional Roundtable, as reported by Cassie Carroll of Illinois and Jean Ponzi of MoBot. Emily Backus, attendee from Denver, is now on the GBENN leadership committee.
- Audree Miller of Arkansas DEQ began a P2 Intern program for her state after attending this roundtable.

## National Activities

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This section describes GLRPPR's collaboration with the other P2Rx Centers to share expertise and program experiences relevant to other regions. These activities build capacity among the P2Rx Centers and their region's technical assistance providers by leveraging resources and building connections that help to advance progress toward EPA's strategic goals.

## Assess Needs

During the first part of the project period, GLRPPR shared with ESRC and P2RIC the questionnaire and results from the needs assessment conducted in 2014-2015. Based on those resources, P2RIC launched their own OMB approved survey in April. P2RIC shared the survey instrument, OMB approval forms, and results with GLRPPR. During the next project period, GLRPPR intends to do a follow-up to their previous needs assessment to measure the usefulness of GLRPPR's tools and resources, including LibGuides, Help Desk Librarian, Sector Resources, and e-mail newsletters.

### ***P2 Impact Amplifies Tennessee Materials Reuse Project***

*Vaughn Cassidy, an Environmental Specialist with the Office of Sustainable Practices in the Tennessee Department of Environment and Conservation, wrote a P2 Impact piece that appeared on March 24, 2016. The column explained how taking a closer look at the waste from four big industrial sectors in the state helped companies exchange waste materials.*

*On March 29, he reported that he had already received calls asking about the project. He stated that he received inquiries from Yale University and Complete Recycling in California.*

*This is one example of how the P2 Impact column amplifies the impact of a single project by increasing exposure of these practices to a more general business audience.*

GLRPPR's executive director continues to assess regional needs by participating in Region 5's EPA/State Dialog calls, monthly P2Rx Administrative calls, and regular check-in calls with Region 5's P2 coordinator. These activities not only keep her informed about regional needs but also provide her with the opportunity to learn about what other programs are doing and pass that information along to Region 5's TAPs.

### **Foster Collaboration & Broaden Impact**

During the project period, Laura Barnes, GLRPPR's Executive Director, participated on the P2Rx Marketing and Executive Committees. She continues to coordinate the P2 Impact column for GreenBiz.com. Seven columns were published during the project period. They are available at <https://www.greenbiz.com/blogs/enterprise/p2-impact>. The column is a valuable way to amplify the impact of a single pollution prevention project by increasing its exposure to a more general business audience.

In March 2016, GLRPPR hosted representatives from seven of the eight P2Rx Centers at their annual meeting in Chicago. P2 staff from Region 5 also attended the two-day meeting. The Center Directors discussed current projects, ideas for future

collaboration, and techniques for capturing outcome measurements from their work.

Beginning in April 2016, Laura Barnes had several conversations with Jeff Kohn, one of the leads on EPA's food manufacturing NEA, about how best to coordinate and amplify the impact of best P2 practices among food processors with state P2 programs. These conversations resulted in Kohn and his intern submitting a P2 Impact column on the results of some of their analysis of Toxics Release Inventory emissions and P2 data for the food processing sector. GreenBiz published the column in November 2016. Kohn has also participated in calls with the P2Rx Centers to discuss the work his group is doing with the food manufacturing sector and how the P2Rx centers can assist with broadening the impact of that work.

In September 2016, Laura Barnes, along with representatives of seven other P2Rx centers, attended the EPA-State Pollution Prevention Dialog in Philadelphia. The meeting provided excellent opportunities to learn about innovative programs in other parts of the country; better understand the barriers that P2 TAPs face when trying to provide service to businesses; provide input on EPA's P2 grant process; explain how the

P2Rx Centers can help EPA and P2 TAPs amplify the impact of their projects by broadening their reach when communicating results; and emphasize the role of the P2Rx Centers as curators, connectors, and conveners. It also gave P2Rx Centers the opportunity to remind the state TAPs and EPA about the resources and services that they offer, including P2Tech, the P2 101 LibGuide, P2 InfoHouse, regional meetings, and the Zero Waste Case Study Database.

## Develop & Deliver Training

During this project period, GLRPPR worked with P2RIC, Peaks to Prairies Regional Information Center, the Minnesota Technical Assistance Program (MnTAP), and the Minnesota Pollution Control Agency (MPCA) to plan a Triple Regional Pollution Prevention Roundtable meeting to be held in Minneapolis from May 2-4, 2017.

As a result of the planning calls held to date, the committee has chosen the Minneapolis Public Library as the venue. The committee has also discussed ideas for conference content. The committee surveyed their region's TAPs to obtain feedback about topics of interest for them. Based on these results, they developed the following preliminary agenda:

- Tuesday afternoon
  - Optional site visit to EcoLab. MPCA is assisting with arrangements for this tour.
  - Wednesday (full day) will consist of facilitated interaction for P2 technical assistance professionals (David Carter of Kansas State University's Pollution Prevention Institute has been invited to facilitate.)
    - During the morning session, participants will share the essential elements of their successes (or failures). Each program will provide an example of: Barriers; Benefits; Best Program Practices; P2 Policies; P2 Implementation; P2 Measurement; Innovative Program Delivery; and Funding/Partners.
    - In the afternoon, questions about the topics or processes identified from the morning presentations will be offered at individual tables for three 45-minute discussion sessions followed by a full group summary with take-aways for training needs, policy changes, group actions, workgroups, follow-up conference calls, and ways P2Rx Centers can help.
- Thursday will consist of interactive mini-workshops of two hours each, covering several topics. The committee expects TAPs to leave with specific ideas/plans for their programs. These workshops will be offered sequentially.
  - Engagement workshop (provides for amplification of P2) (P2RIC lead with Peaks to Prairies assisting with tribal engagement)
    - Market Research
    - Diffusion of Innovation
    - Behavior change
    - Intern programs
    - Example case studies
    - Tribal engagement
  - Toxics Use Reduction/Material Substitution: How To Do It (MnTAP lead with assistance from the Minnesota Green Chemistry Group).
    - TSCA
    - Toxics Use Reduction

- Behavior change
  - Example case studies
- Hands-on Tools (To be held in the library’s computer lab after lunch. The conference committee will encourage people to bring their laptops to ensure enough equipment) (GLRPPR lead; Laura Barnes will facilitate.)
  - Laura Barnes will construct a LibGuide to provide context about these tools. She will also develop a “scavenger hunt” to help people learn to use the tools. Finally, she will construct short instructional videos that will be embedded into the LibGuide. The workshop attendees will be asked for feedback on the LibGuide and the videos. Tools covered may include:
    - TURI substitution database
    - Case Study database
    - TRI P2 tool
    - EPA GHG Web tool
    - EPA EJ Screen
    - EPA P2 calculator
    - ECHO
    - GLRPPR’s ArcGIS based tool (beta)?
    - Others?
- The committee is also considering whether to offer a P2 101 workshop as an option for people new to the field. We would either offer this concurrently with Ecolab tour on Tuesday afternoon or the hands-on workshop on Thursday.
  - Exercise using green square game or Play-Doh Fun Factory?
  - Basics of P2 site visit
  - Resources on the web

In order to facilitate outcomes measurement, the committee intends to ask registrants several pre-test questions to gauge their knowledge prior to attending the conference. They also intend to ask what calculators/tools they currently use and whether they have questions that they need answered or resources that they are unable to locate.

In collaboration with ESRC, Laura Barnes presented a training webinar to TAPs in EPA Regions 3 and 4. Entitled “Utilizing Public Data to Identify Technical Assistance Targets,” the training introduced attendees to tools for downloading data from EPA’s Toxics Release Inventory, Greenhouse Gas (FLIGHT) Inventory, and Enforcement and Compliance History Online (ECHO) database, as well as the Census Bureau’s County Business Patterns dataset. Seventeen people attended the webinar live. The archived webinar is available on the [ESRC web site](#). There is also a link on the GLRPPR web site from the Conference and Webinars page. There have been 50 views of the archived video on YouTube and 148 on the ESRC web site since it was posted in mid-March. According to the post-webinar survey administered by ESRC, seven of the nine respondents intended to use information presented in the webinar when they prepared their P2 or SRA grant applications.

In March 2016, Laura Barnes conferred with EPA’s Safer Choice program contacts about the possibility of hosting a webinar on the program. After discussion, the group decided that a better strategy is to publicize the availability of an archived recording of a Safer Choice webinar hosted by ESRC for Region 3 and 4 TAPs.

GLRPPR also agreed to continue to promote Safer Choice resources and partner with the program on their Spring Cleaning social media/e-mail blast push. In April 2016, GLRPPR distributed e-mail about the program to the Roundtable and P2Tech e-mail list. GLRPPR also sent an e-mail blast to its MailChimp subscriber list. Finally, GLRPPR also tweeted several messages about the Safer Choice Program during the week of April 4.

The Lean and Pollution Prevention training scheduled for July 27, 2016 in Chicago was cancelled due to low registration. Although both Zero Waste Network and GLRPPR staff worked diligently to promote the event, there was not enough interest from food processing trade associations to encourage attendance. GLRPPR staff learned from some of the state TAPs that the food manufacturing sector can be difficult to engage. Their primary emphasis is on food safety, which makes them reluctant to make process or chemical changes to improve environmental performance. We would like to try to offer the training again within the region. If we do, we intend to market it more widely to other industry sectors, in addition to food manufacturing.

#### **GLRPPR Contributes to Successful Safer Choice Media Campaign**

*GLRPPR's MailChimp e-mail blast was distributed to 285 recipients. It had an open rate of 20.5% (above the industry average) and a click rate of 2.1% (at the industry average). GLRPPR had four retweets and seven Likes of Safer Choice posts on Twitter during the campaign week. On Facebook, GLRPPR showed a reach of 49 on Safer Choice posts for the campaign week. That's significantly higher than most of GLRPPR's Facebook posts.*

*As a result of the Spring Cleaning education event on social media, U.S. EPA Region 5 reported reaching 14,473 Twitter users, 3,931 Facebook followers, and 17,075 listserv subscribers. Nationally, the Safer Choice website observed a 60% increase in activity during that week.*

## Regional Activities

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### Foster Collaboration

GLRPPR hosted a half-day meeting in Chicago on July 26, 2016. Eight people attended in person (three from state TAPs, one from GLRPPR, and four from U.S. EPA Region 5). One person (state TAP) attended via conference call. The programs in attendance gave updates. EPA distributed feedback received from the states in advance of the EPA/State P2 Dialog meeting. The participants discussed a wide range of issues, including barriers to technical assistance efforts and how EPA might be able to assist with overcoming them.

During the project period, Laura Barnes participated in the planning of Michigan DEQ's first sustainability conference. In conjunction with the event, GLRPPR held a second half-day meeting in Grand Rapids, MI. The GLRPPR meeting was attended by ten people (seven from state TAPs, one from GLRPPR, one from U.S. EPA Region 5, and one from industry). Each program gave an update. The discussion revealed a number of common themes. Michigan DEQ is particularly interested in working on customer engagement, which is why they have begun offering monthly sustainable business webinars and organized their conference. Ohio EPA is organizing a similar sustainable business conference to be held in 2017. Ohio EPA has also added a platinum level to their E3 performance track program, which will focus on the social part of the Triple Bottom Line. Although both programs still offer pollution prevention services, they have shifted their marketing efforts toward sustainable business and compliance assistance. Both programs expressed

interest in GLRPPR's continued efforts to analyze public data. Michigan DEQ was particularly interested in state level analyses. Karen Edlin reported that the agency had hired someone to mine public data to assist with targeted technical assistance efforts but the position was eliminated due to budget cuts.

## Help TAPs Solve Problems

GLRPPR received ten requests for information during the project period. Follow-up with the requesters yielded the following responses:

- As part of their work with craft breweries, Michigan DEQ requested assistance with recycling options for grain and hops bags. Laura Barnes provided several examples of how breweries are reusing these bags. She also suggested contacting Michigan Agricultural Extension because grain bag recycling is also an issue for farmers. When Barnes followed up with Michigan DEQ, Devan Dodge reported that, although the information GLRPPR provided was a good start, the brewers were still seeking solutions that will work for them.
- A staff person from U.S. EPA Region 5 requested information on case studies on P2 approaches or P2 Best Management Practices for several chemicals in different sectors. Laura Barnes did a literature search and compiled the results into a report entitled *Best Practices for Methylene Chloride, TCE, and Methyl Chloroform in the Metals, Pharmaceutical, and Hot Mix Asphalt Sectors*. When Barnes followed up, the staff member replied, **"A great deal of the information from references you provided, as well as information from other sources (i.e. EPA documents and factsheets) was incorporated into the attached "Safer Alternatives for Solvent Degreasing Applications" document, for a Region 5 ARD Project. This document is a summary of examples and resources of safer surface cleaning operations in the metal fabricating sector. Your assistance is very much appreciated by the project team."**
- A business development manager from a grain company sought information on the market feasibility of replacing micro-beads with milled corn cobs and assistance with companies with whom he might try to connect. Laura Barnes sent him links to several articles relating to plastic microbeads in cosmetics and the market for alternative additives. When Barnes contacted him to inquire about outcomes, he replied, **"We have connected with several major manufacturers and are in an exploratory phase with several of them. While there haven't been any homeruns yet, it's too early. Your information was very helpful in pointing us in the right direction. Your help was/is appreciated."**
- A project manager from the Illinois Department of Commerce and Economic Opportunity's Small Business Environmental Assistance Program requested assistance on behalf of a funeral home that wanted to install a crematory but was meeting resistance from community members who were concerned about mercury emissions from the unit. She sought information on studies that discussed actual emissions from crematory units. The company was in compliance but wanted to help the community better understand their process and potential emissions. When Barnes followed up with the project manager to inquire about outcomes, she replied, **"I forwarded your information to a group of crematories that were working to raise awareness in their communities of the potential mercury emissions from their facilities. I am not sure how they then used that information, but I can say that it was helpful to have the articles to share with them."**

## Analyze Regional Data and Develop Visualization Tools for TAPs

Environmental data can be a powerful tool to help P2 TAPs decide where to focus their efforts, as well as to highlight areas where further research efforts are needed. In an effort to develop a regional baseline of the manufacturing industry's impact on U.S. EPA Region 5's environment and economy, GLRPPR collected data on their emissions, economic impact, and pollution prevention practices. Further details about the project are available in GLRPPR's final grant report for FY 2015.

In December 2015, GLRPPR published *Spotlight on U.S. EPA Region 5's Food Manufacturing and Processing Industry*. It is available for download at <http://hdl.handle.net/2142/88688>. The publication was subsequently included on [EPA's resources page for the Food Manufacturing P2 National Emphasis Area](#). Since the publication was deposited in IDEALS, the University of Illinois' institutional repository, it has been downloaded 429 times.

Near the end of the last project period, GLRPPR solicited feedback on the final data report from TAPs and U.S. EPA staff. A PDF of the draft publication was submitted with GLRPPR's final project report for federal FY 2015. During this project period, GLRPPR staff made changes based on that feedback. In July 2016, GLRPPR published [The Economic and Environmental Impact of Great Lakes Manufacturing: Snapshot of Emissions, Pollution Prevention Practices, and Economic Impact Using Public Data](#). Since the publication was deposited in IDEALS, the University of Illinois' institutional repository, it has been downloaded 154 times.

GLRPPR staff have developed a data summary fact sheet for Illinois using Tableau dashboards and visualizations. The draft is currently being revised and updated with 2014 data. This fact sheet will serve as a template for the remaining states in Region 5. These fact sheets will be completed and published during the first quarter of 2017.

GLRPPR project staff have developed several draft dashboards in Tableau. These are included in Appendix A. They have also developed a trial data slicer tool in Excel that allows users to visualize data by state, facility, and W code designation. The draft of the data slicer tool was sent to EPA with the six month progress report. These visualizations and the data slicer tool will be updated with 2014 data and published in the first quarter of 2017. During the

### **Ohio EPA Uses GLRPPR Data to Target Technical Assistance**

*In April 2016, during a quarterly call between Ohio EPA and U.S. EPA Region 5, Christine Anderson asked if OEPA had considered contacting past E3 winners and supporting them to enter their detailed P2 implementation activities into the TRI database (for those winners that are TRI reporters). Current P2 implementation data in TRI may lack the level of detail needed for other businesses to duplicate and implement.*

*Anderson had previously discussed the need for generating more detailed P2 information in TRI with Laura Barnes of GLRPPR. Barnes suggested starting with TRI reporters that already have a good relationship with TAPs (such as those built through achievement and recognition programs). OEPA agreed that good relationships are critical for this type of collaborative work and could be a good practice for OEPA to consider with its award winners.*

*Anderson mentioned the TRI analysis done by GLRPPR was very informative and complements this type of work. OEPA agreed and found having data sorted by NAICs in GLRPPR's TRI analysis to be especially helpful for making P2 connections.*

*From this conversation, it is clear that some of the state TAPs in Region 5 are using the information provided in GLRPPR's data analysis and finds continued work in this area to be useful.*

next project period, GLRPPR will collaborate with the Illinois State Geological Survey to develop a web tool for analyzing these data sets using ArcGIS.

## Develop Finding Aids & Share Information

### LibGuides

LibGuides is a tool that the University of Illinois Library provides for developing web-based subject guides. Usage statistics for GLRPPR’s LibGuides during the project period appear in Figure 1. Laura Barnes has also developed a number of LibGuides in her role as ISTC’s Sustainability Information Curator. Links to these guides are included in the appropriate sector resources on the GLRPPR web site and on the [Topic Hubs](#) page of GLRPPR’s web site. During the project period, Laura Barnes updated the P2 101 LibGuide by adding Safer Choice resources to the Green Chemistry topic page and compiling a linked list of EPA Sector Notebooks, which EPA/State P2 Dialog meeting attendees characterized as a useful resource identified as useful at the. She also corrected broken links in the P2 101 LibGuide and and P2 in Arts Education Topic Hub. Link checking for the LibGuides is an ongoing process that will continue during the next project period.

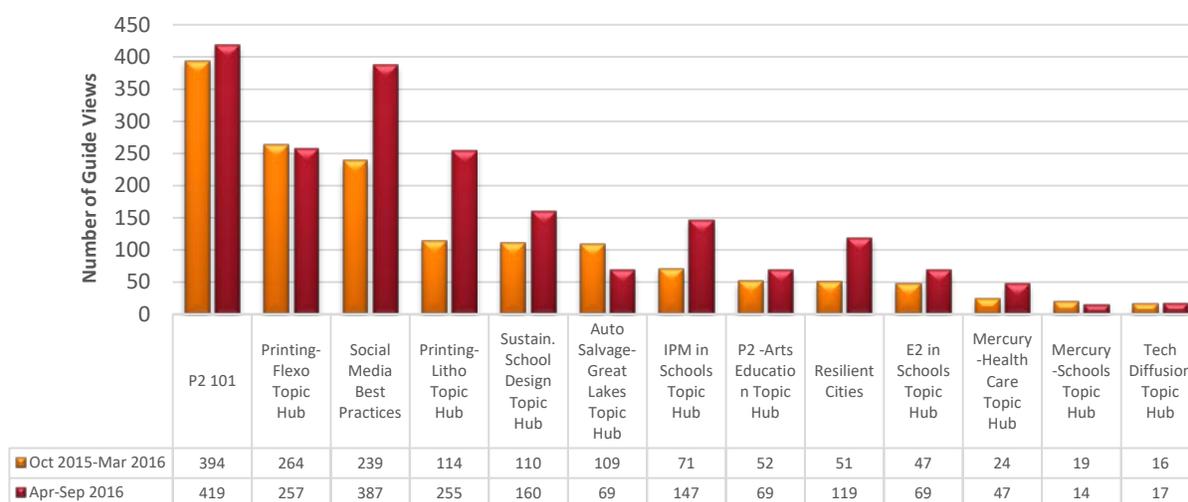


Figure 1: LibGuide Analytics

### Web Site and Social Media

[GLRPPR’s web site](#) is the information hub of the organization. Content added to the web site is also distributed through social media accounts and the MailChimp e-mail newsletter. Services available through the web site include a blog; sector resources and topic hubs; an event calendar; funding opportunities; a help desk librarian service; a webinar archive; and a contacts database. Web analytics for the reporting period appear in Table 1. Traffic to GLRPPR’s web site comes from several different sources. Figure 2 illustrates how users come to visit the web site.

Table 1: GLRPPR Web Site Analytics	
Total site visits	10,761
Total page views	20,195
New visitors	8,663
Returning visitors	2,205

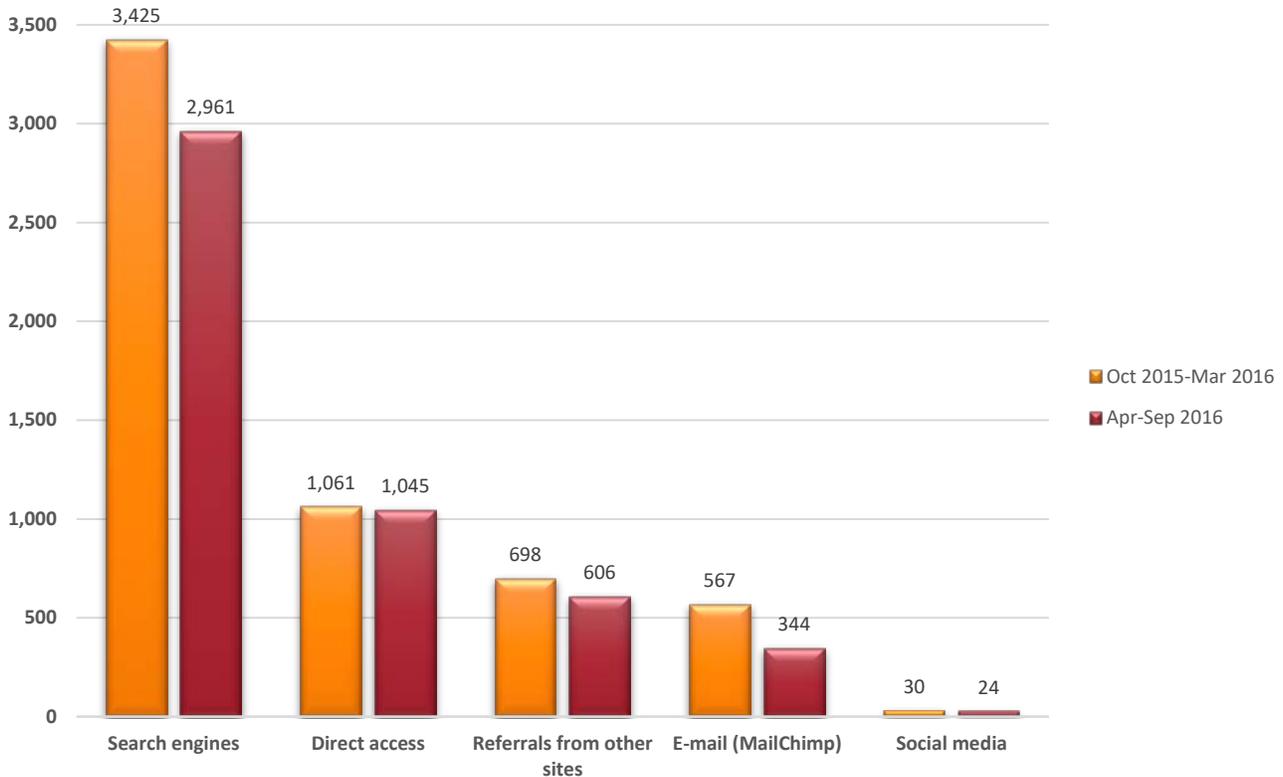


Figure 2: Web Site Referral Traffic Sources

### E-mail Newsletters

GLRPPR uses [MailChimp](#) to publish a twice-weekly newsletter to highlight new publications, events, funding opportunities, blog posts, and news items added to the GLRPPR web site. Each newsletter is archived on the GLRPPR web site at <http://www.glrppr.org/newsletter>. GLRPPR also publishes a monthly newsletter to highlight upcoming training opportunities, conferences, and webinars.

The 95 newsletters sent during the project period generated 911 visits to the GLRPPR web site (8% of total site traffic), with an average visit duration of 1:53 (minutes:seconds). The site average for the period was 1:16.

The twice-weekly newsletters sent during the reporting period had an average open rate of 16.02% and an average click rate of 5.40%. The events newsletters had an open rate of 20.42% and a click rate of 4.12%. MailChimp’s average for the educational industry is a 16.59% open rate and a 2.3% click rate. GLRPPR’s open rate is slightly below the industry average for the New on the Web Site newsletter and above average for the events newsletter. The click rate for each is significantly higher than the industry average. The web site update mailing is sent to 274 subscribers and the monthly events mailing is sent to 980 subscribers.

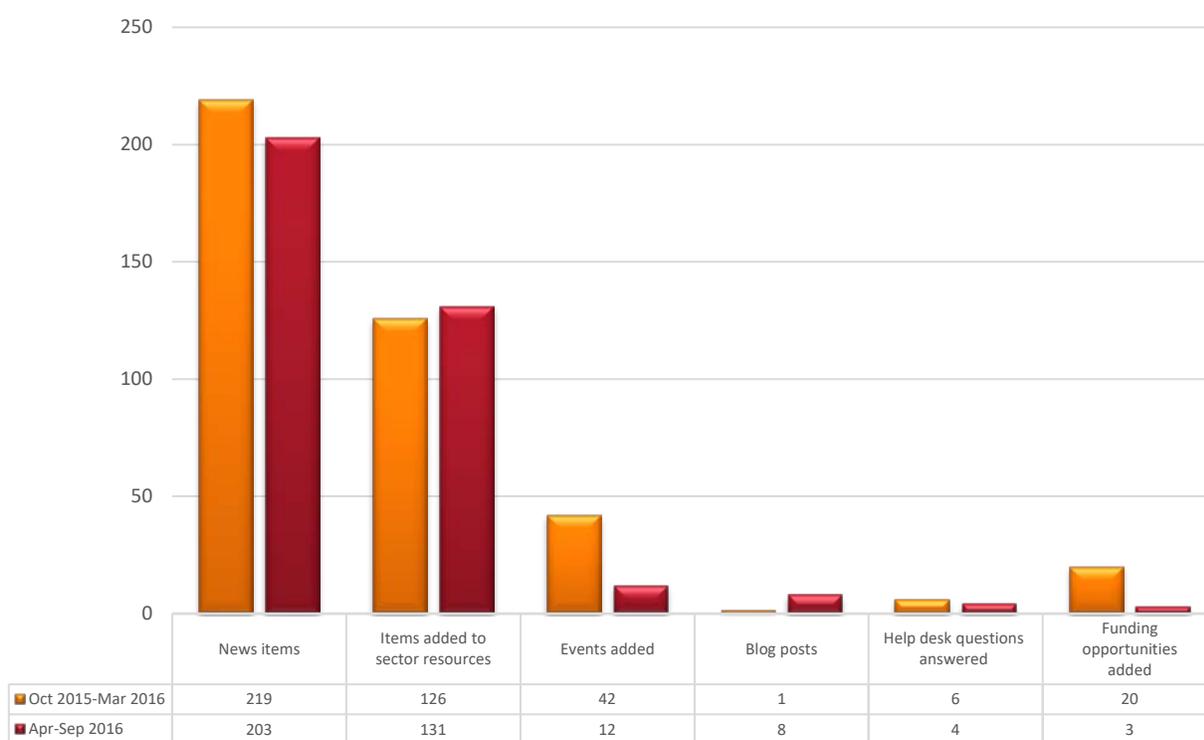
### Roundtable E-Mail List

GLRPPR maintains the Roundtable e-mail discussion list through the Great Lakes Information Network (GLIN). The list currently has 302 subscribers. Subscribers can use the list to ask questions, promote events and resources, and discuss issues of interest to the region by sending a message to [roundtable@great-lakes.net](mailto:roundtable@great-lakes.net). However, the list is primarily used by GLRPPR staff to distribute information of interest to subscribers. During the project period, Laura Barnes forwarded 76 messages to the list. Topics included:

- webinar and training announcements;
- calls for abstracts and papers for upcoming conferences;
- Safer Choice information;
- announcements about new publications; and
- P2 Impact Call for Authors.

GLRPPR staff would like to increase engagement on the part of list members and welcomes suggestions for doing so.

Blog posts and items added to news, events, and sector resources are also distributed through GLRPPR’s Facebook and Twitter feeds. Statistics for the number of specific items added to GLRPPR’s web site during the reporting period appear in Figure 3. There are currently 86 people following GLRPPR on Facebook and 316 on Twitter. Topics of blog posts ranged from funding opportunities to webinar announcements to information about new resources relevant to the P2 TAP community.



**Figure 3: New Content Posted to GLRPPR Web Site**

GLRPPR staff continue to do basic maintenance on GLRPPR’s Sector Resources collection, correcting broken links and deleting any records that could not be fixed. They are also conducting a comprehensive gap analysis of existing sectors to locate more recent information for sparsely populated sectors. During the project period, fourteen sectors were reviewed for broken links and outdated information. 237 links were fixed and 83 entries were deleted during the project period. GLRPPR staff have also focused on adding additional case studies to the sector resources collections. Having hourly employees working on the project enable GLRPPR staff to keep up with link checks and other changes to make sector resources more usable for visitors to the web site. During the next project period, GLRPPR staff will focus on some of the larger sectors to see if they can be migrated to LibGuides or reorganized to make them more usable.

GLRPPR maintains a [YouTube channel](#), which includes archives of its webinars. GLRPPR's webinars were viewed 298 times during the reporting period. **The most watched video was the recording of the BPA in thermal paper webinar.** To increase visibility of this video collection, GLRPPR plans to embed these videos and display them prominently on the GLRPPR web site.

### Publication Downloads

GLRPPR has five collections in the University of Illinois' IDEALS repository. Links to the collections are included on the GLRPPR web site.

The Reports and White Papers collection (<https://www.ideals.illinois.edu/handle/2142/74805/>) includes documents produced by GLRPPR. The collection currently has three documents, which were downloaded 1,246 times during the reporting period. Links to these documents are available on the front page of the GLRPPR web site. They are included in GLRPPR's sector resources collection. **The top downloaded documents in the collection during the reporting period were *Ammonia, Hydrochloric Acid, Hydrogen Sulfide, N-hexane, Nitric Compounds, and Sulfuric Acid in the Food Processing Industry* (455 downloads) and *Spotlight on U.S. EPA Region 5's Food Manufacturing and Processing Industry* (379 downloads).**

The Articles collection (<https://www.ideals.illinois.edu/handle/2142/46563/>) includes materials written about GLRPPR for other publications. There are currently two items in this collection. They were downloaded 299 times during the project period. **The top downloaded article (129 downloads) was "P2Rx Centers Provide Technical Assistance, Training, and Information to Help Businesses Go Green and Improve Their Bottom Line."**

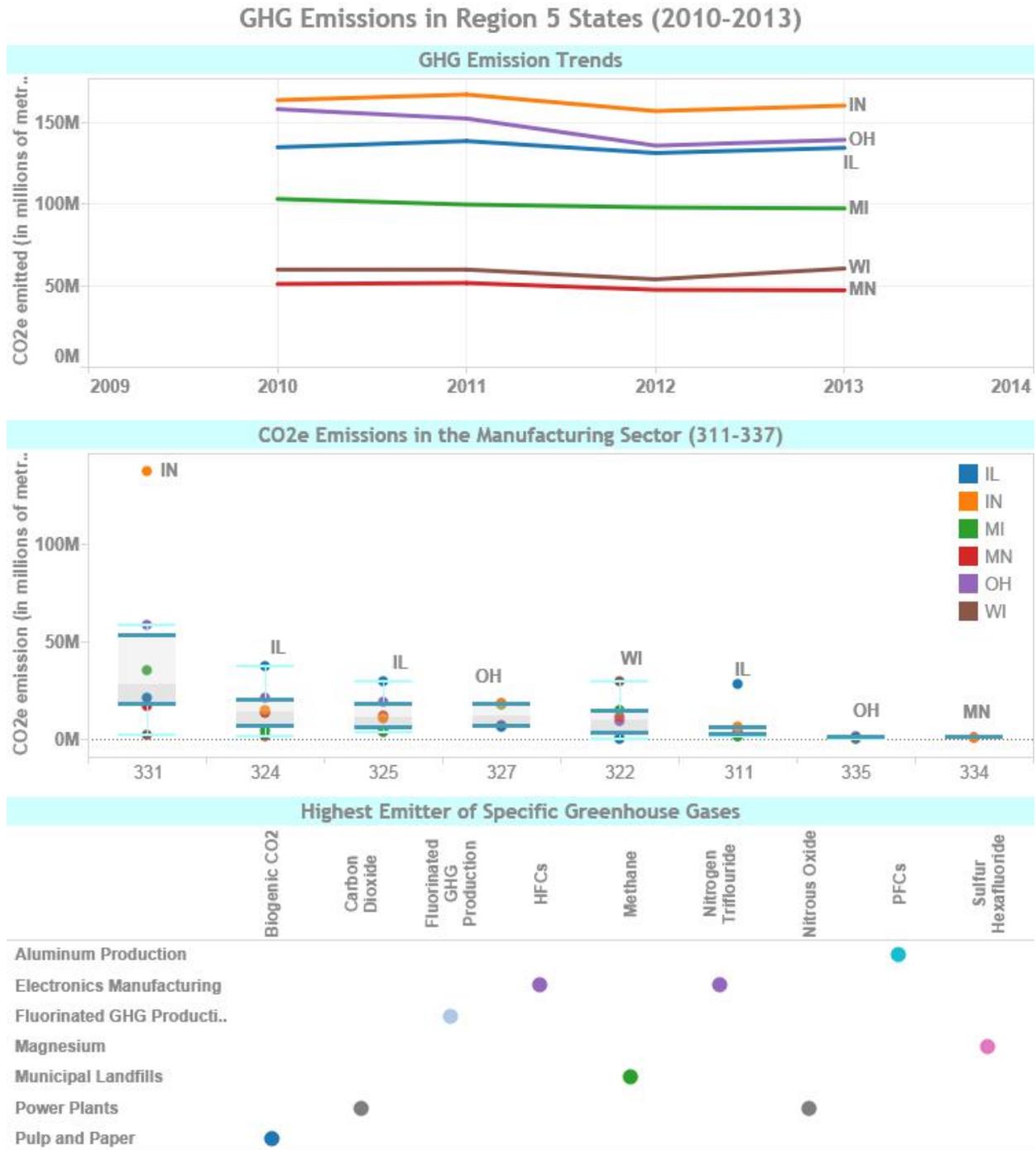
The Presentations collection (<https://www.ideals.illinois.edu/handle/2142/33745>) includes PDFs of slide decks from GLRPPR webinar presenters. There are twelve items in the collection. There were 1758 downloads from this collection during the reporting period. **The top two downloaded presentations were "Green Libraries: Getting Started" (453 downloads) and "Do you want your receipt? BPA and BPS in thermal paper" (160 downloads).**

The Newsletters collection (<https://www.ideals.illinois.edu/handle/2142/695>) includes PDFs of GLRPPR's print newsletter The Link, which ceased publication in 2008. The collection contains 31 documents. There were 1,891 downloads during the reporting period.

The Project Reports collection (<https://www.ideals.illinois.edu/handle/2142/48720>) includes PDFs of GLRPPR's progress and annual grant reports. During the reporting period, there were 513 downloads from this collection. We will continue to add reports to this collection to help keep our members informed about our efforts.

# Appendix A: Tableau Dashboard Examples

## Greenhouse Gas Emissions in Region 5 States



GHG emissions in the Region 5 states mirrored the pattern of overall chemical emissions, with Indiana reporting the highest emissions numbers, followed by Ohio, Illinois, Michigan, Wisconsin, and Minnesota.

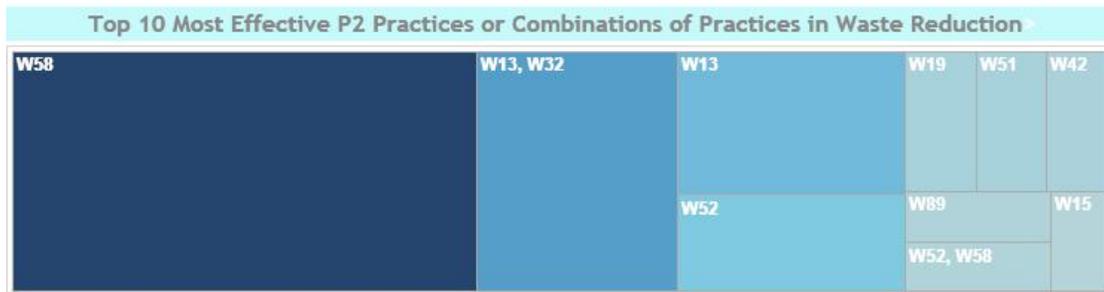
GHG emissions decreased slightly in Region 5 in 2012, then rose again in 2013 in all states except for Michigan and Minnesota.

In industries classified in NAICS codes 311 through 337 (manufacturing sector), the primary metals industry was the highest emitter of CO<sub>2</sub>e. Indiana was the highest overall emitter of CO<sub>2</sub>e. Illinois was the highest GHG emitter in the petroleum, chemical, and food processing industries. Ohio led GHG emissions in the nonmetallic minerals and electrical equipment industries. Wisconsin was the highest emitter in the paper industry. Minnesota was the highest emitter in the computer and electronics industries.

Power plants emitted the most carbon dioxide and nitrous oxide (CO<sub>2</sub> also comprises the bulk of all GHG emissions). The electronic manufacturing industry (NAICS 335) was the highest emitter of both HFCs and nitrogen trifluoride. The pulp and paper industry (NAICS 322) was the highest emitter of biogenic CO<sub>2</sub>.

## P2 Practices in Region 5 States

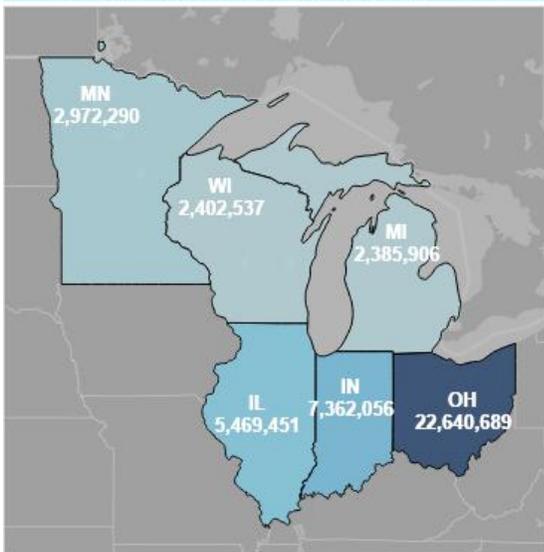
### P2 Practices in Region 5 States (2009-2013)



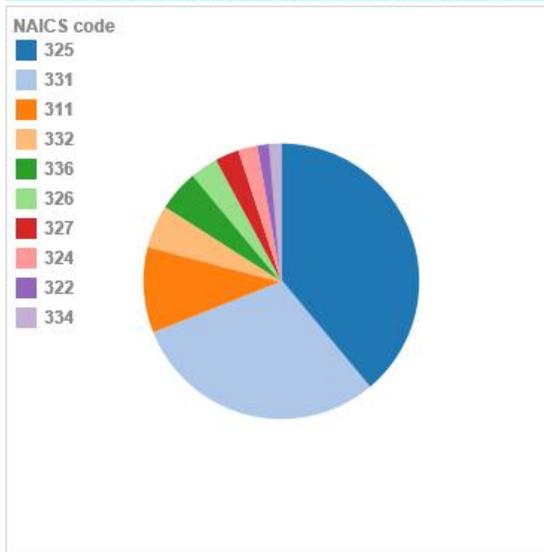
### Most Prevalent Source Reduction Category Used by Industry Sectors

Source Reduction Category	NAICS code																	
	311	312	313	316	321	322	323	324	325	326	327	331	332	333	334	335	336	337
Good Operating Practices	27	1	2	2	3	22	25	33	594	98	18	213	235	32	35	41	58	53
Process Modifications	51			1	12	86	13	61	319	97	22	58	102	21	49	53	90	51
Raw Material Modifications	15		4	1	7	14	18	4	185	79	19	60	55	19	46	19	43	13
Spill and Leak Prevention	19				1	4		30	255	16	6	43	50	7	5	27	8	35
Inventory Control	2						2	4	212	27	5	6	38	4	6	5	10	
Product Modifications	4			3	17	3	14	4	95	19	16	9	27	16	38	4	23	13
Surface Preparation and Finishing			1		2				2	26	3	41	28	13	9	20	29	27
Cleaning and Degreasing	8							1	68	5	3	5	43	1	6	1	22	

### Comparison of Waste Reduced by State



### Top 10 Industry Sector Waste Reducers



Process modifications and good operating practices are the most commonly reported P2 practices or combinations of practices in the TRI P2 data, both when considering reported practices and practices associated with reported reductions. P2 practices in these source reduction categories tend to be easiest and least expensive to implement, so companies usually start with them. For example, over 13.5 million pounds were reduced by a combination of P2 practices categorized as process modifications. These include efforts like modifying equipment layout/piping or instituting recirculation within a process. Almost 4.5 million pounds were reduced by good operating practices, which include improved maintenance scheduling, recordkeeping, or procedures, and introducing an in-line product quality monitoring or other

process analysis system. Over 800,000 pounds were reduced by raw material modifications and almost 700,000 pounds by product modifications. In addition, almost 4.5 million pounds were reduced by facilities that used a combination of good operating practices and spill and leak prevention. Although good operating practices are among the easiest to implement, a recent paper in *Environmental Science & Technology* ([Ranson, et al, 2015](#)) concluded that good operating practices were actually one of the least effective source reduction techniques, while process modifications ranked in the middle range of effectiveness.

The industry sectors most effective at reducing releases of chemicals were generally also the highest emitters. Of the top five emitters, four of them also ranked in the top five waste reducers. They were chemicals, primary metals, food, and fabricated metals. The only major difference was that instead of the paper industry, the transportation industry reduced more waste by using P2 practices.

Among the Region 5 states, companies in Ohio reduced chemical emissions (in pounds) the most, followed by Indiana, Illinois, Minnesota, Wisconsin, and Michigan. Note that Minnesota had the lowest overall emissions among the Region 5 states and still managed to rank fourth among the states in greatest reductions of chemical releases.