Pollution Prevention (P2) Spotlight

REDUCING SOLVENT USE

Overview of Organic Solvents

Organic solvent chemicals are widely used in a variety of industrial operations. In sectors that manufacture metal parts, solvents are used to dissolve and remove unwanted material from parts during cleaning and degreasing. Solvents are also used as carrier chemicals in the application of paints and coatings.

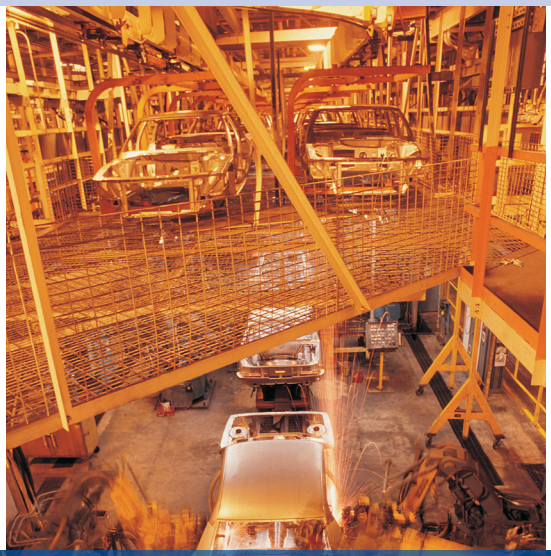
Many organic solvent chemicals evaporate readily, creating the potential for worker or public exposure to these chemicals. Per the TRI listing criteria, solvents included on EPA's Toxics Release Inventory (TRI) cause one or more of the following: cancer or other chronic human health effects; significant adverse acute human health effects; and/or significant adverse environmental effects.

Review of TRI Data

Many facilities have implemented pollution prevention (P2) practices to reduce solvent use and waste generation in both cleaning and coating applications. This P2 Spotlight presents examples of P2 success stories for solvents as reported to EPA's TRI Program, with a focus on sectors working with metal parts including:

- fabricated metal product manufacturing (NAICS* code 332);
- automotive manufacturing (NAICS 3361, 3362 and 3363); and
- aerospace manufacturing (NAICS 3364).

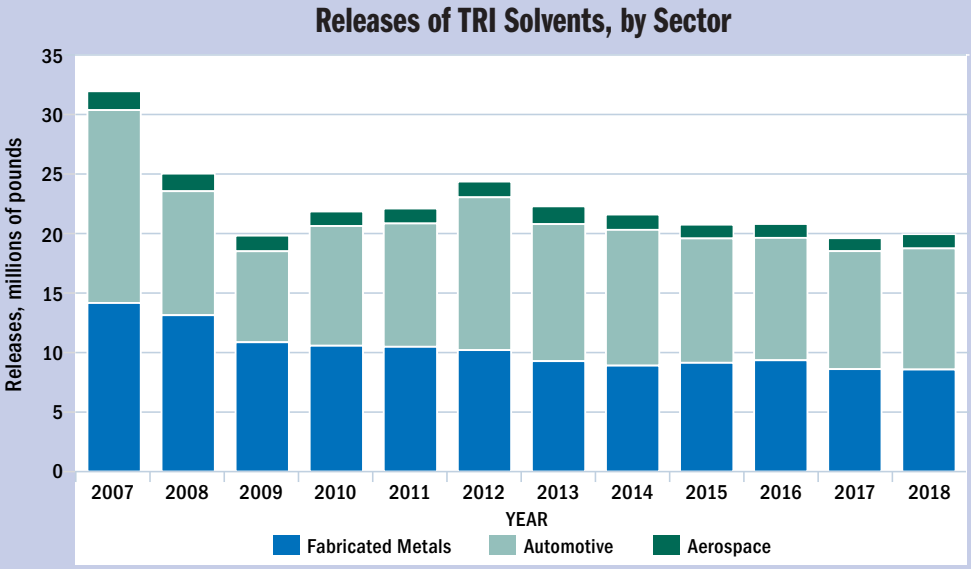
*North American Industry Classification System sector designation



Find more P2 examples using the P2 Search Tool at: www.epa.gov/tri/p2

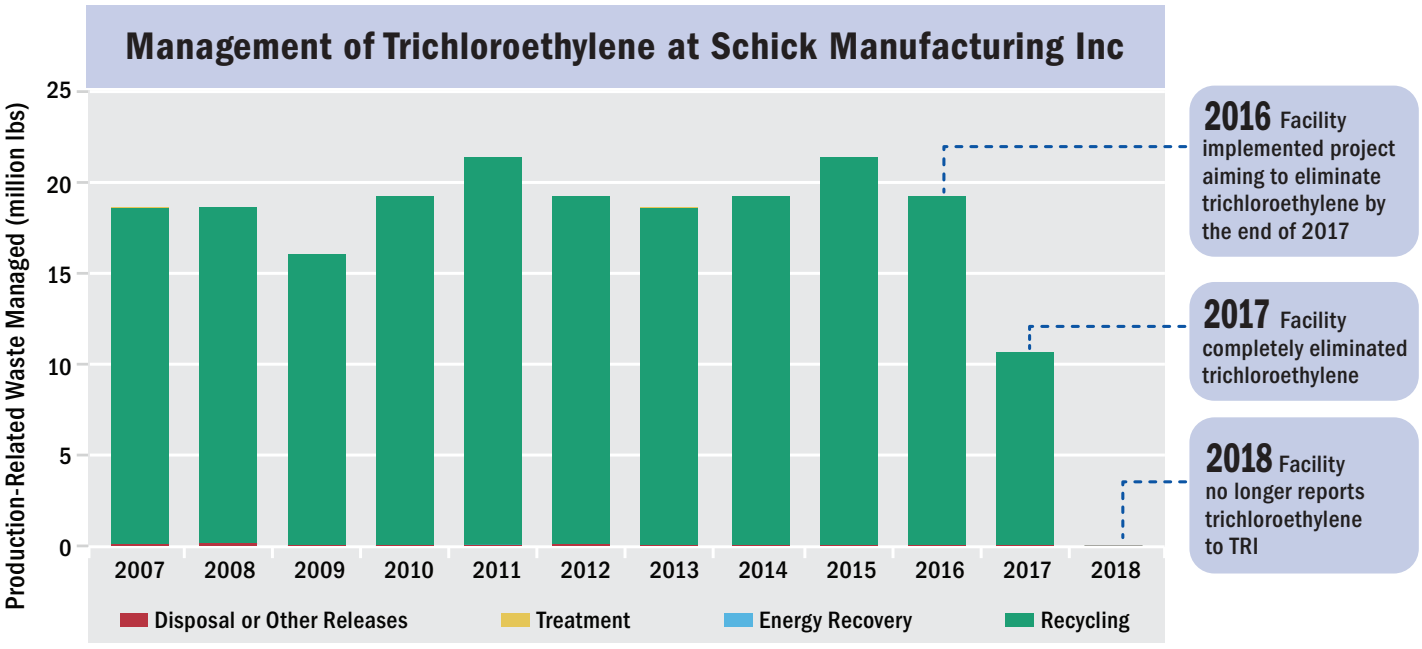
From 2007 to 2018, releases of TRI solvents from facilities have decreased in all three sectors shown in this figure: fabricated metals (by 38%), automotive manufacturing (by 37%) and aerospace manufacturing (by 16%).

More opportunities for reductions exist in these and other sectors. The following examples of P2 from the TRI may help facilities to further decrease solvent use and releases.



FACILITY FOCUS: Fabricated Metals Manufacturer

A facility that manufactures razor blades for personal care made changes to their cleaning process to reduce their use of trichloroethylene, and reported **complete elimination of trichloroethylene usage** at the facility by the end of 2017. The facility had used trichloroethylene in two razor blade cleaning processes. The facility replaced one cleaning step with a comprehensive hot-air blow off system and replaced the final cleaning step with an alcohol-based vacuum cleaning system.



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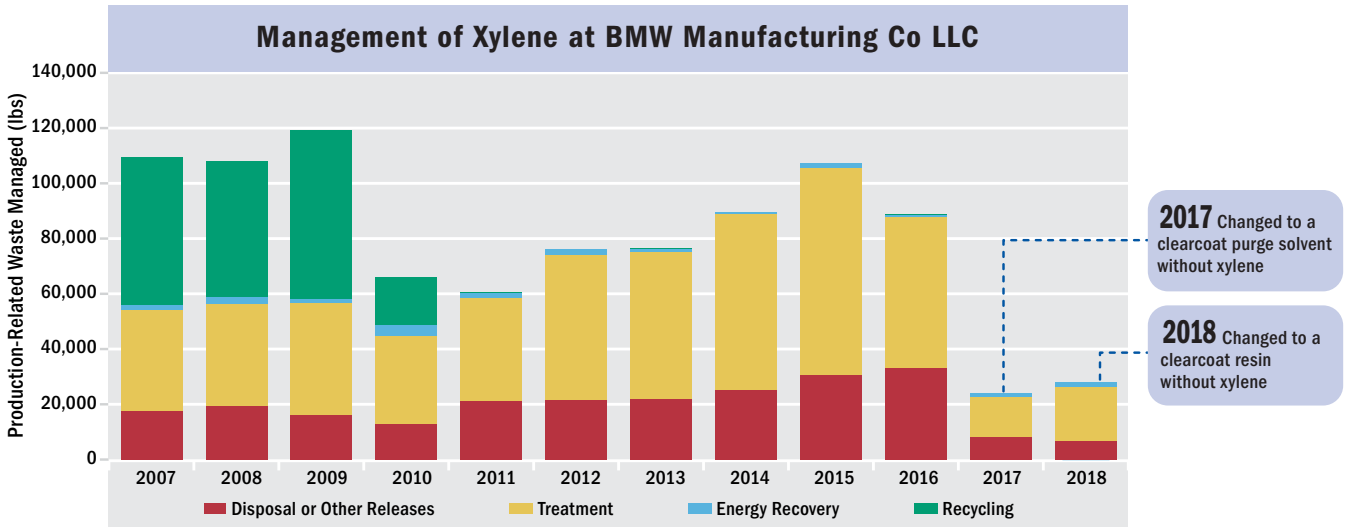
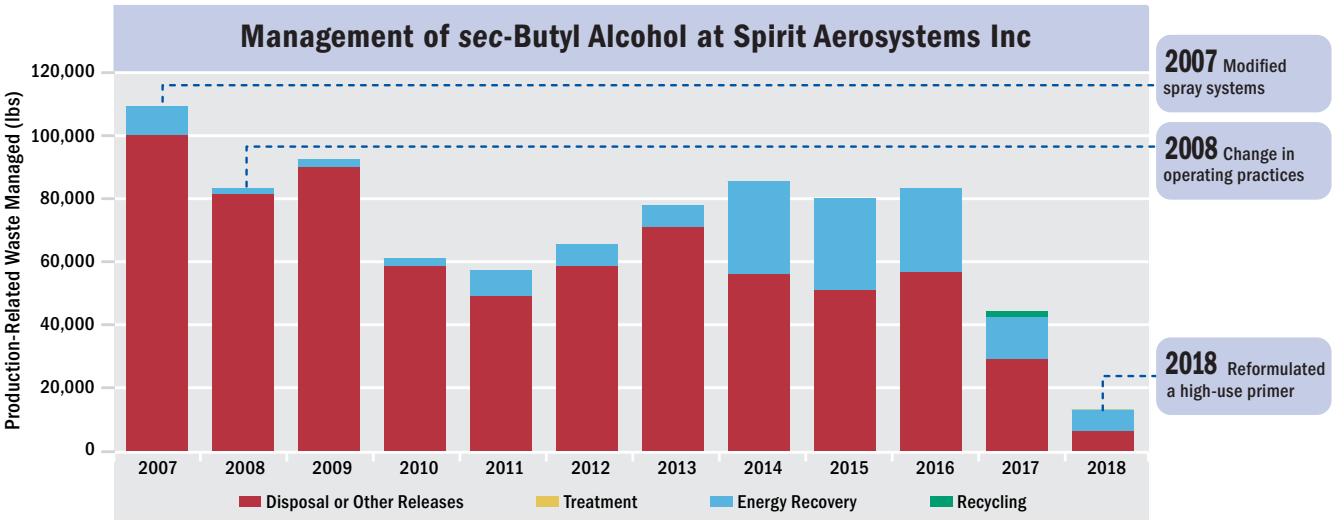
FACILITY FOCUS: Automotive Manufacturer

By substituting materials used in painting operations, an automobile manufacturer reduced its use and releases of xylene. From 2017 to 2018, the facility **purchased reformulated clearcoat resin and purge solvent that no longer contains xylene** in those products. In 2007, the facility managed over 100,000 pounds of xylene waste through on-site incineration, off- site recycling and energy recovery, and releases to air. Since 2007, the quantity of xylene waste managed decreased by 74%, including a 62% reduction in the quantity released to air, while production at the facility substantially increased during this time.



FACILITY FOCUS: Aerospace Manufacturer

A facility in the aerospace sector that manufactures structures for commercial and defense aircraft, such as fuselages and wing components, **reduced its use and releases of *sec*-butyl alcohol by implementing several P2 activities**. Efforts initially focused on modifying the spray systems and operating practices. More recently, after an internal P2 opportunity audit, the facility reformulated a high-use primer used in a high-throughput paint booth. Even as the facility's production increased, these activities considerably reduced the management of *sec*-butyl alcohol waste, particularly the quantities released, which were entirely to air and decreased by 94% from 2007 to 2018.



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Best Practices for Solvent Reduction

The TRI contains many examples of P2 activities that have reduced the use of solvents. When reporting to TRI, facilities are required to report their newly implemented P2 activities (referred to as "source reduction" activities in TRI) by selecting a code that describes the activity. Facilities may describe these activities in more detail by providing optional commentary on the P2 activity implemented or its resulting benefits. Examples highlighted demonstrate solvent reductions through improved cleaning processes and surface coating operations. Additional examples from TRI data and other resources include:

- Reducing solvent quantities required through activities like shortening fluid delivery lines
- Substituting solvent formulations, including switching to aqueous formulations or to other organic solvents with lower hazard
- Reusing solvent, such as reusing solvent from a process to clean equipment
- Choosing alternative methods for processes including paint stripping to eliminate use of organic solvent

Resources for Exploring Solvent Reduction

FIND P2 EXAMPLES

Find more examples of P2 practices and compare facilities' waste management quantities using the TRI P2 Search Tool.

SEARCH SAFER ALTERNATIVES

Explore alternative solvents or ingredients listed on EPA's Safer Chemical Ingredients List.

EXPLORE TRI DATA

For visualizations and interactive data analysis of TRI data, use the TRI P2 Industry Profile Dashboard.

TECHNIQUES FOR SOLVENT REDUCTION

Consider ways to further avoid or reduce the use of hazardous solvents:

PROCESS MODIFICATION

Use alternative removal methods that don't require solvent, or use less solvent

CHEMICAL SUBSTITUTION

Find solvents that are non-toxic, non-VOC alternatives

DIRECT REUSE

Capture and reuse spent solvents within the process

PRODUCT REDESIGN

Modify your product so its manufacture is solvent-free or less reliant on solvents

For more information, visit TRI's P2 webpage