

## Reducing Styrene Waste in the Plastics Product Manufacturing Sector

### Overview of Styrene

Styrene or ethenylbenzene (CAS 100-42-5) is an organic compound used mainly in the production of polystyrene plastics and resins. Styrene is also widely used in the manufacture of synthetic rubber and glass-fiber-reinforced plastic products and in the production of various copolymers. Facilities in the Plastics Product Manufacturing sector (NAICS 3261) use styrene to make laminated products, plumbing fixtures, packaging films, pipes and pipe fittings, polystyrene foam, and other plastic products commonly used by consumers such as housewares, dinnerware, containers, floor coverings, countertops, and other items.

### Styrene Reported to the Toxics Release Inventory (TRI)

The Plastics Product Manufacturing sector (NAICS 3261) accounted for 51% (15.2 million pounds) of all styrene releases reported to EPA's TRI Program for 2016. Since 2006, the sector's styrene releases have decreased by 40%.

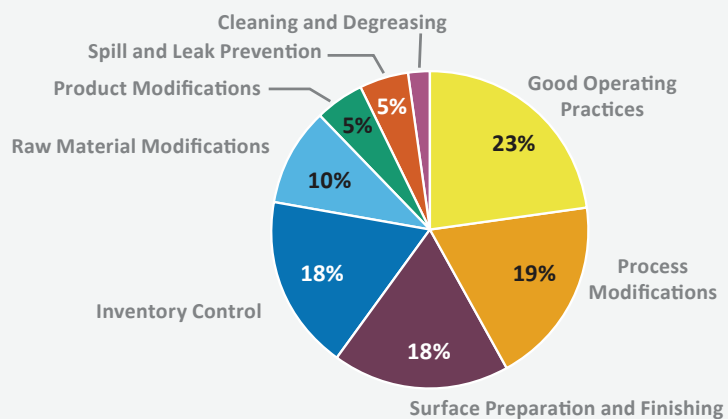
### Commonly Reported Pollution Prevention Activities for Styrene

Many facilities in the Plastics Product Manufacturing sector have implemented pollution prevention activities that have reduced their air emissions and other waste management quantities of styrene. For 2016 alone, 76 facilities that filed a TRI reporting form for styrene implemented a total of 88 source reduction (P2) activities for the chemical. Commonly reported activities include good operating practices, process modifications, and surface preparation and finishing. In addition to the P2 information reported to TRI, the published literature corroborates that efforts are underway to identify either substitutes for styrene use as a monomer in the manufacture of plastics or resins, or alternative technologies that obviate the need for styrene-based plastics and resins.

### QUICK STATS: Plastics Product Sector

- Facilities reported a **40% decrease** in styrene releases from 2006 to 2016.
- Facilities reported **88 source reduction activities** for 2016.
- The sector has **reduced styrene emissions** by using substitute chemicals, upgrading equipment, and improving work practices.

### Styrene Source Reduction Activities Implemented by Plastic Product Manufacturers, 2016



## Reducing Styrene Waste in the Plastics Product Manufacturing Sector

As part of their TRI reports, facilities have the option to provide a narrative describing their efforts to reduce styrene releases. Some examples include:

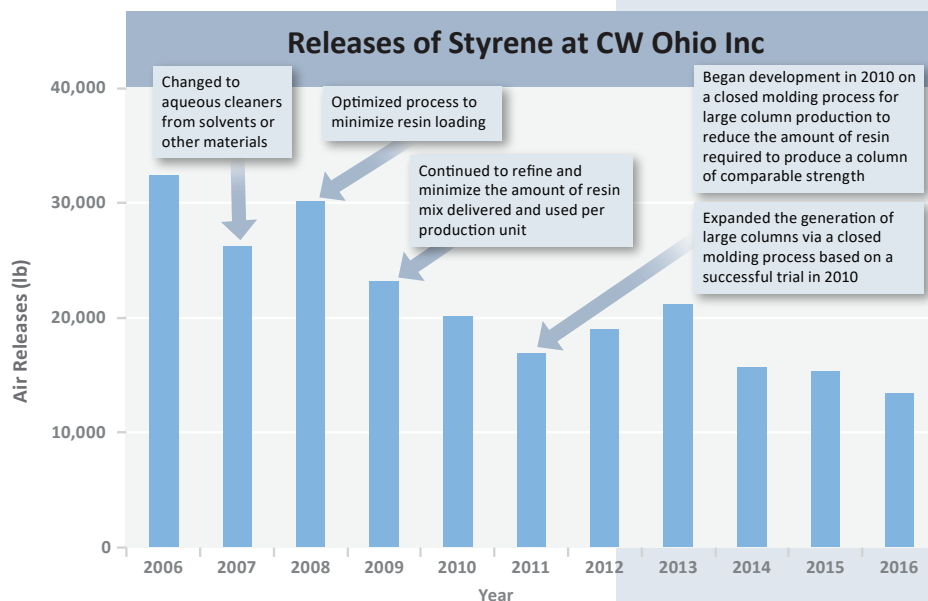
- A [plastic products manufacturer in Indiana](#) replaced styrene solvent with acetone and water-based cleaners, and expanded their product lines using polyethylene-based rather than styrene-based products.
- A [plastic plumbing fixture manufacturer in Oregon](#) uses styrene-containing resins to manufacture fiberglass products. The facility uses closed mold processes such as RTM (resin transfer molding) and bag infusion to keep the resin enclosed during the catalyzation period, significantly reducing emissions.
- A [plastic products manufacturer in North Dakota](#) improved scheduling to place orders together resulting in longer production runs that lowered raw material usage and waste associated with startup and shutdown.

### Facility Focus: CW Ohio Inc.

[CW Ohio Inc.](#) located in Conneaut, Ohio, is an example of a facility in the Plastics Product Manufacturing sector that implemented P2 activities for styrene. This facility manufactures cupolas, weathervanes, louvers, and decorative windows. Since 2006, the facility's styrene releases reported to TRI have decreased by 59%, as shown in the figure.

The facility reduced releases in part through P2 activities including changing to aqueous cleaners, minimizing resin loading and resin mix use, and switching to a closed molding process. These P2 practices implemented by the CW Ohio Inc. facility clearly demonstrate how source reduction is effective in reducing releases of styrene.

Other facilities in the sector that use styrene may be able to implement the same or other practices to achieve similar reductions. Additional P2 information is available for other TRI facilities in EPA's [TRI P2 Search Tool](#).



### P2 Resources

Facilities interested in additional P2 or waste minimization assistance can contact their [state technical assistance providers](#) or environmental assistance agencies. These organizations may offer recognition opportunities for facilities that improve processes and reduce TRI-related waste.