



Pollution Prevention (P2) Spotlight

REDUCING METAL WASTE

Overview

Metals are widely used in industrial operations as input materials such as in the manufacture of steel and other alloys that are used to make parts or products. Metals may also be applied to manufactured parts as protective coatings for corrosion or wear resistance through processes such as galvanizing and electroplating. Some of these metals and metal compounds are on EPA's Toxics Release Inventory (TRI) list of chemicals.

For metal waste that is generated, facilities often recycle the waste to reduce releases of metals into the environment and to reduce the quantity of virgin materials required. If metals included on the TRI chemical list do enter the environment, per TRI listing criteria, they have the potential to persist and may cause adverse effects to humans and other organisms.

Review of TRI Data

Many facilities have implemented pollution prevention (P2) activities that focus on more efficient use of metals and metal compounds and identification of alternative materials with lower concentrations of TRI-listed metals. This P2 Spotlight presents examples of P2 success stories regarding metals as reported to TRI, with a focus on industry 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 metals have decreased from facilities in the automotive manufacturing sector (by 66%) and the fabricated metals sector (by 12%), but increased in the aerospace manufacturing sector (by 26%). These sectors released just 4% of the waste they generated during 2018, and recycled 96% of their waste.

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

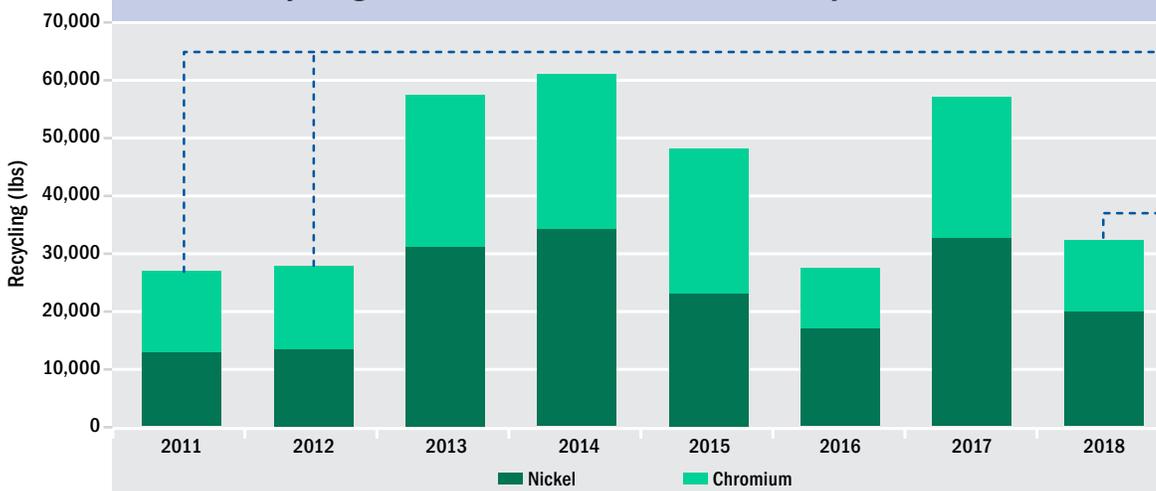
Releases of TRI Metals, by Sector



FACILITY FOCUS: Aerospace Manufacturer

An [aircraft parts and auxiliary equipment manufacturer](#) reduced their metal waste through several process changes aimed at reducing the scrap/drop generated from their metal cutting processes. First, the facility began purchasing pre-cut blanks which are closer in size to the final parts, reducing waste generated. Next, they also focused on improving how they nest materials for cutting to reduce the drop generated. Additionally, the facility took a closer look at the drop material to see what different parts they could make from the leftover shapes and sizes. These changes to manage the drop material yield became considerably more cost effective when the price of high nickel- and chromium-containing metals increased substantially. For chromium and nickel waste that is generated, the facility sends it off-site for recycling/metals recovery. The facility has recycled more than 99.9% of its nickel and chromium waste since 2011.

Recycling of Nickel and Chromium at Triumph Fabrications



2011-2012
Improved maintenance scheduling, recordkeeping or procedures

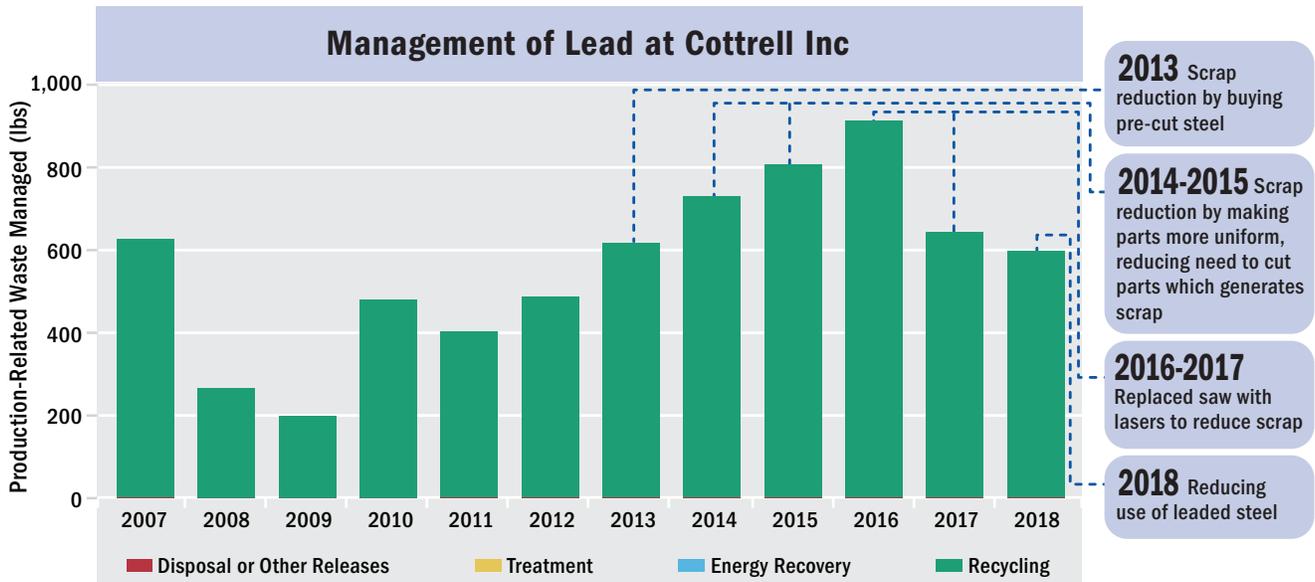
2018 Revised dimensions for raw material purchases

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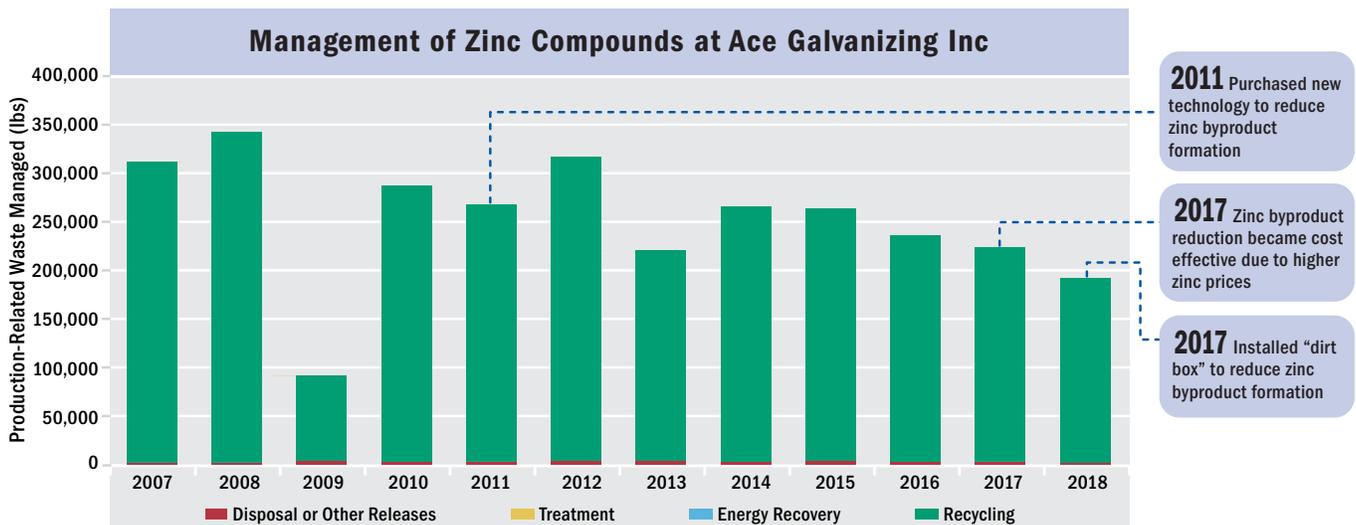
FACILITY FOCUS: Automotive Manufacturer

A [manufacturer of over-the-road car hauler trailers](#) implemented multiple P2 activities to **reduce its use of lead-containing steel and generation of scrap metal**. This facility reported P2 activities for lead every year from 2013 to 2018. For lead waste that is generated, the facility sends it offsite for recycling. The facility tracks all lead waste through an inventory management system to ensure all lead waste generated is recycled. The quantity of lead waste managed at the facility increased from 2011 through 2016 as production increased, but since 2016, lead waste managed has decreased considerably (down 35%) while production decreased slightly (down 8%).



FACILITY FOCUS: Fabricated Metals Manufacturer

A [metal coating facility](#) installed a “dirt box” that allows employees to leave more zinc in the galvanizing bath when **skimming off residue**. The facility calculated that this would result in up to a 40% reduction in skimmings. Reducing skimmings results in the facility purchasing less zinc. The facility previously reported plans to implement this system due to higher zinc prices. For zinc waste that is generated, the facility sends the vast majority off-site for recycling/metals recovery.



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



Best Practices for Metal Waste Reduction

Many facilities already implement techniques to reduce metal waste generation. For TRI reporting, 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. Additional examples from TRI data include:

- ◆ Reducing scrap metal generation, such as by [optimizing cutting layouts](#) and [grouping like items to maximize the process efficiency](#).
- ◆ Identifying metal alloys with [lower concentrations](#) of TRI-listed metals.
- ◆ Recycling scrap metals. While recycling is not considered a P2 activity, recycling more material or recycling more efficiently reduces the amount of virgin material needed and prevents releases to the environment. For waste that is generated, recycling is the preferred way to manage the waste. Facilities report activities related to recycling such as new recycling activities or [activities to improve recyclability of metal waste](#).

Resources for Exploring TRI Metal Waste Reduction

FIND P2 EXAMPLES

Find more examples of P2 practices and compare facilities’ waste management quantities using the [TRI P2 Search Tool](#).

RECYCLE METAL WASTE

For information about the value of recycling, see [EPA’s Recycling Economic Information Report](#).

EXPLORE TRI DATA

For visualizations and interactive data analysis of TRI data, use the [TRI P2 Industry Profile Dashboard](#).

TECHNIQUES FOR METAL WASTE REDUCTION

Consider ways to further avoid or reduce metal waste generation:



PROCESS MODIFICATION

Use processing methods that generate less metal waste



MATERIAL MODIFICATION

Find materials with lower TRI metal content, such as different alloys



PRODUCT REDESIGN

Modify your product to contain lower quantities of metals