

Zinc Recycling

In Use Stocks



Economic development is coupled with the use of metals. The demand for zinc is intimately related to infrastructure growth (e.g., construction, transportation, etc.), which is continually increasing in both emerging economies and industrialized countries. As a result, questions arise regarding the availability of zinc ores to satisfy long-term demands. Recycling has become an important way to mitigate these concerns by using stocks of metal in society to generate new raw materials.

What are In-Use stocks?

In-Use stocks of zinc are those materials being used in society. That is, zinc that has already been extracted, processed, put into use, currently providing service, or discarded or dissipated over time. In addition, some zinc is held in stockpiles by processors, fabricators, and sometimes by governments. Eventually, the product is discarded at the end of its useful life. Zinc in one form or another moves rapidly through the stages of processing, fabrication and manufacturing, but may stay in use for long periods – years, decades, perhaps a century or more. In some cases, such as zinc in obsolete/abandoned buildings, the zinc is no longer in use, but not yet recovered and recycled. These “hibernating” stocks are also potentially reusable, but their recovery may well not be economically feasible.

How do In-Use stocks compare to geologic stocks of zinc?

There is an estimated 2,800 million metric tons (Mt) of zinc contained in the earth’s crust in such form and amount that economic extraction is currently or potentially feasible (Resources). As a component of the resource, the Reserve Base (480 Mt; technologically available zinc) and Reserves (250 Mt; economically recoverable zinc) meet minimum criteria related to current mining and production practices – accessibility, grade, quality, and quantity. Estimates of the amount of zinc currently considered as In-Use stocks (~300 Mt) are roughly equivalent to the amount considered as reserves and represent about 60% of the total zinc that has been extracted and processed throughout history. Given that zinc-bearing materials have very long lifetimes in society, the amount of material coming out of use and available for

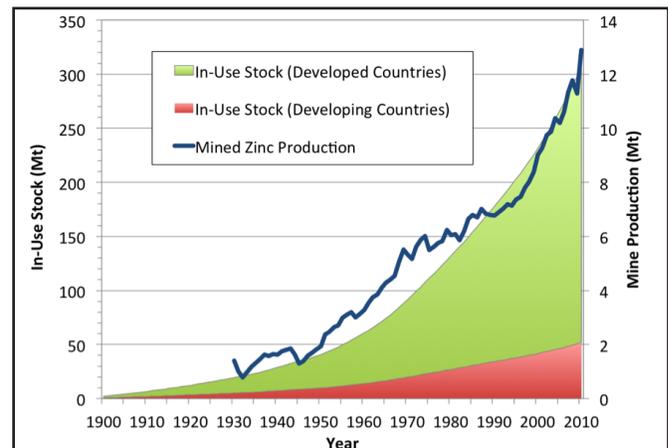


Figure 1. Annual zinc mine production and cumulative growth of In-Use stocks (Mt = million tonnes).

recycling is a fraction (~25%) of current production from ores and concentrates. Currently, around 4 Mt of zinc is recovered and returned to use through mature recycling networks.

How have In-Use stocks evolved over time?

There is currently an estimated 300 Mt of zinc currently In-Use, which exists as stocks within society (Figure 1). As expected, growth of zinc In-Use stocks are intimately linked to the demand for refined zinc and long service life of zinc-bearing material. Furthermore, zinc usage coincides with population growth in developed countries and increased urbanization. Based on these estimates, on average, per capita zinc In-Use stocks in developed countries (100 kg/capita) are five-times greater than that found in developing areas (20 kg/capita).

What can In-Use trends tell us about future demands?

Figure 2 illustrates the spectrum of per capita zinc In-Use stock for several developed countries. Initial (mid-20th century) differences in zinc In-Use stock range between >300 kg/capita (USA) and <50 kg/capita (Italy) due to initial driving forces behind industrialization (e.g., preparation for or rehabilitation from World War II). Currently, developed countries range from 60-130 kg/capita for Japan and Europe up to 180 kg/capita for the USA. However, the trajectory of each developed economy suggests that zinc In-Use stock saturation may occur around 100-150 kg/capita.

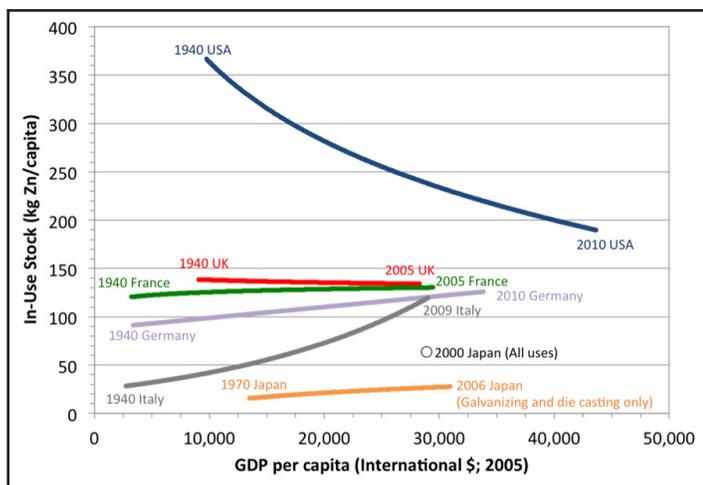


Figure 2. Evolution of In-Use zinc stocks relative to per capita GDP for several industrialized countries.

Applying these estimates for zinc In-Use stock to developing countries/economies can help to define potential demand scenarios and targets for infrastructure development related to waste management (regulations in support of recycling). This also raises the question of anticipated saturation of zinc In-Use stock (~130 kg/capita) with anticipated urban development (70% of population, or 6.3 billion people, in urban areas by 2050). Under these assumptions, saturation of zinc In-Use stocks in urban areas would amount to roughly 820 Mt by the end of the 21st century. This would suggest that an additional 500 Mt of zinc would be tied up as In-Use stock over the next 80 years. As unlikely as such a scenario may seem, it illustrates that waste management initiatives across the globe must be proactive in their attempts to alleviate stresses on geological stocks.

How does the zinc industry use information on In-Use stocks?

Due to the value of zinc as a commodity, the industry continues to advance technologies for recovering zinc from products at end of life. For example, the global capacity to recover zinc from galvanized steel scrap (steel filter dust) is continually growing as developing areas mature and become sources for new recycling infrastructure. The industry is also working with stakeholders to promote practical waste management programs by facilitating objective decision-making through the generation and monitoring of information on the effectiveness of zinc recycling.

