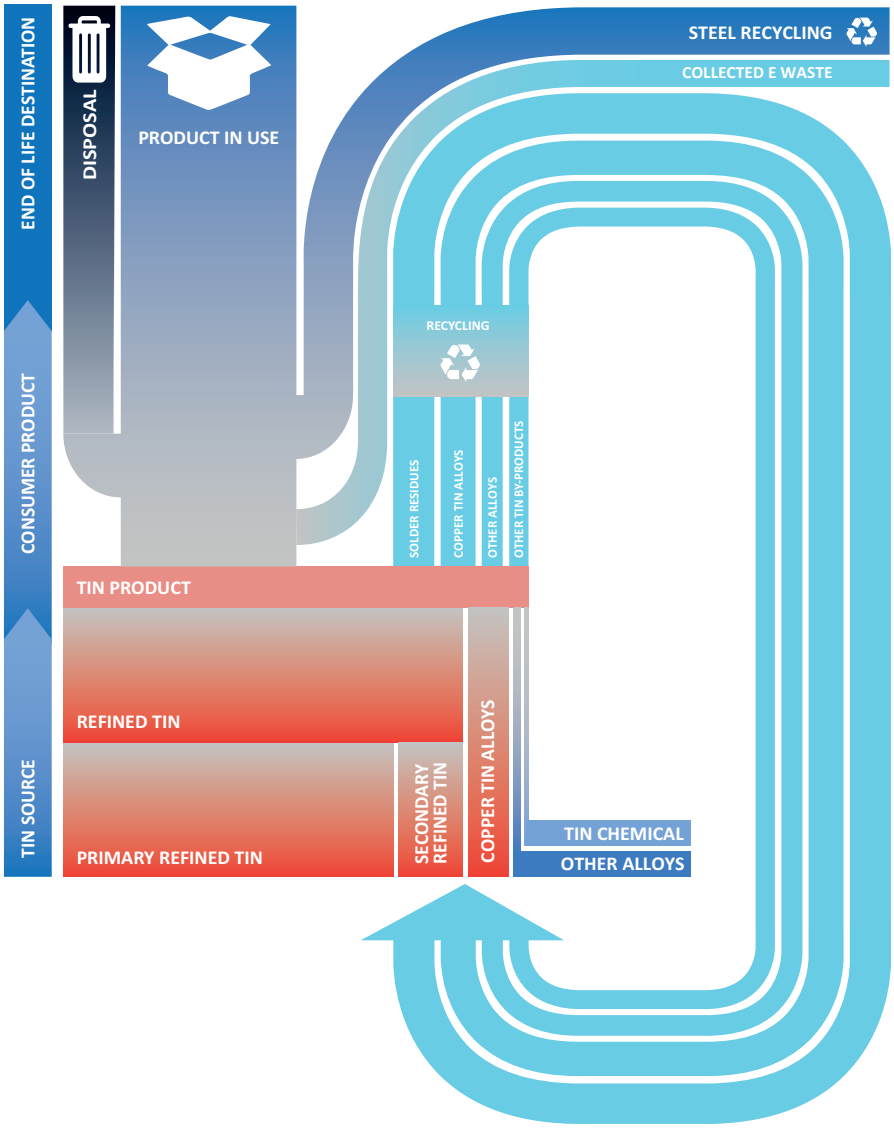
Tin Flows

Tin is used in numerous applications that are critical to the quality of modern life. Tin-using products have very different lifetimes and end-of-life collection opportunities.

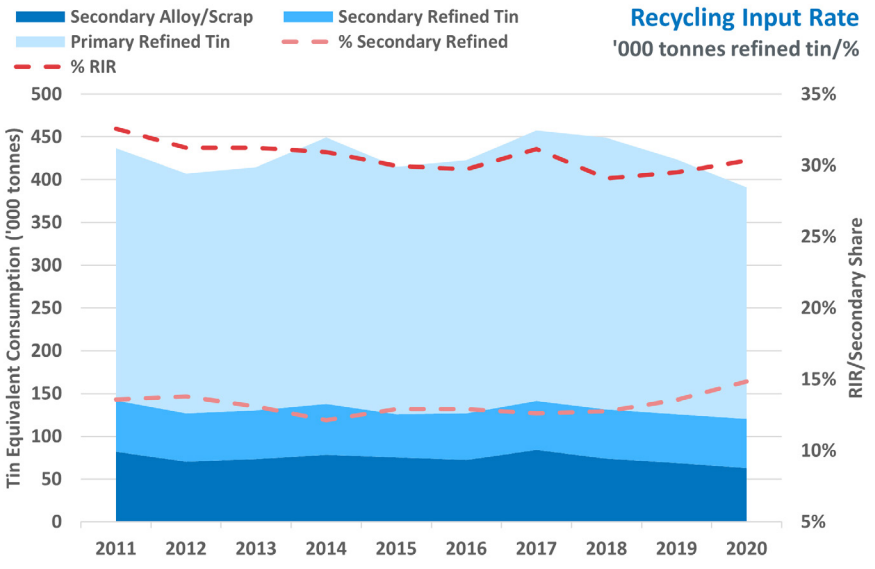
Tin residues are recycled either back to pure tin ingots or reintegrated into tin based or other alloys. The metal is infinitely recyclable to the same high quality.

Scrap and residues generated during industrial production or tin product use are frequently recycled. Residues are either reused efficiently in-house or recovered by external scrap processing companies.



Historic Recycling Input Rate

Overall, the average recycled content of tin products can be quantified as the 'Recycling Input Rate' (RIR). This measures the percentage contribution of recycled 'secondary' tin, both in refined and unrefined forms. In 2019 the RIR of tin was 30%, with re-refined tin contributing approximately 17% of total refined tin use. Reused or reformulated alloys made up the remaining 16%. The RIR has varied between 30-35% over the last decade, with dips generally corresponding to periods of tin price lows.



Feedstock Statistics

The end-of-life destination of tin depends on the tin product. Nearly half of all tin is used in solder, with the rest split between tin chemicals such as PVC stabilisers, lead-acid batteries, tinplate, and copper alloys.

Tin is typically recovered from tin manufacturing 'by-products' or 'residues'. These include solder dross, electroplating oxides, as well as a host of other secondary feedstocks. The tin concentration of such residues is often higher than in consumer scrap, presenting a greater opportunity for tin recovery. Importantly, tin price affects the feasibility and therefore size of tin 'Recovery Opportunities'.

	Feedstock	Estimated Tin Content (tpa)
Solder Residues	Solder paste	30-40,000
	Solder alloys	
	Solder dross (electronic & industrial)	
	Circuit boards	
	Circuit board production detinning	
Tin Alloys	Bronze and brass	10-20,000
	Other alloy scrap	5-10,000
	Lead-acid battery metals	5-10,000
Tin By-products	Metallurgical slags	5-10,000
	Electroplating tin & tin alloy oxides	<5,000
	Glass coating oxides	<5,000
	Metallurgical tin drosses	<5,000
	Recycled tin chemicals	<5,000
	Tinplate & tinned copper detinning	<5,000
Upcycling	Upcycled tinplate	<1,000
Recovery Opportunities	Secondary lead slag	10-20,000
	E-Waste	>50,000
	Disposal	>70,000

Increasing awareness of the need for a circular economy will encourage re-use and recycling of manufacturing by-products and consumer scrap.

For further information on tin recyclers, secondary tin producers, and the secondary tin value chain please contact ITA.

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