

# TIN

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**D**uring 2000, the LME three-months tin price spiked to its highest level in two years, going over US\$6,000/t at the start of the year. One year later and the price was down to fresh lows below US\$5,300/t, its lowest for almost two years.

The tin market had been in surplus in 1999 to the tune of around 6,000 t. The market remained in surplus through 2000, thanks, once again, to a surge in Chinese production and exports to the West. In fact, it appears that there was an increase in the size of the surplus to around 10,000 t although the tin price rallied towards the end of the September quarter on expectations of lower supply as Chinese export licences ran out.

Demand continued to grow in 2000, notably in Asia where continued strong growth offset small falls in demand in Western Europe. However, with the global economy now slowing down it seems unlikely that demand growth can continue its steady upward trend through 2001. Demand for tin in Japan, in particular, is likely to be hit by the import duties imposed on Japanese tinplate going to the US. Most of the increase in Japanese demand for tin in recent years can be put down to rising tinplate exports rather than actual domestic consumption.

## Production

According to the Jakarta Ministry of Energy and Mineral Resources, Indonesia's tin metal production in 2000 dropped 5.8% to 46,432 t from 49,105 t in 1999, while exports declined 10% to 42,935 t, earning US\$237.1 million in 2000, down 7% from US\$255 million in 1999. The decline in production was partly the result of community conflicts in several mining sites. PT Timah has reduced its forecast production for 2001 to 35,000 t in anticipation of declining tin reserves, estimated to last only seven years at current

production rates. Speaking in February 2001, president director Erry Riyana Hardjapamekas commented that the "global market is not conducive for pushing up production". However, the company is exploring for tin in south Myanmar and Vietnam. Timah produced 40,050 t of tin-in-concentrate in 2000. The company's cost of producing refined tin rose to US\$3,917/t, up from US\$2,764/t the previous year.

Output by Indonesia's other tin producer, PT Koba Tin rose 8.4% to 11,579 t of tin-in-concentrates. The company, which is 75%-owned by Iluka Resources of Australia, has been granted a 10-year extension to its contract to operate in Indonesia. Late in the year, Australian explorer Herald Resources announced the discovery of significant tin mineralisation from a drilling programme at its Batu Besi property on Belitung Island.

Tin accounts for more than 11% of all China's non-ferrous metal export volumes, and concentrates account for over 80% of total tin exports. Tin production in 2000 rose by 19.6% to 110,415 t. Output in December was up 67.3% at 14,168 t. However, analysts believe production will fall back in 2001 because of a cut in export licences from 60,000 t to 40,000 t. The move follows

Tin-in-Concentrate Output ('000 t)			
	1998	1999	2000 <sup>e</sup>
Indonesia	53.9	47.8	51.6
Peru	25.7	29.7	35.2
Brazil	15.0	14.0	14.0
Bolivia	11.0	12.0	11.6
Australia	10.2	11.0	9.5
Portugal	2.9	2.2	2.3
Malaysia	5.7	7.3	7.0
Others	10.0	8.5	10.0
<b>Total</b>	<b>134.4</b>	<b>132.5</b>	<b>141.2</b>

<sup>e</sup> estimate

concern over domestic concentrate feed sources. However, it has to be said that the impact on supply from China may not be noticeable. The country's tin producers have a history of getting round such licence cuts.

Yunnan Tin, China's largest tin metal producer hopes to have its new Ausmelt furnace operational by mid-2001. The new plant will replace its seven ageing reverberatory furnaces. The Ausmelt furnace will have the capacity to process 50,000 t of concentrate per year, producing around 24,000 t of tin metal.

In December 2000, Fernando Gala, director of mining at Peru's Energy and Mines Ministry forecast that the country's output of tin could rise by 21% in 2001. Tin production by Minsur, the country's sole producer had already risen in 2000 by 22.2% to 27,409 t. The company also spent US\$7 million in exploration activities through the year to boost reserves.

In Bolivia, after a privatisation process, which seems to have gone on for ever, ownership of the Vinto tin smelter and the Huanuni mine was transferred to the foreign purchaser, Allied Deals, by the government in March 2000. The final costs of the deal to Allied include a bank fee of about US\$1 million, US\$15 million for the smelter and associated assets and US\$500,000 for a 30-year lease on the mine. However, the privatisation had little immediate impact on Vinto's output although Allied Deals hopes to boost the output rate from 11,000 t/y of tin in 2000 to 15,000 t/y in 2001. Separately, Allied has plans to invest US\$10 million in the Huanuni mine but its plans to boost the mine's concentrate output will take around 18 months to implement.

Mined output in Malaysia passed the 7,000 t level for the first time in five years. Malaysia Smelting Corp., now the only operating tin smelter in Malaysia, produces 12% of the world's tin metal. In November, the smelter's chief executive Mohamed Ajib Anuar said,

"We are studying the possibility of expanding". Any such expansion would boost sales at what is the world's biggest custom tin-smelting company and might limit any decline in earnings caused by higher fuel costs. The smelter is running at full capacity, producing about 30,000 t/y of tin metal. Ajib declined to say how much the company would spend to expand its plant. MSC imports about 80% of the tin ores it uses.

Despite increased export demand in 2000, Thailand's tin mining companies, of which there are around 15, did not increase production. As a result, the production of tin metal at the Thaisarco smelter continued to rely on imported ore while total domestic ore output fell by 20%.

In Australia, Murchison United made a deal with the Tasmanian State Government for joint funding of a US\$22 million, six-year exploration and development programme to secure the future of the Renison Bell tin mine. The company is also undertaking a feasibility study on the treatment of tailings at the mine. Bechtel Corp's pre-feasibility study suggests production costs of US\$1,900/t. The mine has 19 Mt of tailings grading 0.4% Sn.

Elsewhere in Australia, Marlborough Resources continued to develop its Ardlethan tin project, hoping to process around 950,000 t/y of ore, producing around 600 t of tin-in-concentrates. The company says reserves are sufficient for an eight-year mine life.

Russia's Novosibirsk Tin Combine aimed to raise output by 50% in 2000, from under 8,000 t in 1999. For 2001, its target is even more ambitious - output is projected to reach 20,000 t of tin metal. The company claims that the domestic market will absorb much of the increase in production.

Tin mining in the UK is dead but still seems unwilling to lie down. Yet again attempts were made to revive the UK's last tin mine. In September 2000, Baseresult Ltd, comprising the partners of Wilf Hughes, which failed to

rescue the mine in 1999, exchanged contracts with South Crofty Plc. The firm claimed a combination of higher tin prices and better mining methods would make the mine profitable. However, with the mine flooded and requiring an investment of £2 million (US\$2.8 million) to be cleared of water, it seems unlikely that tin production will resume.

The US produced around 16,900 t of tin from scrap recycling in 2000. The US Government continues to work towards the full disposal of its tin stockpile. The Defense National Stockpile Center holds two sales annually, in the spring and the autumn, aiming to dispose of 6,000 t each time. The DNSC's Annual Materials Plan for fiscal year 2001 calls, once again, for the disposal of 12,000 t of tin. The remaining stockpile is held in four depots with the largest holdings at Hammond in Indiana, and at Baton Rouge in Louisiana. At September 30, 2000, the DNSC's tin inventory totalled 59,686 t. In the 12 months to the end of September 2000, the Center sold 11,984 t of tin.

### Consumption

Tinplate remains the single most important end-use for tin. Preliminary antidumping duties at a rate of 95% were first imposed on Japanese imports of tinplate into the US by the Commerce Department in April. Supply of Japanese tin mill products to the US market had risen 74% from 200,000 t in 1997 to 348,000 t in 1999, equating to a rise in market share from 5% to 13.5%. The duties were confirmed by a 4-2 vote by the US International Trade Commission in July.

However, the US has not been the only country in which tinplate producers have been complaining about dumping. Eight Chinese tinplate manufacturers wrote to the Ministry of Foreign Trade and Economic Co-operation and the State Economic and Trade Commission to call for protective measures and restrictions on tinplate imports.

The eight companies are Shanghai Baoshan Iron and Steel Co. Ltd, Wuhan Iron and Steel Co. Ltd, Guangzhou Pacific Ocean Tin Co. Ltd, Zhongshan Zhongyue Tin Co. Ltd, Hainan Haiyu Tin Co. Ltd, Jiangsu Union Tin Co. Ltd, Fujian Union Tin Co. Ltd and Fujian Zhongrida Metal Co. Ltd. Most of these companies are co-operative plants with Taiwanese and Japanese partnerships.

The companies claimed that an upsurge in imports from South Korea, the Commonwealth of Independent States, Europe and Australia, have damaged the healthy development of the domestic industry. The Chinese firms say imports from these countries increased by 50% year-on-year, taking a 40% share of the Chinese market, and undercutting domestic prices by almost a third.

The North American and Western European tinplate markets are effectively mature. However, Asia, Eastern Europe and Latin America still have considerable potential for growth. Current worldwide production stands at around 16.7 Mt/y and could rise substantially in the next few years. Tinplate production stands at 181,000 t/y in Western and Northern Europe, at 1.07 Mt/y in South America and 346,000 t/y in Africa (according to figures quoted by Craig Peterson, commercial vice president, USS-Posco Industries). Tinplate production in Asia is at a higher level of 5.6 Mt/y but, on a *per capita* basis, there is still plenty of scope for growth. For tinplate consumption in China to reach

<b>Western World supply/demand balance in refined tin ('000 t)</b>				
	<b>1998</b>	<b>1999</b>	<b>2000<sup>e</sup></b>	<b>2001<sup>f</sup></b>
Mine Production	134.4	132.5	141.2	145.0
DLA Sales	12.0	12.0	12.0	12.0
Net E. Bloc Exports	30.0	47.0	45.0	35.0
<b>Total Supply</b>	<b>176.4</b>	<b>191.5</b>	<b>198.2</b>	<b>192.0</b>
<b>Demand</b>	<b>182.0</b>	<b>185.0</b>	<b>188.0</b>	<b>190.0</b>

<sup>e</sup> estimate, <sup>f</sup> forecast

levels seen in the West, Peterson believes that production capacity of around 12 Mt/y would have to be brought on line.

Through the year, there was news of planned production cuts by Corus, with the announcement of the closure of its Ebbw Vale tin mill, in Wales, in 2002. In Germany, Rasselstein Hoesch plans a three-stage shut down of its 180,000 t/y tinplate plant in Dortmund by the end of 2001. Both Corus and Rasselstein Hoesch aim to boost output at other plants but still not by as much as the capacity they are closing down.

However, these cutbacks are being more than offset in global terms by capacity increases elsewhere. Erdemir, Turkey's sole tinplate producer, says it has trebled its output to 300,000 t/y after installing a new tinning line. In Argentina, Siderar's tinplate line is back in action after capacity was boosted to 150,000 t/y from 120,000 t previously.

US Steel's tinplate interests have grown substantially. In September, the company completed the purchase of the steel and tinplate operations of VSZ in Kosice, Slovakia, and in October it reached agreement for the purchase of LTV's tin mill products business in the US. LTV had filed for Chapter 11 bankruptcy protection at the end of 1999.

It is worth remembering that, while tinplate has been around for some time, its production process is still being refined. In July 2000, NKK Corp. and Learonal Japan unveiled a new low-pollution, high-efficiency tinplate electrolyte. The environmentally-friendly product is a two-in-one electrolyte allowing uniform plating in a wide range of electric current densities, achieving productivity equal to, or greater than, that of halogen-based electrolytes while generating virtually no fluoride sludge.

The consumption of tin in solder continues to grow, not least because of the move towards

the use of lead-free solders and solder pastes which have a higher tin content than their tin-lead predecessors. During 2000, electronic and electrical equipment makers Sony and Panasonic both confirmed their plans to end the usage of lead in solders.

Tin chemicals also account for a growing sector of consumption. The majority of organotin uses comprise five major commercial applications: PVC heat stabilisers, biocides, catalysts, agrochemicals and glass coatings.

The International Tin Research Institute (ITRI), the world's foremost laboratory devoted to tin research and market development, continues its work to boost tin consumption, focusing now on tin-based fire retardants and the automotive market. Its push for the adoption of tin as a non-toxic alternative to lead in shotgun cartridges and airgun pellets has paid off with both now in commercial production.

The fire retardants, zinc hydrostannate (ZHS) and zinc stannate (ZS) were first marketed in 1990 as gradual replacements for antimony trioxide and certain other traditional flame retardants. Currently, consumption of ZHS and ZS in Europe is reportedly growing at 11% per annum accounting for 700 t/y of tin consumption. ITRI hopes to repeat that

<b>Average tin prices (US\$/lb)</b>	
1993	2.34
1994	2.48
1995	2.82
1996	2.80
1997	2.56
1998	2.51
1999	2.45
2000	2.46
2001 <sup>f</sup>	2.46
2002 <sup>f</sup>	2.51

<sup>f</sup> - forecast

success in Japan and North America. Potentially, fire retardants could use 5,400 t/y of tin assuming a combined 15% market share for ZHS and ZS.

In the automotive market, tin is consumed mostly in electronic solders, heat exchange solders and batteries, which together account for about 7,000 t/y of tin consumption. Further consumption growth in these areas is possible as the amount of solder usage in cars expands. However, potentially, the most promising area for expanded tin use is the market for wheel weights. These are now produced as a lead-antimony alloy, but the move toward lead-free automobiles may provide the opportunity for tin to gain a market share in this field.

**Outlook**

A change to the way tin is traded occurred in February 2001, with the changeover of activity on the Kuala Lumpur Tin Market. The KLTM daily price, quoted since 1984, has established itself as the reference price for contract pricing for consumers and producers throughout the Asia Pacific region, which accounts for more than 80% of global primary tin production.

The KLTM authorities had announced in October 2000 that the market would cease trading tin denominated in Malaysian Ringgit on February 2, switching to US dollar-based pricing. A further change is due on June 15, 2001, when the KLTM will move to an electronic trading system, replacing the current open outcry. The changeover in currency is partly a belated reaction to the imposition of capital controls by Malaysia in September 1998. The government banned the trading of its currency outside the country, effectively hobbling foreign companies previously active on the KLTM. The market authorities are banking on the changes to provide a substantial boost to liquidity but the changes have also been interpreted as defensive, following the listing of Singapore by the London Metal Exchange as a good delivery point for tin.

The short-term outlook for tin demand in 2001 has been clouded by growing evidence of the global economic slowdown. Industrial production in Korea, responsible for a substantial part of recent demand growth, is falling back. The imposition of duties on Japanese tinplate exports to the US is hitting Japanese demand since much of the growth in tin demand in Japan in 1999 and 2000 was the direct result of rising tin mill product exports. However, there are also other influences on the price. Fund activity remains a potent factor, driving prices down at the start of 2001, allowing tin consumers to lock in supplies at 'bargain' prices.

In the medium term, it has been suggested that the world is heading towards a shortage of tin in two to three years as output declines in Brazil and Indonesia, leaving China to fill the gap. Whether the Chinese producers can increase production is a moot point. Xiao Jianming, general manager of Yunnan Tin Corp. has suggested they may not be able to. The Chinese Government is moving to tighten regulations on mining activity after decades of environmental damage caused by uncontrolled mining. The government in Beijing is also unlikely to expand the country's export quota, aware of the impact that this could have on the tin price.

<b>Chinese Tin Exports 2000* (t)</b>	
January	5,208.00
February	7,980.00
March	8,335.00
April	6,162.00
May	5,975.00
June	6,294.00
July	7,040.00
August	6,425.00
September	5,365.00
October	4,987.00
November	5,584.00
December	8,376.00
<b>Total</b>	<b>77,731.00</b>

\*unwrought tin and tin alloys (based on reported customs figures)