

LEAD

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World consumption of lead in 2000 reached 6.5 Mt, up 3.2% from the all time high reached in 1999. Metal production was also up 5.5%, at 6.6 Mt, while mine production actually decreased to 2.94 Mt. In the Western World, just under 61% of metal production came from secondary sources.

Net imports of lead into the Established Market Economy Countries (EMECs) were estimated at 508,000 t, a similar level to 1999 and up a very significant 78.8% on the 1998 level of 284,000 t. Despite this, LME stocks fell from 176,400 t at the end of 1999 to a total of 131,000 t, having reached a low point of 102,900 t in March. The lead price again weakened throughout the year, with the average LME settlement price falling to US\$454/t as compared to US\$502 in 1998, US\$528 in 1997 and as high as US\$624 in 1997. The price rallied a little in the last quarter to finish the year at US\$471/t.

Supply and Demand

EMEC mine production fell slightly from 1999 levels, at 2.23 Mt, down 33,000 t. Production in the Americas fell by 64,000 t to 1.05 Mt, with deliberate production cuts announced by Doe Run and problems at Cominco's Sullivan mine not being matched by increased output in Mexico. Production in Australia was up by 17,000 t to 650,000 t, with Pasminco's Century mine coming on stream, the first shipments being made from the Karumba port complex in August. In Western Europe, production increased 13.2% to 240,000 t. The increase was largely due to improved production in Ireland and the reopening of the Los Frailes mine in Spain which had been closed since April 1998 due to the failure of a tailings dam. However, the latter could be a short reprieve as Boliden has indicated an unwillingness to open a third pit at Los Frailes in the current climate of lead prices which

could result in the mine's closure in October 2001.

EMEC metal production increased by 40,000 t (0.8%) to 5.04 Mt in 2000. Secondary production increased to 3.08 Mt (up 3.8%) representing just under 61% of total metal production. Primary production decreased to 1.97 Mt, (0.9%) over the 1999 level, as concentrate availability tightened during the year. Scrap supplies in the US and Europe were generally adequate last year. A principal difficulty has been trying to maintain margins in the light of the competition for scrap and a declining lead price. In Europe this has caused concern about collection rates when lead scrap prices barely cover the cost of collection.

In Western Europe, metal production was virtually unchanged at 1.62 Mt, of which secondary production accounted for 1.06 Mt (65.2%). Output in Germany increased from the 1999 level of 353,000 t to 388,000 t while in France production fell again by 11,000 t to 262,000 t. There were also production increases in Belgium (up 9,000 t) and in Italy (up 13,000 t) but in the UK, by contrast, production fell by 36,000 t from 372,000 t to 346,000 t. The fact that secondary production in the UK increased to 191,000 t from 182,000 t in 1999 suggests that primary production was down by 35,000 t, presumably due to the reduction in bullion shipments from Mount Isa in Australia.

In the US, metal production fell by 14,000 t to 1.43 Mt, with primary production at 342,000 t, down by 8,000 t, and secondary production down 6,000 t to 1.09 Mt, representing 76.1% of the total. In Canada, production was 284,000 t, up 17,000 t on 1999 representing a much-improved performance from Cominco's Trail smelter with its Kivcet furnace. Production improved in Mexico, however,

now that the Peñoles Torréon smelter is back in full production following the problems of 1999, when it was forced to operate at lower production levels for environmental reasons.

In Asia, production at 2.15 Mt was 262,000 t (13.9%) up from 1999 levels and a significant 30.1% increase over 1998. China, up 215,000 t (23.4%) again led the way and there were further production improvements in Japan, Kazakhstan and in the Republic of Korea. The surge in production from China in particular has had a significant impact on LME stocks and consequently the prospects for the lead price. However, in the last quarter of the year, concentrate availability tightened, coupled with less attractive treatment charges, and this has resulted in lower Chinese imports of concentrates.

In Australia, some production was lost at MIM's Mount Isa smelter owing to downtime needed to make changes to accommodate feedstock from the George Fisher Project.

EMEC lead consumption was 5.57 Mt, 2.5% above the previous record level set in 1999. The economic situation was strong in North America in the early part of 2000 but there were ominous signs of a slow-down in the second half of the year. The economy in Europe has been strong in 2000 and recovery of the economic situation has continued in South-east Asia following the problems arising from the currency crisis in 1997 and lead consumption is now edging above 1997 levels in these countries. Japan also felt the impact of the economic problems in the area but lead consumption seems slower to recover because some companies have moved battery production to other countries in the region.

European vehicle production increased by 1.0% to a new record of 15.47 million units, although as in 1999, the picture varied considerably from country to country. In France, production was up 8.5% to a new record of 3.36 million units, and Italy and Spain showed improvements of 0.9% and

6.3% respectively. By contrast, German and UK production were down 2.5% and 8.1% respectively. In the US, vehicle production was down just 1.7% over 1999 at 12.82 million units. However, this figure conceals a worsening economic situation during the year as production figures slid from 6.2% up in the first quarter to 10.2% down in the last quarter of the year. Battery shipments fared less badly at 99.6 million units (down 0.75% from the previous year's record), with replacement batteries accounting for 81.1 million and original equipment batteries almost 18.5 million units.

Japanese vehicle production was up 2.5% on the 1999 levels at 10.1 million units. Battery production showed a healthy 7.6% increase on 1999 and was better than 1997 levels.

In 2000, it is estimated that the gap between Western World production of lead metal and consumption was 523,000 t. Net imports from the former Eastern Bloc countries were 503,000 t, up 2.9% over 1999 levels of 489,000 t. Chinese exports reached 440,000 t and there were significant exports from Kazakhstan. US stockpile releases were reduced to 32,000 t in 2000, compared with 60,000 t the previous year. As a consequence, LME stocks decreased from the 176,000 t at the end of 1999, to 131,000 t at the end of 2000. Stocks in the Helsingborg warehouse decreased from 62,000 t in 1999 to 28,000 t at the end of 2000.

Price Trends

The lead settlement price started the year at US\$477.50/t but LME stocks continued to rise to over 200,000 t and, as result of this, the lead price fell progressively, reaching a low of US\$399/t on April 27, the lowest price for almost seven years. From this point on, LME lead stocks began to fall and with the generally tight supply of both concentrates and physical lead, sentiment changed and prices began to rise to a high of US\$518.50 on September 27, 2000. A sudden increase in LME stocks of over 40,000 t in just two days in early October reversed the trend and

the price dropped as low as US\$446 before finishing the year at US\$471/t. The stock ratio (total stocks/consumption) has remained consistently below five weeks. Having started the year at 4.8 weeks it progressively fell, to end the year at an estimated 3.9 weeks.

Lead scrap prices have generally fallen as the LME price has declined and the smelters tried to retain margins. In the US, the average scrap price in 2000 was 5.4 c/lb and was at a level of 5.3 c/lb at the year-end, a decrease of 3.9%. In Europe, the picture was more variable, with UK prices declining from an average of £69/t in 1999 to average only £52/t in 2000 (- 24.6%), in Germany from an average of DM186/t to DM171/t (-7.7%) and in France from FF654/t to FF540/t (-17.5%).

The lead-acid battery remains the key market for lead, particularly the automotive battery, and thus growth is dependent on the health of the automotive markets around the world. These started the year relatively buoyant in the US and Europe with the replacement battery market particularly strong in the US. However, the downturn in the US economy has affected confidence and there is no sign of a recovery in the first quarter of 2001 with vehicle production down almost 20% year-on-year.

In terms of future prospects for growth of the lead market, most of the threats and opportunities come from the battery market. As reported previously, the increasing complexity of the electrical equipment on the modern car may well result in the increase of the voltage from the existing 12 volt systems to 36 volts or even a dual voltage system. Whereas this could mean an increased demand for lead, it could result in some competition for part of the electrical requirement from other battery systems. As in the quest for a reliable battery for electric

vehicle applications, cost and weight could be the competing factors and although work continues in this area, the outcome is still far from clear.

While European legislation against cadmium in vehicles could rule the nickel/cadmium battery out of the picture as a competitor, both nickel/metal hydride and lithium-ion battery systems will be making a strong play for this market but, at the moment, cost would seem to be their main problem. The lead acid system will have to demonstrate that it can do the job required in a reliable fashion. The position could become clearer in the next year or so as some top end European models seem destined to lead the change.

Despite continued research on batteries, there is little progress being made in the introduction of pure electric vehicles. The vehicle manufacturers seem to be moving towards the hybrid electric vehicle, in which a small engine used in tandem with an electric motor and battery can cut fuel consumption to around 80 miles/gallon. Toyota is selling the Prius in Europe and Honda started marketing the Insight in the UK in September 2000. GM and Ford seem set to follow suit in the US with hybrid versions of their sports utility vehicles. Currently, however, the battery of choice for this type of vehicle is the nickel/metal hydride type but this is acknowledged to be very expensive.

Research continues into the improvement of the valve-regulated lead-acid battery through the initiatives of the industry-supported Advanced Lead-Acid Battery Consortium. One such project, part sponsored by the DTI in the UK, is seeking to develop a novel lead acid battery and management system for HEV applications. When developed, the battery will be evaluated in a Honda Insight which has been acquired for the purpose.

| World Lead Production ('000t) | | | | | | | | | |
|-------------------------------|------------------------------------|------------|------------|------------------|--------------|--------------|------------------------------------|--------------|--------------|
| | Mine Production (Metal Content) | | | Metal Production | | | Metal Consumption Refined Metal | | |
| | 1998 | 1999 | 2000 | 1998 | 1999 | 2000 | 1998 | 1999 | 2000 |
| EUROPE | 360 | 365 | 361 | 1,848 | 1,847 | 1,893 | 1,954 | 1,998 | 2,074 |
| Albania | - | - | - | - | - | - | 1 | 1 | 1 |
| Austria | - | - | - | 23 | 24 | 24 | 66 | 64 | 64 |
| Belgium | - | - | - | 92 | 109 | 118 | 58 | 51 | 55 |
| Bosnia | 1 | - | - | - | - | - | 6 | 6 | 6 |
| Bulgaria | 24 | 14 | 10 | 77 | 82 | 87 | 9 | 7 | 9 |
| Croatia | - | - | - | - | - | - | 4 | 4 | 5 |
| Czech Republic | - | - | - | 24 | 25 | 28 | 38 | 42 | 47 |
| Denmark | - | - | - | - | - | - | 4 | 4 | 4 |
| Finland | 3 | - | - | - | - | - | 3 | 3 | 3 |
| France | - | - | - | 289 | 273 | 262 | 251 | 259 | 259 |
| Germany | - | - | - | 353 | 353 | 388 | 356 | 372 | 379 |
| Greece | 23 | 19 | 16 | 6 | 5 | 6 | 11 | 12 | 12 |
| Hungary | - | - | - | - | - | - | 9 | 10 | 10 |
| Ireland | 36 | 39 | 57 | 13 | 11 | 10 | 26 | 32 | 31 |
| Italy | 7 | 8 | 7 | 199 | 215 | 228 | 262 | 279 | 283 |
| Macedonia | 30 | 27 | 26 | 28 | 22 | 26 | 6 | 6 | 6 |
| Netherlands | - | - | - | 17 | 18 | 20 | 51 | 30 | 32 |
| Norway | - | - | - | - | - | - | 2 | 3 | 4 |
| Poland | 60 | 68 | 50 | 64 | 70 | 70 | 59 | 64 | 68 |
| Portugal | - | - | - | 4 | 5 | 4 | 31 | 24 | 28 |
| Romania | 15 | 21 | 18 | 20 | 18 | 27 | 17 | 18 | 20 |
| Russian Federation | 13 | 14 | 15 | 36 | 44 | 50 | 92 | 95 | 105 |
| Slovak Republic | - | - | - | - | - | - | 4 | 4 | 4 |
| Slovenia | - | - | - | 14 | 15 | 14 | 16 | 16 | 17 |
| Spain | 19 | 28 | 51 | 90 | 86 | 91 | 188 | 192 | 200 |
| Sweden | 112 | 118 | 109 | 87 | 79 | 77 | 32 | 32 | 31 |
| Switzerland | - | - | - | 10 | 10 | 10 | 11 | 13 | 14 |
| Ukraine | - | - | - | 9 | 7 | 6 | - | - | - |
| UK | 1 | - | - | 370 | 372 | 346 | 310 | 329 | 350 |
| Yugoslavia | 16 | 9 | 2 | 23 | 4 | 1 | 14 | 10 | 10 |
| Other CIS | - | - | - | - | - | - | 14 | 16 | 17 |
| AFRICA | 182 | 180 | 181 | 127 | 131 | 135 | 124 | 124 | 126 |
| Algeria | 1 | 1 | 1 | 6 | 6 | 6 | 21 | 21 | 21 |
| Egypt | - | - | - | - | - | - | 8 | 8 | 9 |
| Kenya | - | - | - | 1 | 1 | 1 | 3 | 3 | 3 |
| Morocco | 80 | 80 | 84 | 65 | 65 | 69 | 9 | 9 | 9 |
| Namibia | 14 | 12 | 12 | - | - | - | - | - | - |
| Nigeria | - | - | - | 4 | 4 | 4 | 5 | 5 | 6 |
| South Africa | 84 | 80 | 77 | 52 | 52 | 53 | 66 | 64 | 64 |
| Tunisia | 3 | 7 | 7 | - | - | - | 6 | 6 | 6 |
| Zambia | - | - | - | 1 | - | 1 | 1 | 1 | 1 |
| Zimbabwe | - | - | - | 2 | 1 | 1 | - | - | - |
| Other Africa | - | - | - | - | - | - | 5 | 7 | 7 |

| World Lead Production ('000t) cont. | | | | | | | | | |
|-------------------------------------|------------------------------------|--------------|--------------|------------------|--------------|--------------|------------------------------------|--------------|--------------|
| | Mine Production (Metal Content) | | | Metal Production | | | Metal Consumption Refined Metal | | |
| | 1998 | 1999 | 2000 | 1998 | 1999 | 2000 | 1998 | 1999 | 2000 |
| AMERICA | 1,146 | 1,113 | 1,049 | 2,166 | 2,137 | 2,191 | 2,179 | 2,253 | 2,274 |
| Argentina | 15 | 14 | 14 | 31 | 26 | 30 | 37 | 32 | 34 |
| Bolivia | 14 | 10 | 10 | - | - | - | - | - | - |
| Brazil | 8 | 10 | 9 | 48 | 52 | 50 | 108 | 108 | 114 |
| Canada | 190 | 162 | 149 | 266 | 267 | 284 | 70 | 70 | 67 |
| Chile | - | - | - | - | - | - | 8 | 7 | 8 |
| Colombia | - | 1 | 1 | 12 | 11 | 11 | 14 | 12 | 14 |
| Honduras | 4 | 5 | 5 | - | - | - | - | - | - |
| Mexico | 166 | 120 | 138 | 259 | 199 | 244 | 163 | 179 | 185 |
| Peru | 258 | 271 | 271 | 104 | 111 | 116 | 16 | 16 | 16 |
| Trinidad | - | - | - | 1 | 1 | 1 | - | - | - |
| US | 491 | 520 | 452 | 1,420 | 1,447 | 1,433 | 1,728 | 1,791 | 1,795 |
| Venezuela | - | - | - | 25 | 23 | 22 | 32 | 29 | 31 |
| Other America | - | - | - | - | - | - | 4 | 9 | 10 |
| ASIA | 722 | 696 | 695 | 1,652 | 1,888 | 2,150 | 1,673 | 1,810 | 1,925 |
| China | 581 | 549 | 560 | 757 | 918 | 1,133 | 505 | 524 | 565 |
| India | 38 | 38 | 33 | 65 | 64 | 70 | 95 | 112 | 119 |
| Indonesia | - | - | - | 22 | 18 | 18 | 40 | 45 | 46 |
| Iran | 13 | 15 | 15 | 47 | 47 | 40 | 70 | 75 | 75 |
| Israel | - | - | - | 12 | 13 | 13 | 11 | 12 | 14 |
| Japan | 6 | 6 | 9 | 302 | 293 | 311 | 308 | 289 | 297 |
| Kazakhstan | 26 | 31 | 31 | 92 | 159 | 165 | 10 | 10 | 11 |
| Korea DPR | 30 | 26 | 22 | 25 | 22 | 19 | 20 | 17 | 15 |
| Korea, Rep. | 4 | 2 | 2 | 180 | 190 | 212 | 236 | 272 | 290 |
| Malaysia | - | - | - | 29 | 33 | 35 | 62 | 76 | 86 |
| Myanmar (Burma) | 2 | 2 | 2 | 2 | 2 | 2 | - | - | - |
| Pakistan | - | - | - | 3 | 3 | 3 | 10 | 10 | 12 |
| Philippines | - | - | - | 22 | 24 | 25 | 26 | 42 | 42 |
| Saudi Arabia | - | - | - | 18 | 20 | 20 | 8 | 10 | 12 |
| Singapore | - | - | - | - | - | - | 13 | 14 | 14 |
| Sri Lanka | - | - | - | 1 | 1 | 1 | - | - | - |
| Taiwan, China | - | - | - | 39 | 45 | 42 | 132 | 150 | 145 |
| Thailand | 7 | 12 | 10 | 22 | 26 | 33 | 46 | 66 | 95 |
| Turkey | 12 | 14 | 10 | 12 | 8 | 6 | 59 | 60 | 63 |
| UAE | - | - | - | 2 | 2 | 2 | - | - | - |
| Uzbekistan | 1 | - | - | - | - | - | - | - | - |
| Other CIS | 2 | 1 | 1 | - | - | - | 2 | 2 | 3 |
| Other Asia | - | - | - | - | - | - | 6 | 6 | - |
| Other Asia West | - | - | - | - | - | - | 14 | 18 | 14 |
| OCEANIA | 584 | 633 | 650 | 206 | 278 | 261 | 64 | 64 | 50 |
| Australia | 584 | 633 | 650 | 200 | 272 | 256 | 54 | 56 | 41 |
| New Zealand | - | - | - | 6 | 6 | 5 | 10 | 8 | 9 |
| World Total | 2,994 | 2,987 | 2,936 | 5,999 | 6,281 | 6,630 | 5,991 | 6,249 | 6,449 |
| Western World | 2,243 | 2,261 | 2,228 | 4,895 | 4,935 | 5,044 | 5,205 | 5,431 | 5,567 |

The slowdown in the US economy will have a negative impact on battery sales in 2001 but, as yet, the impact elsewhere is unclear. The telecom sector is also in a somewhat troubled state and a slowdown of growth in this area could impact sales of industrial batteries to this market which has been seeing spectacular growth in recent years. Much will depend on whether the planned developments in this area attract the public to purchase any necessary equipment. On the positive side for the lead price, the market for lead, both in concentrate form and in physical metal remains tight and is probably likely to get worse rather than better in the foreseeable future.

Health and Environmental Issues

It is widely recognised that lead is a material with potentially harmful properties. However, there is an important difference between a substance having harmful properties (ie its hazardous characteristics), and the ability of these properties actually to cause harm to humans or the environment (ie the risk it presents). Hazard relates to the intrinsic properties of a substance, whereas risk is associated with the way in which a material is used. To ensure the safety of both human health and the environment, the use of lead is tightly regulated to reduce any risks associated with its use. However, despite the many measures already taken, which have resulted in significant reductions in the emissions of lead to air, water and soil over the past 20-30 years, the use of lead often continues to be targeted by regulators on the basis of hazard.

One of the most important issues in early 2001, both for the lead industry and for industry as a whole, has been the launch of a European Commission draft white paper on chemicals policy which sets out a new approach for the management of all chemicals in the EU. Proposals include:

- Use of "the reversal of the burden of proof" principle, whereby industry should become responsible for the testing and risk assessment of its own chemicals, only

producing and using chemicals which it had demonstrated to be safe, and

- The use of a stringent authorisation system for chemicals of particular concern. This would involve the granting of special permission to enable a substance of concern to be used in a specific application which industry had demonstrated to be safe through the use of risk assessment.

A number of other important issues have also been occurring at EU level. The European Commission's Scientific Committee on Occupational Exposure Limits (SCOEL) has released a recommendation for new lead in blood (30 µg/dl) and lead in air (100 µg/m³) limits. The End-of-Life Vehicles Directive is now in force, and progress towards a directive restricting the use of lead in electrical and electronic equipment is continuing.

A significant issue in 2000 was the proposal by Denmark for a ban on the use of lead. The European Commission referred this to its Scientific Committee on Toxicology, Ecotoxicology and the Environment (CSTEE) for an Opinion on whether such a measure was justified and in proportion to the perceived risks. The CSTEE's opinion concluded that the introduction of a general ban on the use of lead was not justified on either health or environmental grounds. However, despite these findings, the Danish authorities signed an official order banning a range of uses. The first prohibitions entered into force on March 1, 2001, with others to be introduced at various times up to 2004. Industry is investigating the possibility of legal action.

In a major new initiative in defence of lead, the European lead industry has launched a voluntary risk assessment on lead. This will investigate the nature and scale of any risks associated with the use of lead and, if found, how these risks should be managed. The three-year project has the support and involvement of both Member States and the European Commission.