

# LEAD

*By Allan Cooper*

**W**orld consumption of lead in 2002 was 6.55 Mt, up 0.9% from the level reached in 2001. Metal production was also up 0.9%, at 6.60 Mt, despite mine production at 2.74 Mt being down 8.5% on output in 2001. In the Western World, 62.5% of metal production came from secondary sources, up slightly from the previous year's level of 61.9 %.

Net imports of lead into the Western World were estimated at 441,000 t, 15.5% down on the 2001 figure of 522,000 t. Despite this, LME stocks rose to 184,000 t at the end of 2002 compared with a total of 97,000 t at the end of 2001. The lead price fell during the year, with the average LME settlement price falling to US\$452.5/t as compared with US\$476/t in 2001. The price finished on a weak note to end the year at US\$421.50/t.

## **Supply and demand**

Western mine production decreased almost 10% from 2001 levels, at 2.02 Mt, down 224,000 t. Production in the Americas fell 5.8% to 1.02 Mt, caused mainly by production losses in the US and Canada, the latter mainly due to closures of Cominco's Sullivan and Polaris mines. Production in Australia fell back almost to 2000 levels at 658,000 t, from the 715,000 t reached in 2001. In Western Europe, production collapsed from 200,000 t to 115,000 t. This decrease was largely due the closure of Boliden's Laisvall mine in Sweden and the company's Los Frailes mine in Spain. Also, mining operations at the Tara mine in Ireland were suspended for much of the year.

Total Western refined metal production fell slightly by 29,000 t (0.6%) to 4.90 Mt in 2002. Secondary production increased to 3.06 Mt (up 1.0%) representing 62.5% of total metal production. Primary production again decreased to 1.84 Mt, (3.2%) from the 2001 level, as concentrate availability continued to tighten during the year. Scrap supplies in the US and Europe have generally been on the short side – due largely to mild winter weather and a seemingly increasing battery life.

In Western Europe, metal production fell a further 91,000 t to 1.48 Mt (5.8%), of which secondary production accounted for 1.0 Mt (67.4%). Output in Germany was virtually unchanged from the 2001 level at 378,000 t while in France production fell again, by 27,000 t to 203,000 t due mainly to the closure of Metaleurop's Villefranche smelter. This was closed, along with Oker in Germany, and both plants are operating as battery treatment plants, supplying feed to the Noyelles-Godault and Nordenham plants. There were also production decreases in Belgium (down 12,000 t) and in Sweden (down 10,000 t) because of lower concentrate supplies. In Italy production was down 29,000 t because of extended shut downs at Porto Vesme. The future of this plant remains in doubt because of the feed supply situation and the high power prices on Sardinia. In the UK, production decreased by 14,000 t from

382,000 t to 368,000 t. The closure of MIM's secondary smelter at Wakefield, which had been operating below capacity, was announced at the end of the year.

In the US, metal production was down only slightly at 1.36 Mt (1.2%), with primary production at 260,000 t, down by 16,000 t due to production cutbacks at Doe Run. Secondary production was up 13,000 t at 1.10 Mt, representing 81% of the total. In Canada, production was 251,000 t, up 20,000 t on 2001. This reflects the absence of a prolonged closure of the Trail smelter which occurred in 2001 although the production increase there of some 25,500 t was partly offset by lower production at Noranda's Belledune smelter. Production in Mexico was up 2.5% at 232,000 t.

In Asia, production continued to increase strongly to 2.32 Mt, up 159,000 t (7.4%) from 2001 levels. Production increases were recorded in India (23.8%), Kazakhstan (4.4%) and the Korean Republic (8.5%) but China led the way with production increasing from 1.17 Mt in 2001 to 1.29 Mt, an increase of 9.9%. Many Chinese smelters have increased capacity and it seemed to be only in the latter part of the year that the concentrate shortage was really beginning to bite.

In Australia metal production increased to 302,000 t (11.4%) largely as a result of increased production at Pasminco's Port Pirie plant.

Lead consumption in the Western world fell again in 2002 to 5.35 Mt, 2.0% below 2001 and 4.9% below the record level set in 2000. Demand for lead continued to be very sluggish in the US. Consumption was down by 131,000 t (7.4%) to 1.56 Mt, and a full 12.7% down on the level in 2000. Part of this fall can be explained by the movement of some battery production to Mexico, but a major factor would be the poor state of the industrial battery market. In Western Europe, consumption was down 54,000 t (3.1%) at 1.68 Mt. In Asia, once again China showed an impressive growth in consumption of 22.8% to 860,000 t, and fully 45.8% over the 2000 level. In most of the region demand showed some signs of growth but in Japan consumption fell back further to 252,000 t, a drop of 32,000 t (11.3%) on the 2001 level, probably reflecting increased battery production offshore.

Western European car sales fell by 3.6% to 14.3 million passenger cars in 2002 although the UK bucked the trend to set a record of 2.56 million new registrations, helped by a series of sales incentives during the year. In the US, vehicle production was up 6.9% over 2001 at 12.17 million units although vehicle sales in the US actually fell by 2% despite sales inducements. According to BCI data, in 2002, replacement battery shipments were 88.1 million and 20.4 million for original equipment in the US, Canada and Mexico. By comparison, the previous year's figures for the same countries were replacement batteries at 86.2 million and original equipment batteries at the same level of 20.4 million units.

Japanese vehicle production rose by 4.9% on the 2001 levels to 10.3 million units although domestic sales were down 1.9%.

In 2002 it is estimated that the gap between Western production of lead metal and consumption was 447,000 t. Net imports from the former Eastern Bloc countries were estimated at 441,000 t, down 15.5% on 2001 levels of 522,000 t. US stockpile releases were 26,000 t in 2002 compared with 40,000 t the previous year. LME stocks increased from the 97,000 t at the end of 2001, to 184,000 t at the end of 2002. Of these stocks, 48,000 t were held in Singapore and 121,000 in US warehouses. The low stocks in Europe reflect tightening supplies.

### **Price trends**

The lead settlement price started the year at US\$504/t and concerns about potential shortages, should Porto Vesme close, drove the price to a high of US\$538 on January 11. However, with demand for lead generally soft, especially in the US, lead reversed the upward trend with the result that the price of lead reached a low of US\$402.50/t on October 1. The price has remained generally weak and it closed the year at US\$421.50/t. The stock ratio (total stocks to consumption) has increased from the level of around 4.4 in 2001 to a peak of 5.6 weeks in the second quarter of 2002, and finishing the year at 4.9 weeks.

In the US, the average scrap price in 2002 was US\$0.057/lb and was at a level of US\$0.058/lb at the year-end, the same as December 2001. In Europe, UK prices have been static at an average of £50/t in 2001 and 2002, whereas in Germany the price has declined from an average of €87/t to €86/t and in France it has increased from €80/t to €82/t, narrowing the price differential between the two countries to €4/t.

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 2003 generally down in the US, Europe and Japan with the replacement battery market also weak in the US following a mild winter, despite belated cold weather in the northeast of the country.

In terms of future prospects for growth of the lead market, most of the threats and opportunities continue to come from the battery market. Although there has been a lot of talk about the move to 36V electrics in cars, there have been no other additions to the market since the launch of the Toyota Crown in the last quarter of 2001. While the emphasis seems to have moved away from the pure electric vehicle, except perhaps in certain types of airport service vehicles, there is as yet little sign of a major market penetration of the hybrid and mild hybrid approach as typified by the Toyota Crown. While it is clear that this type of vehicle can deliver significant fuel economies, and a corresponding saving in harmful emissions, manufacturers seem to be holding off from these major changes as long as possible.

As stated in this review last year, this type of service can cause problems for the lead-acid battery. The battery must be able to deliver charge and receive it at high rates and to do this must operate in a partial state of charge mode so

that it will not become overcharged or too deeply discharged. A much more systems-orientated battery solution is required. Otherwise, the much more expensive Nickel/Metal Hydride or Lithium Ion systems could gain a share of this market. Research is under way to try and solve some of these problems in programmes sponsored by the Advanced Lead Acid Battery Consortium. One such project should produce some interesting results during 2003, when a specially developed lead-acid battery will be retro-fitted into a Honda Insight and undergo extensive testing. It is important for lead-acid to succeed in this market, not solely to avoid the risk of substitution, but for the fact that this generation of batteries will contain up to 50% more lead than in the present 12 volt units.

Aside from a generally indifferent world economy, another principal cause of the poor demand for lead has been the poor performance of the industrial battery market, especially in the telecoms field. While this has by now almost certainly bottomed out, there are by no means signs that the market is returning to its former state of growth.

Should the economic picture improve during 2003, and lead consumption show signs of growth, price movement could come quite quickly. There have been many cutbacks in mine production in recent times and this is now being compounded by smelter closures, particularly in Europe. Supplies here are now very tight and spot lead premia are increasing. As stated earlier, LME stocks are currently nearly all in the US and the Far East. Demand is strong in the Far East and should the US-held stocks decline, or move to Europe attracted by the higher premia, concerns over supplies could see big price changes. This could be particularly true as increasing domestic demand, coupled with a shortage of concentrates on the market, is reducing China's ability to export lead.

### **Health and environmental issues**

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. However, the industry is taking steps to ensure it is represented at the appropriate levels when new regulations are being formulated.

Lead Development Association International (LDAI) has continued to coordinate work on the voluntary risk assessment on lead on behalf of the European lead industry. The three-year project was officially launched on January 1, 2002 and has been following the official EU process for risk assessment. The Netherlands Government had agreed to participate in the process as the official sponsoring country to ensure that the assessment is carried out in a fair and credible way, and independent experts in relevant health and environmental disciplines have been retained by industry to form scientific review panels. Both the health and environmental proposals were well received by the review panels with a range of constructive comments

being put forward. Both these recommendations, and the proposals themselves, were approved by the reviewing country, with only a small number of amendments being suggested. Extensive literature searches were carried out which identified several hundred documents relating to lead. In order to fill the remaining data gaps in the effects assessment, LDAI established a number of specific research projects covering issues such as effects data for the aqueous environment. Meanwhile LDAI began data collection on exposure in the final quarter of 2002 by means of the distribution of occupational exposure and environmental emissions questionnaires to all sectors of the lead industry. LDAI also continued to co-ordinate the development of a European lead communications strategy, including close involvement with the production of a lead sustainability brochure.

At the European Union level an important issue has been the European Commission's proposal for a New Chemicals Policy. This includes a system by which manufacturers and importers would be responsible for assessing the risks associated with their substances. Indeed for substances of high concern (possibly including lead) positive authorisation would be required for their continued use.

There have been a number of other important issues at EU level. In 2000, the European Commission's Scientific Committee on Occupational Exposure Limits (SCOEL) released its recommendation for new lead in blood ( $30\mu\text{g}/\text{dl}$ ) and lead in air ( $100\mu\text{g}/\text{m}^3$ ) limits. LDAI has continued to work closely with the Eurométaux Intersectorial Lead Group in co-ordinating industry's response on both scientific and socio-economic grounds.

The European Commission has continued to develop its proposals with regard to the end-of-life management of priority waste streams. Progress continued towards complementary Directives on Waste Electrical and Electronic Equipment and Restrictions on Hazardous Substances and, through the LDAI, the industry has been involved in lobbying activities aimed at reducing the scope of the proposed restrictions on lead.

Another significant issue addressed during 2002 was the development of an EU Water Framework Directive which would replace existing legislation on water quality. A Eurométaux Project Team is responsible for related scientific issues, particularly the potential classification of lead as a priority hazardous substance which would result in a requirement for emissions to be completely phased out by 2020.

**Lead Production and Consumption ('000 t)**

	<b>Mine Production (Metal Content)</b>			<b>Metal Production</b>			<b>Metal Consumption Refined Metal</b>		
	2000	2001	2002	2000	2001	2002	2000	2001	2002
<b>Europe</b>	360	330	249	1,882	1,883	1,764	2,048	2,039	2,049
Albania	-	-	-	-	-	-	1	1	1
Austria	-	-	-	24	22	21	61	59	56
Belgium	-	-	-	119	100	88	57	40	38
Bosnia	-	-	-	-	-	-	6	6	6
Bulgaria	14	16	24	84	81	66	13	14	15
Croatia	-	-	-	-	-	-	5	5	5
Czech Republic	-	-	-	28	28	28	70	78	79
Denmark	-	-	-	-	-	-	1	1	1
Finland	-	-	-	-	-	-	2	2	3
France	-	-	-	262	230	203	268	265	250
Germany	-	-	-	387	375	378	390	403	381
Greece	16	27	29	5	5	5	9	7	8
Hungary	-	-	-	-	-	-	10	11	11
Ireland	57	45	32	9	10	7	29	34	41
Italy	3	4	4	231	222	193	279	284	286
Macedonia	24	24	24	23	20	20	6	7	12
Netherlands	-	-	-	21	20	18	29	30	30
Norway	-	-	-	-	-	-	4	2	4
Poland	51	53	45	56	66	50	52	59	55
Portugal	-	-	-	4	4	4	22	24	19
Romania	19	19	17	24	29	28	20	20	20
Russian Federation	14	14	19	32	58	63	83	94	111
Serbia & Montenegro	4	5	5	1	-	-	10	10	10
Slovak Republic	-	-	-	-	-	-	4	5	5
Slovenia	-	-	-	14	14	14	17	15	20
Spain	51	36	6	120	122	125	231	246	240
Sweden	107	88	44	78	75	65	11	10	5
Switzerland	-	-	-	10	8	9	11	11	7
Ukraine	-	-	-	15	12	12	-	-	-
UK	-	-	-	338	382	368	328	315	310
Other CIS	-	-	-	-	-	-	20	22	20

Table continued next page

	2000	2001	2002	2000	2001	2002	2000	2001	2002
<b>Africa</b>	178	149	125	125	125	131	131	130	138
Algeria	1	1	1	6	6	6	21	20	21
Egypt	-	-	-	-	-	-	9	9	9
Kenya	-	-	-	1	1	1	3	3	3
Morocco	82	77	73	67	58	65	11	13	12
Namibia	12	12	12	-	-	-	-	-	-
Nigeria	-	-	-	4	3	3	6	6	6
South Africa	75	51	33	46	55	55	59	59	65
Tunisia	7	7	6	-	-	-	6	5	6
Zambia	-	-	-	1	1	1	1	1	1
Other Africa	--	-	--	--	--	--	14	14	15
<b>America</b>	1,053	1,074	1,017	2,215	2,058	2,082	2,281	2,147	2,060
Argentina	14	12	12	36	35	42	29	12	24
Bolivia	10	9	9	-	-	-	-	-	-
Brazil	8	9	11	50	47	47	114	112	112
Canada	149	154	97	284	231	251	68	55	58
Chile	1	1	-	-	-	-	6	5	2
Colombia	-	-	-	9	9	9	18	17	17
Honduras	5	7	8	-	-	-	-	-	-
Mexico	138	130	140	241	222	232	195	192	225
Peru	271	289	291	116	118	121	16	15	15
US	458	463	448	1,457	1,376	1,359	1,791	1,694	1,563
Venezuela	-	-	-	21	20	21	31	30	28
Other America	-	-	-	-	-	-	13	15	16

Table continued next page



	2000	2001	2002	2000	2001	2002	2000	2001	2002
<b>Asia</b>	806	726	694	2,150	2,163	2,322	1,979	2,062	2,161
China	660	599	568	1,100	1,172	1,288	590	700	860
India	36	32	35	67	63	78	119	127	130
Indonesia	-	-	-	18	18	17	66	46	57
Iran	17	18	17	42	44	44	68	70	68
Israel	-	-	-	13	20	22	14	14	15
Japan	9	5	6	312	303	280	301	284	252
Kazakhstan	39	43	43	208	159	166	11	14	15
Korea DPR	12	9	6	10	7	5	7	5	4
Korea, Rep.	3	1	-	220	211	229	303	314	330
Malaysia	-	-	-	32	38	40	84	82	86
Myanmar (Burma)	1	1	2	2	3	2	-	-	-
Pakistan	-	-	-	3	3	2	12	12	12
Philippines	-	-	-	25	26	26	38	33	34
Saudi Arabia	-	-	-	18	16	16	12	14	14
Singapore	-	-	-	-	-	-	14	14	14
Taiwan, China	-	-	-	42	40	55	145	145	154
Thailand	11	-	3	27	30	43	96	82	111
Turkey	17	16	14	8	8	6	63	62	60
UAE	-	-	-	2	2	2	-	-	-
Other Asia East	-	-	-	-	-	-	3	3	3
Other Asia West	-	-	-	1	1	1	28	32	36
Other CIS	1	1	1	-	-	-	3	6	6
<b>Oceania</b>	650	714	658	263	276	307	46	47	44
Australia	650	714	658	259	271	302	41	41	39
New Zealand	-	-	-	5	5	5	5	5	6
<b>World Total</b>	<b>3,047</b>	<b>3,000</b>	<b>2,744</b>	<b>6,649</b>	<b>6,545</b>	<b>6,606</b>	<b>6,509</b>	<b>6,492</b>	<b>6,552</b>
<b>Western World</b>	<b>2,237</b>	<b>2,245</b>	<b>2,021</b>	<b>5,093</b>	<b>4,929</b>	<b>4,900</b>	<b>5,623</b>	<b>5,458</b>	<b>5,347</b>

Source; International Lead and Zinc Study Group.