

# TUNGSTEN

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The tungsten market in 2002 suffered from a decline in demand for virgin material, largely because there had been substantial purchasing for stocks as prices continued to rise during the first half of 2001. Actual consumption also fell, not least because of economic frailty in the main consumer regions. On the supply side, Western world production of concentrate increased for the first time in several years and announcements continued about new projects.

Given the above, it is not surprising that prices (except ferrotungsten) fell during 2002.

For the first time in several years, there was an increase in production in countries (Table 1) other than China consequent upon the re-opening of Cantung in northwest Canada after 16 years on care and maintenance (the background to this move was given in last year's report). It is interesting to note from trade statistics that only 1,700 t were exported in 2002 (into the US), leaving an apparent 1,100 t as stock. Although the mine is guaranteed a floor price which is currently above the concentrate quotation for material required by its principal backers, economic considerations would appear to demand sales of total output. In Portugal, the major shareholder in the Beralt mine announced plans to sell its interest, but other companies maintained their endeavours to open (or re-open) mines in Australia, Thailand and Vietnam.

Production in China has been assessed as usual on the basis of demand for virgin material. In 2002, the estimate of 28,200 t is lower for once than the official figure of 34,600 t. Given, however, that the estimate in 2001 was 12,000 t higher than official data, there is no doubt that some balancing is taking place.

China's Ministry of Land and Resources is examining proposals by the Chinese Tungsten Industry Association (CTIA) to curb mine production. CTIA's case is that export controls on tungsten products failed because the price spike encouraged illegal mines to produce more and have the concentrate converted to ammonium paratungstate (APT) or oxides at small, independent conversion plants, which would export the products outside the licensing system. CTIA is urging the compulsory closure of such plants and has proposed an initial production quota of 22,150 t, distributed amongst 123 mining companies based on production, capacity and reserves. CTIA's plan addresses the real problem of over-supply. It goes to the root by limiting the supply of the raw material from mines and permitting only licensed conversion plants to operate (perhaps 10-20). Successful implementation should, in principle, be more effective than the current licensing system for exports of tungsten products.

Any article about a commodity of which China supplies 75-80% to the world must mention China's entry into the WTO and its implications. China would seem bound to revise its policy of subsidising state-owned industries, amongst which are tungsten enterprises. Other member countries of WTO, however, have always found ways and means to protect their key industries so China will not be unique in finding a solution. The essential problem for China, mentioned in previous articles, is how to cope with job losses without the infrastructure of a social safety-net. Chinese converter and trading companies have already taken large shareholdings in production sources to guarantee supply as a first line of defence in the competition to come for the country's resources.

A production figure for the CIS is not available but is estimated at 3,000 t. The Lermontov and Primorsky mines are the major producers, with additional material perhaps being sourced from Tyznyauz and the Kazakhstan and Uzbekistan regions, with all production being consumed domestically (Table 2).

Reported imports from China by the main consumer countries total 18,100 t, a lower figure than China's own export statistics (19,000 t). No doubt a crackdown by the Chinese authorities on smuggling, and lower prices, have combined to ensure the huge discrepancy of 2001 did not re-occur.

The mix of material imported from China in 2002 was as follows: concentrates 400 t; oxides 6,600 t; tungstates 5,100 t; W powder 1,450 t; W C powder 1,750 t; FeW 2,800 t; total 18,100 t. CIS exports were mostly concentrates.

Stockpiles continue as a source of supply to the market. In the US, small tonnages of FeW and W powder were sold by the Defense Logistics Agency (DLA) but the main tonnage was concentrate. The Defense National Stockpile Center (DNSC) held a meeting with industry in June 2002 to discuss its Annual Materials Plan (AMT) for tungsten. Several companies (US consumers, traders and producers from other countries) submitted written representations urging the DNSC not to offer tungsten for sale in 2002 in order to avoid disrupting a market which was already over-supplied. An announcement in early September, however, stated that the DNSC would resume its sales programme later in the month, inviting offers for ores and concentrates.

At the end of the year, there were some 28,750 t of concentrate and 500 t of W powder left available for sale.

In the CIS, it is assumed that exports originate from stocks and, to end 2002, some 50,000 t have been exported since 1992 when the CIS first became a source of supply (Table 3).

Tungsten consumption is dependent on a healthy industrial climate, with its main uses being in cemented carbides, alloyed steels, super alloys, electrical and electronic products, and armaments (Table 4).

Tungsten is a metal of many superlatives. It has not only the highest melting point of all elements except carbon – sources in scientific literature vary between 3,387°C and 3,422°C – but also excellent high temperature mechanical properties and the lowest expansion coefficient of all metals. A temperature of about 5,700°C is needed to bring tungsten to the boil, which corresponds approximately to the temperature of the sun's surface. Tungsten is also among the heaviest metals. Its electrical conductivity at 0°C is about 28% of that of silver, which itself has the highest conductivity of all metals.

Tungsten is an essential commodity whose unusual properties make an important contribution, through its use in cemented carbide and high-speed steel tools, to the achievement of high productivity levels in metal and wood-working, construction, mining and wear protection, on which the world's economic well-being depends. In the household, tungsten is used in light bulbs, television sets, magnetrons for microwave ovens and other electrical consumer products. Other applications include chemical uses, mainly in the form of catalysts.

Demand reflects the supply of the raw material to the market in a specified period, whether purchased for consumption or stocks. Actual consumption, including recycled material, is much more difficult to assess. A figure of 25-30% is regularly used as an overall average to add in to the demand statistics to cover the consumption of scrap but two or three major consumers are known to use much higher percentages although data is kept confidential.

Overall, Western demand for virgin tungsten in 2002 fell by a massive 32% to its lowest level since 1996, as stock accumulation had its inevitable effect. Western Europe (basically the EU countries) witnessed the largest decline in demand, at no less than 54%. It should be recalled, however, that there had been an increase of 43% in 2001 over 2000 and real consumption was reportedly quite strong, so it may be hoped that the demand level will recover in 2003. In Japan, demand fell by 20% despite strong consumption in the auto and PCB drill industries. In the US, demand fell by 14% and actual consumption (according to the USGS) by 11% from 14,500 t in 2001 to 12,900 t which is not surprising in view of the economic situation. As the US Government increases its spending on defence, the consumption may expect to benefit.

For China, a constant estimate of 10,000 t per annum is used. No estimates are given for the CIS where it is assumed that local production is consumed internally and DPR Korea is also an unknown factor, although imports have been reported by China. Elsewhere, demand at 4,300 t was the same as in 2001, with the Republic of Korea (South Korea) the major consumer. Other areas include Israel, South Africa, India, Brazil, Taiwan and Pakistan.

The *Metal Bulletin* quotations for APT, which are the best reflection of the market, fell steadily throughout the year in Europe; in the US, there was a marginal recovery in August from the lowest point in June (Table 5).

**Comment**

The fundamentals of the tungsten market need to shift towards a greater emphasis on new applications and more active promotion of tungsten usage in new and existing applications. Exciting projects such as the green bullet programme and radiation shielding for fusion reactors need to be given wider publicity. Much is heard in the trade press about new sources of supply but little about the demand side. Whilst the strength of the economy, on which tungsten usage is heavily reliant, is beyond the control of the tungsten industry, vigorous promotion of the unique properties of the metal remains firmly within its own powers.

**Table 1 Mine Production (t)**

	<b>2001</b>	<b>2002</b>
(s) Austria	1,450	1,400
(w) Bolivia	500	450
(s) Canada	-	2,800
(w) Mongolia	50	-
(w) Peru	50	50
(w) Portugal	700	700
(w) Rwanda/Uganda	150	350
(s/w) Thailand	150	50
(s/w) Other	150	100
<b>Sub Total:</b>	<b>3,200</b>	<b>5,900</b>
(s/w) China (est.)	38,550	28,200
(s/w) CIS (est.)	3,000	3,000
<b>TOTAL:</b>	<b>44,750</b>	<b>37,100</b>

s/w = scheelite/wolframite

**Table 2. Sources of Supply (t)**

	<b>2001</b>		<b>2002</b>	
China	39,000	80%	28,200	76%
CIS	3,950	8%	1,850	5%
MECs	3,200	6%	4550	12%
DLA	2,500	5%	1,800	5%
Other	350	1%	700	2%
<b>TOTAL:</b>	<b>49,000</b>		<b>37,100</b>	

**Table 3. Demand for Virgin Tungsten**

	2001 (t)	2002 (t)	Market Share
Western Europe	17,600	8,050	22%
Japan	6,850	5,450	15%
US	9,700	8,300	22%
Other Market Economies	4,300	4,300	12%
<b>Sub-Total:</b>	<b>38,450</b>	<b>26,100</b>	
China - Domestic Consumption	10,000	10,000	27%
- Imports of Concentrates	400	900	2%
Other	150	100	-
<b>TOTAL:</b>	<b>49,000</b>	<b>37,100</b>	

**Note:** - Consumption in the CIS and DPR Korea is not known and is excluded.  
- 'Other' includes exports of products by China to E Europe and DPR Korea

**Table 4. Estimated Consumption by End-Use Sectors**

	Western Europe	Japan	US	China	CIS
Hardmetals	62%	53%	66%	41%	55%
Steels / Superalloys	24%	12%	9%	35%	30%
Mill Products	6%	7%	16%	16%	10%
Other	8%	28%	9%	8%	5%

**Table 5. Metal Bulletin Quotations**

	US\$/	Jan 1 2002	Dec 31 2002
Concentrate	mtu WO <sub>3</sub>	40 - 50	32 - 45
APT (US)	mtu WO <sub>3</sub>	81 - 88	64 - 70
APT (Europe)	mtu WO <sub>3</sub>	64 - 77	48-52
FeW (Rotterdam)	kg of W	5.60 - 5.70	5.60-5.90

Note: The US ammonium paratungstate (APT) quotation has been converted from short ton units to metric tonne units for comparison purposes.