



# A PRELIMINARY MARKET REVIEW OF TUNGSTEN

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# 1.0 EXECUTIVE SUMMARY

The supply and demand of most industrial metals and minerals is cyclic and is influenced by many factors. These factors include changes in demand patterns and the substitution of alternative products, the discovery and availability of new mines, and the political and economic structures of the key producing regions. There is almost no exception to these rules.

### **Production and Supply.**

In the late 1980's and early 1990's the supply structure of many of the industrial minerals and metals traditionally produced and consumed in Western markets was disrupted by two major changes in the market. These were increases in Chinese production and the change of the CIS (former Soviet Bloc) from importer to exporter.

Tungsten was one of the minerals quite dramatically affected by these changes. By the early 1990's, China with significant reserves and low cost of production, had secured over 90% of world markets for the production and sale of base concentrates. The Chinese processors also flooded the market with APT at prices marginally above the concentrate price. As a direct result and despite previously strong financial histories, the great majority of Western tungsten miners, including the King Island operation in Tasmania, were driven from the market. Additionally most APT capacity outside China was eventually forced to close.

Tungsten prices (both concentrate and APT) remained extremely low during the 1990's and in fact well below the true cost of production. Many Chinese mines were 'high graded' and APT plants were artificially supported by government export incentives. As a direct result, exploration and mine development programs outside China were almost totally abandoned.

However, commencing in the early part of this decade, the global market structure for tungsten again began to change, particularly driven by a rapid increase in domestic demand of tungsten products in China. This signalled to the global market, two key issues:

- ▶ The rapid increase in demand in China would tighten raw material availability to other markets, particularly given the Chinese Government policy of curtailing mining programs to maintain reserves for future domestic requirements, and
- ▶ The Chinese program of developing downstream processing would place increased pressure on processing companies outside China. In order to remain competitive and secure sufficient base concentrates, these companies urgently needed to develop alternative supplies outside China.

Recognition of these circumstances has since led to a significant increase in exploration and mine development activities outside China and particularly in Vietnam, Australia and in North and South America. However despite this increased activity, and apart from the restart of the Canadian CanTung mine in 2005, no new major production has actually been realised and this is unlikely to occur until late 2009 at the earliest. Rapid increases in mine development and operating costs and also the very limited availability of high grade deposits is increasingly indicating that a further advance in price structures is necessary before major new mining programs can actually be achieved.

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### Consumption

The consumption of tungsten is reasonably broad based, both in industrial and geographical terms. Major applications are metal-cutting tools, drill bits, light bulb filaments, high temperature alloys, military use and chemical applications. Regionally, the largest consuming area is China, followed by Europe and North America. China also has by far the fastest growth; however India is also showing signs of rapid growth in demand

Most applications for tungsten are relatively mature, and it is difficult to identify major new uses. Minor exceptions include the replacement of lead bullets by tungsten, primarily for environmental reasons. However, this would still represent a relatively small percentage of the market, which is unlikely to greatly impact on current supply and demand structures.

Over the next five years to the end of 2012, global consumption of tungsten is expected to increase from its current level of approximately 81,200t W (59,800t W virgin tungsten) tonnes per annum to 109,328t W (81,996t W virgin tungsten) tonnes. Mature markets such as Europe and North America are only expected to grow by 2% per annum. Chinese domestic consumption is forecast to continue growing in excess of 10% per annum, largely driven by the increase in requirements for cutting and drilling tools. However, it should also be noted that China's growth over the past five years has averaged 15% and if these levels were to be maintained world tungsten demand will exceed 122,000t W (91,500t W virgin demand) by 2012.

### Price Structures

As a result of the described constant over-supply situation through the 1990's and early 2000's, prices fell to low levels of US\$45t/mtu for concentrates and only marginally above for APT.

However, as indicated, a number of important events have since occurred which has greatly influenced current and forward price structures.

China has not only curtailed domestic mining programs, but has now become a significant importer of tungsten concentrates and tungsten scrap. Also the Chinese Government has moved from a position of providing export incentives for tungsten exports to now introducing production and export quotas, and consistently increasing export tariffs.

The net result of these changes coupled with the continuing growth in global demand has resulted in strong price increases commencing in 2004, to a current level of approximately US\$180-210/mtu for concentrates and US\$220-\$250/mtu for APT (quoted price structure by Asian Metal News and a number of other publications).

With the Chinese Government strongly encouraging an even higher level of downstream processing, with a large percentage of these downstream products being consumed domestically, plus expected further increases in export tariffs for semi processed products, the availability of tungsten units to markets outside China, in all forms, will continue to tighten. Furthermore, China has now become a major importer of tungsten concentrates and scrap.

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The net result of these changing circumstances, the recognition of increasing costs to develop and operate mines outside China, plus the fact that tungsten has a 'high value in use' in most applications and substitution is unlikely, result in the conclusion that a continuing escalation in price structures is highly likely. During the next five years, it is forecast that global prices for APT will reach or even exceed US\$300/mtu. It should also be noted that almost no tungsten concentrates are currently produced in US\$. In turn, even if the value of the US currency continues to decline, the global market price of tungsten products will be adjusted to reflect this change.

### **The Opportunity for New Producers.**

Provided that an acceptable rate of return can be achieved at long-term pricing levels, barriers of entry for a new producer outside China will be minimal. In the projected strong market, long term letters of intent to purchase either concentrates or APT should be readily achievable and these would underwrite project finance. However, these letters of intent would be firmly subject to the following conditions.

- Confirmation that the operation would be relatively competitive with existing production programs, and that this position could be sustained for the life of the supply contract. European, North American and Japanese processors must still be able to access cost competitive concentrates in order to maintain a competitive position against finished products from China, and
- Confirmation of the required quality, with particular attention to the nominated impurity levels, including radioactivity.

### **Conclusion**

The global market for tungsten is forecast to maintain strong growth over the next five years. Whilst China continues to dominate world mining and primary processing, the availability of tungsten units to non Chinese markets will continue to decline. Equally important, China is now becoming a major importer of tungsten concentrates and scrap materials. Ongoing rapid growth in demand by China will ensure that competition for raw materials between Chinese and non Chinese processors will continue to intensify with the result that there is now an urgent need for increased mining programs outside China.

A strong escalation in prices has already occurred over the past three years. However with producers struggling to meet demand, global mining costs continuing to increase, and the Chinese Government likely to impose tighter production quotas and higher export tariffs to maintain reserves, further global price escalation appears certain.

Barriers of entry for new producers is relatively low apart from actual development costs, and new mine projects will continue to receive strong encouragement from processors both in and outside China.

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