Market Update: Lithium

Lithium producers, current or near-term, will be well placed to take advantage of forecast increases in Li price and demand.

Investment Comment

Increasing intensity of lithium use could require new capacity beyond 2014, though a rush of new producers could bring oversupply – at which stage, successful suppliers will be those that can provide consistent volumes at competitive price. In the short-medium term, resources are ample but could be slow to bring online, due to financial and technical hurdles faced by some projects. There is an opportunity for developers, with projects that can be advanced quickly, to gain market share.

Lithium carbonate price, large contracts (cont. USA) is US$5,070-US$5,291/t.

Pricing

Lithium carbonate is currently at US$5,070-US$5,291/t. The CAGR of Li carbonate 2005-2009 was 6.2%, with 2.0% forecast for 2010-2014 (Source: ASX:GXY). By 2015, nominal prices are expected to approach those seen before the GFC (2007, US$6,731/t; 2015, US$6,757/t).

Chinese lithium carbonate export prices in US$/t 2000-2009, plus forecast 2010-2015.

CAGR of 2% is forecast for 2010-2014.

Source: Galaxy Resources

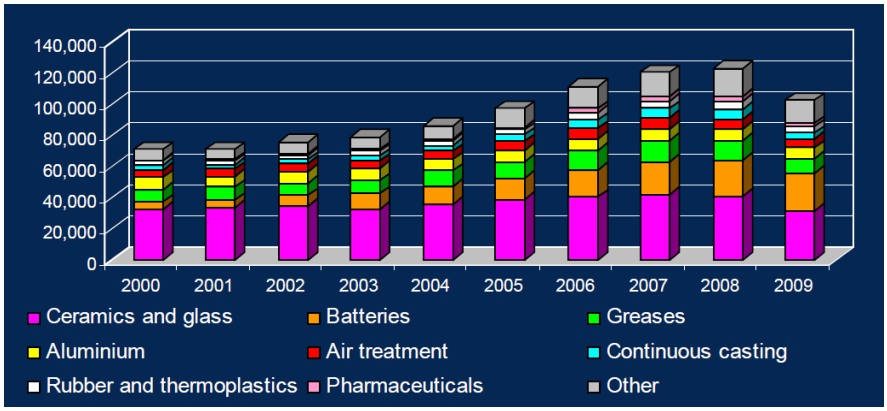
Li is produced from brines and pegmatites, with 25.3kt Li supplied in 2010.

Market: Supply and Demand

The main producers of lithium in 2010 were Chile (brines, 8.8kt Li), Australia (pegmatites, 8.5kt), China (4.5kt) and Argentina (2.9kt), with a total 25.3kt Li, up from 18.8kt in 2009 (Source: USGS estimates). Li converts to Li carbonate at ~1:5 by mass. Global reserves are thought to be 9.9Mt Li, of which 76% are in Chile.

World consumption of Li by end use (t Li Carbonate; Roskill)

Other than batteries, uses include ceramics and glass, and lubricants.



Consumption of ~113kt is expected in 2010, for annual growth of +11%.

Li carbonate consumption in 2008 was ~120kt but fell 15% in 2009 due to the GFC. It is expected to recover by +11% to ~113ktpa in 2010 and be ~148kt by 2013 (+31.5% from 2010). [Source: USGS, Roskill]. The three main uses of lithium by industry sector in 2010 were ceramics and glass (31%), batteries (23%) and greases (9%-10%). Sales volumes for major lithium producers were reported to be up +30% by mid-2010.

The main growth area for Li is battery manufacture, especially for electric and hybrid vehicles. The US has paid US$940M to support its domestic lithium supply chain.

The USGS (US Geological Survey) publishes an annual commodity summary about Li. Important points from the 2011 edition:

- Batteries, especially rechargeables, are the market for lithium compounds with the largest growth potential.
- Automobile companies are developing lithium batteries for electric vehicles, although most such vehicles currently use other types.
- Asian technology companies continue to invest in domestic and overseas lithium operations, with a focus more on security of supply than cost.

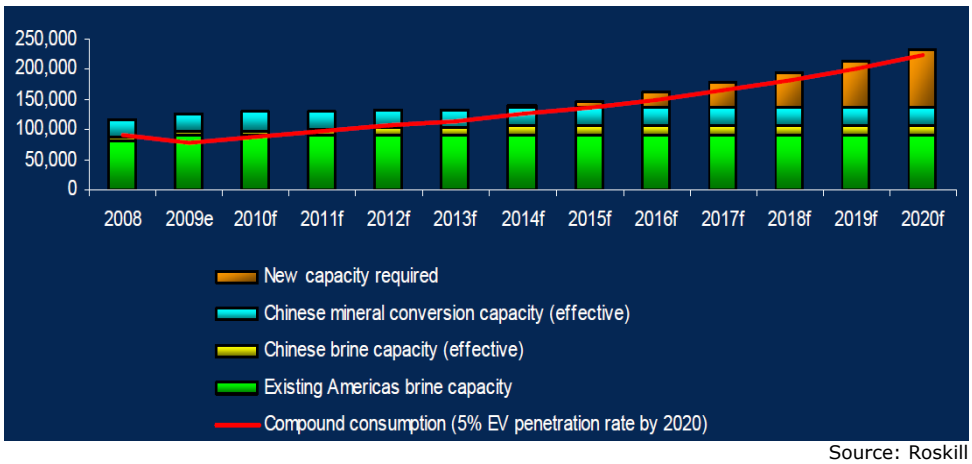
Li batteries are gaining favour due to low heavy metal content (e.g. Pb, Cd, Hg), long life, fast recharge and high power/weight ratios compared to traditional Pb acid, NiCad and Ni hydride rechargeables.

Li ion battery manufacture increased 29% in 2007-2008, decrease by 2% in 2009 and should increase from 2010.

Galaxy Resources (after Market Avenue) reported that Li-ion battery output increased 29% between 2007 and 2008, with sales of US$8.03Bn. The market shrank by ~2% in 2009 but pre-GFC growth rates are expected to return going forward, in line with global demand for electric vehicles, especially in China.

Current and forecast total lithium carbonate demand versus productive capacity, 2008-2020.

This rate of growth could require new Li carbonate capacity from 2014 onwards.



Source: Roskill

Lithium's low mass and high electro-chemical potential make it useful for battery manufacture.

Elemental Facts

Lithium is the lightest solid element, with atomic number 3. It is highly reactive, with a high electrochemical potential and specific heat capacity. These attributes make it especially useful for making batteries and ceramics/glass. The most commonly traded forms of lithium are mineral concentrates and refined lithium carbonate. Lithium is extracted from pegmatites (igneous), brines (salar lakes) and hectorite clays.

Analyst: Dr Trent Allen

Market Update: Niobium

With 15% pa growth forecast, and a steady price, the outlook for Nb is strong.

Investment Comment

Industry forecasts are for ferroniobium (FeNb) consumption growth of ~15% per annum to 2014. New niobium producers have a chance to meet this increase in demand and find secure revenue in the form of long-term supply contracts. Prices should remain stable (RCR long term US$39/kg in FeNb) so long as price-setter CBMM does not feel its dominant market position to be threatened, which is unlikely, as most advanced Nb projects are of a much smaller scale than Araxa.

Pricing

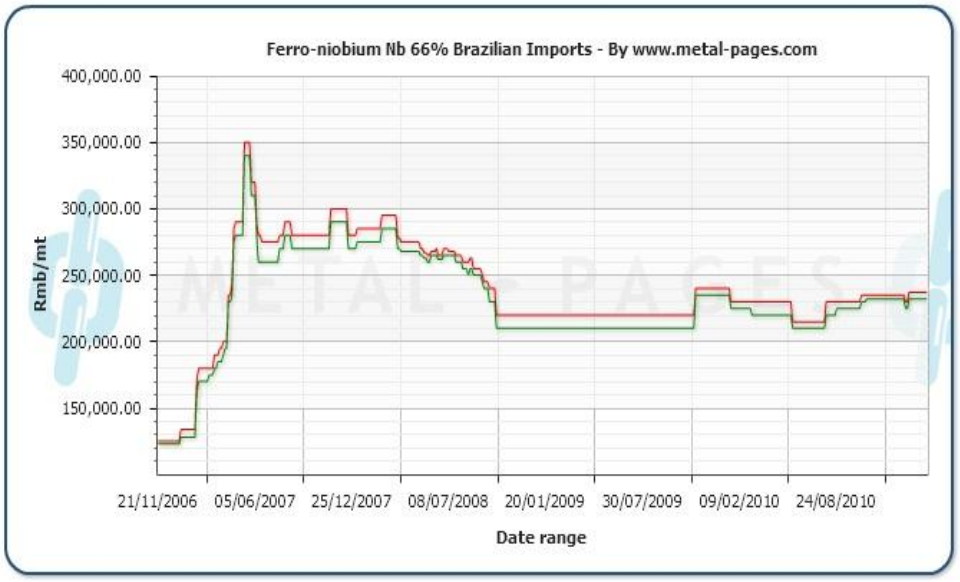
All measures show that Nb prices have risen in the past several years, and were quite resistant to the GFC, likely because Nb is only a small portion of steel production costs, and the price is set by the main producer, CBMM.

Prices were resilient in the face of the Global Financial Crisis …

The current price of Nb is US$43.50-$44/kg (contained in FeNb, EU price, Metal Pages). The 2009 low, of US$34/kg, was reached in March 2009. This was ~25% below the previous high (in March 2008), which compares favourably to declines in base metal prices of ~40% or more over the same period. RCR's long-term forecast for modelling purposes is US$39/kg Nb in FeNb, based on the apparent stability of Nb prices.

Ferroniobium import prices, Chinese yuan (66% Nb from Brazil)

… assisted by the refusal of CBMM to lower its price, which the steel mills continued to pay.

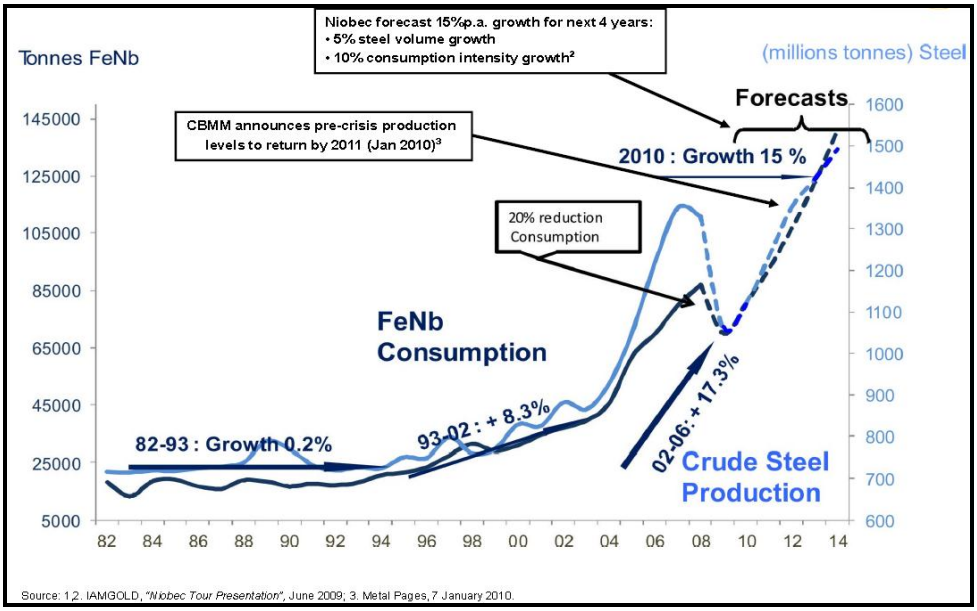


The Nb market has shown consistent long-term growth: 11.2% per annum between 2002 and 2009.

Market: Supply and Demand

In 2010, 74% of niobium in the US was used for steel production (followed by superalloys with 26%). Over the period 2002-2009, the CAGR of global Nb production (11.2%) was more than 2.5x the rate of growth in steel production (4.2%; USGS data). This demonstrates increasing intensity of Nb use over time.

FeNb consumption versus crude steel production



Source: 1,2. IAMGOLD, *"Niobec Tour Presentation"*, June 2009; 3. Metal Pages, 7 January 2010.

Ferroniobium producer Niobec forecast 15% compound annual growth rate (CAGR) for FeNb consumption in 2010.

Prior to the GFC, global production of FeNb was ~60kt (contained Nb). Media reports in mid 2010 from the leading producer, CBMM of Brazil, indicated that volumes had recovered to ~80% of these levels and that the market could be fully recovered by early 2011. Brazil is by far the largest producer of Nb, with 93.5% of world production (Source: USGS).

China consumes 35% of FeNb but is the driving force behind increasing intensity of usage.

China is a major force in consumption of the metal: it currently represents ~35% of FeNb use and >50% of the growth in this market. This gap could close over the next 20 years due to modernisation and increasing sophistication of steel production in China and other developing markets; over this period, the percentage of steel products using niobium could increase from 10-12% presently to more than 20% (Sources: GBE and Roskill Information Services; RCR).

World Nb production is dominated by Brazil (estimated 92% in 2010) and specifically by one producer, CBMM, which sets the FeNb price.

In terms of companies, there are currently three major producers of ferro-niobium: industry leader CBMM (Araxa deposit, Brazil), and two 'second tier' producers, Anglo American (Catalao mine, Brazil) and IAMGOLD (Niobec mine, Canada). CBMM currently holds 76% market share, with 6-8% each for the others. The Araxa reserve grade at 2.5% Nb2O5 is orders of magnitude higher than its competitors' (1.2% Catalao, 0.6% Niobec) and at 500mt it is more than ten times as large as the other two put together. In other words, CBMM dominates global Nb production. In terms of new projects coming online, only Mabounié in Gabon (Eramet) could threaten any of CBMM's market share (resource 350mt @ 1% Nb_2O_5) but the project must overcome poor recoveries and high capex before it can enter production.

Niobium is used primarily by the steel industry. Prices are decided by negotiation of individual contracts.

Elemental Facts

Approximately 90% of Nb is consumed as FeNb by the steel industry, in high-strength low alloy (HSLA) steel products for construction projects, oil and gas pipelines and the automobile and shipping industries.

Niobium is not an exchange traded commodity: 95% of FeNb is sold under individually negotiated contracts based on a benchmark price set by the main producer, CBMM (Brazil).

Analyst: Dr Trent Allen

Market update: Rare Earth Elements

Companies with advanced projects are well positioned to gain from the rare earths boom, as China curtails exports to conserve domestic supplies.

Investment Comment

RCR recently attended the Sixth International Rare Earths Conference, organised by Roskill and Metal Events, to gain a clearer picture of this complex sector. Industry forecasts are for 6%-10% annual growth in total REE demand to 2015. Given China's current dominance of REE production (~95%), there is an opportunity for new producers to take advantage of high prices and demand by ensuring security of supply to non-Chinese buyers, while China increasingly seeks to retain and domestically add value to its REE resources. Rare earth projects, due to their chemical complexity, can take up to 20 years to develop, so only advanced or geochemically simple projects will be able to come online in the near term.

Some REO prices are at 10 year highs.

Pricing

Recovery from the GFC, combined with China's decision to cut REO quotas in 2H10 and 1H11, has driven some prices to historic highs. This includes the LREE, which are more common and less valuable the HREE. For example, the biggest gain has been cerium (Ce) over 12 months, up 1611%. These prices will only be sustainable in the medium and long term to the extent they are driven by supply-demand fundamentals. This could favour the MREE (middle REE) and HREE, which in the past three months have shown significant price gains due to expectations of constrained supply, e.g. dysprosium +65%.

Changes in reported REO prices over 3 and 12 months

The average, unweighted 12 month price increase for the REO shown in this table is 679%. The most valuable elements (Dy, Eu and Tb) each have 25% export tariffs in China; the others 15%.

	Rare Earth Oxide	Current price US$/kg	16-Nov-10	16-Feb-10	3mth % change	12mth % change
Light Rare Earths	Lanthanum	73.0	49.0	5.5	49	1227
	Cerium	71.0	49.0	4.2	45	1611
	Praseodymium	114.5	76.5	25.8	50	345
	Neodymium	124.5	73.5	26.8	69	365
	Samarium	61.0	34.5	4.5	77	1256
Heavy Rare Earths	Europium	650.0	630.0	480.0	3	35
	Gadolinium	73.5	44.5	7.7	65	861
	Dysprosium	410.0	295.0	132.5	39	209
	Terbium	630.0	605.0	350.0	4	80
	Yttrium	92.5	50.5	10.3	83	802
	USD FOB ex-China per kg, 99.999% purity; prices are bid-offer mid points. Source: Metal Pages, 16 Feb 2011					

Source: Metal Pages, RCR

China dominates the global REE trade, with 97% of the 134kt production in 2010.

Market: Supply and Demand

World REO production in 2009 and 2010 (USGS estimated) was 133kt and 134kt respectively, of which 130kt (97%) came from China. It also estimates that China has 50% of the total global REO economic reserves of 110mt (a 10% increase on 2009 global reserves), followed by the CIS (17%) and USA (12%).

Demand for REE is forecast to grow at 7-9% per annum over the five years to 2014.

The main importer of REE metals and compounds is Japan, with a combined 34.3kt in 2008, while China exported 55kt (BGS). It is clear that the majority of rare earths are both mined and consumed in China.

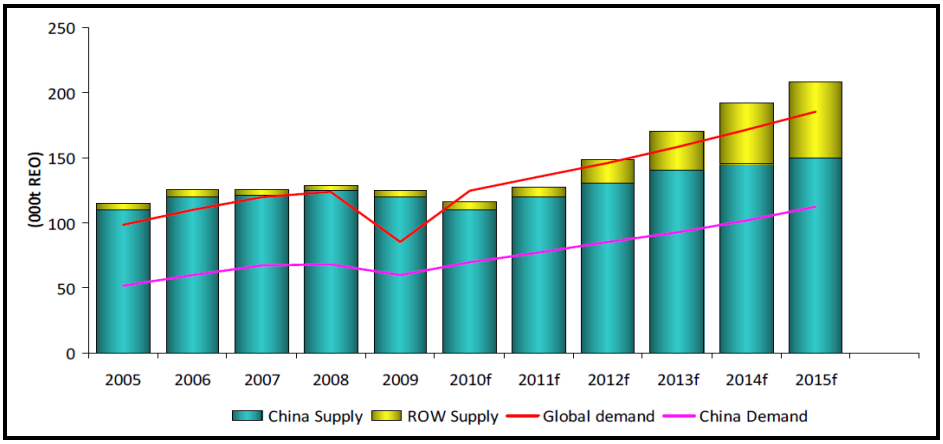
BCC Research forecast 7-9% compound annual growth rate in global REE demand over 5 years from 2009, which equates to a +60kt increase

This could create severe undersupply of some elements, especially the scarce middle and heavy rare earths.

in demand, against a supply increase of +40kt. The IMCOA forecasts 6-10% growth from 2010-2015. Looking forward to 2015, actual consumption is forecast to be 180-185kt TREO (total rare earth oxides) by both BCC and the IMCOA. However, more than this will need to be produced, as the mined REO ratios do not match the spectrum of demand, creating pinch points for some elements (e.g. dysprosium for magnets) and excess of others (e.g. the more common cerium). Accordingly, it is forecast that supply will have to be in the range of 200-210kt REO. Recently (August 2010) the China Society of Rare Earths stated China could supply 160-170kt REO in 2015; sufficient for its own needs (120kt) plus some exports, but 30-50kt short of global demand.

Rare earths, forecast supply and demand curves

This graph shows the looming supply issues for the REE market. Demand growth must be met by production outside China.



Source: IMCOA, Roskill

China dramatically cut export quotas for 2H10 and 1H11.

China's REO export quota for 2H10 was 7,976t, a 64.2% decrease from the 22,282t REO allocated in 1H10 to both Chinese and foreign-owned companies (16,304t to Chinese-owned companies) and a 72% drop from the 28,417t allocated in 2H09. This brought the export quota for 2010 down to 30,258t REO, -40% from the 2009 quota. The quota for 1H11 is even lower, at 14,508t, a 35% reduction from 1H10. China's reasoning is that it wants to conserve REE resources and add value to them in China (this includes foreign-owned processing facilities). It also plans to reduce the inefficiency, environmental damage and REE smuggling that are a consequence of having numerous small-scale unregulated producers (e.g. the REE clay mines of southern China). Industry sources report that by 2015, China's domestic rare earth separation processing enterprises are expected to be reduced to 20 from the current +100.

China is seeking to rationalise its REE sector.

Elemental Facts

The main REE minerals are bastnäsite and monazite

REE have numerous high growth applications.

The rare earth elements (REE) are the 15 lanthanoid elements (atomic numbers 57 to 71). They are divided into the light rare earths (LREE, lanthanum to samarium) and heavy rare earths (HREE, europium to lutetium). Many deposits are related to alkaline igneous rocks or weathered materials such as laterites. REE are used in high growth sectors: energy, electronics, and the environment, e.g. they are a component in some rechargeable batteries and the magnets in electric motors. REE are also used as phosphors in energy-efficient light globes, and in the screens of LCD displays. In 2010, according to the IMCOA, uses of REO (rare earth oxides) will include magnets (21%), catalysts (20%), alloys (18%), polishing (15%) and glass (9%).

Analyst: Dr Trent Allen

Market Update: Tantalum

The supply deficit in Ta markets could last to 2013.

Investment Comment

A tantalum supply shortfall has lifted prices and is expected to last until at least 2013, although this could be alleviated earlier with the planned recommissioning of Australia's Wodinga Mine. Producers will be expected to provide a supply of ethically produced tantalum. RCR's long-term price forecast, based on the assumptions of Ta industry participants (e.g. ASX:GBE) is US$143/kg (US$65/lb) Ta_2O_5.

Tantalum prices are commonly reported as lbs of its main ore mineral, tantalite.

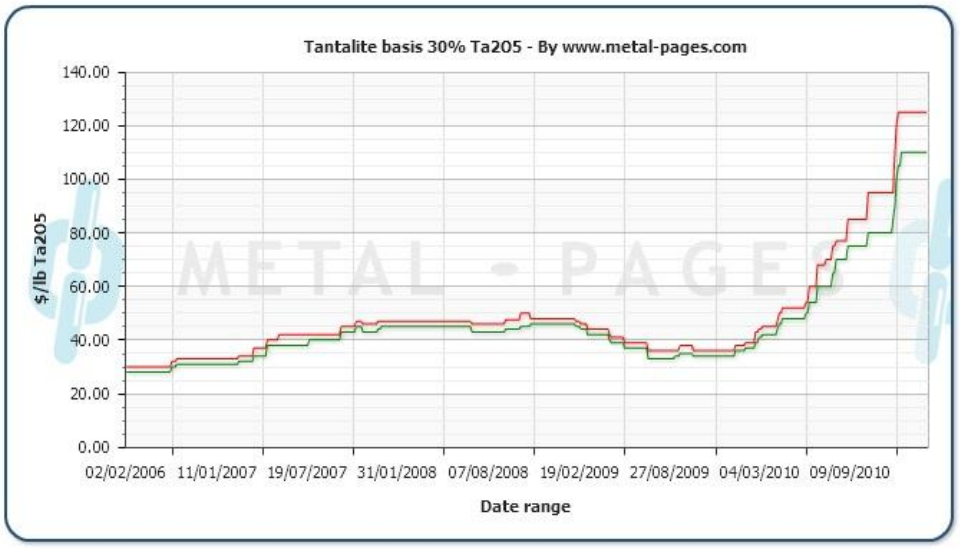
Pricing

The current price of Ta as tantalite (30% Ta_2O_5) is US$117.50/lb Ta_2O_5 (Metal Pages). This is (on average) 208% higher than the same date in 2010 and 239% higher than the 2009 low (August, 2009; US$33.00-36.00/lb Ta_2O_5), which was the lowest price since March 2007 (US$32.22-34.33/lb Ta_2O_5).

The increase is recent and is due largely to anticipation of a supply shortage as the market is starved of DRC tantalite. This shortage is expected to last until at least 2013 (Source: Gippsland Minerals).

Tantalite basis 30% Ta_2O_5

Ta prices have soared 208% in the past year, partly due to international measures taken against the DRC, which supplies "conflict tantalum".



Ta consumers are manufacturers of advanced technology, in Europe, Asia and the USA.

Market: Supply and Demand

Before the GFC, global Ta_2O_5 consumption was estimated to be 6mlbs per annum. Industry commentators suggest that the market is growing at ~ 7% per annum (Sources: GBE, Gippsland Ltd).

Leading commercial consumers are HC Starck GmbH (part of German conglomerate Bayer AG), as well as Cabot Corporation (USA), Ulba OJSC (Kazakhstan), Mitsui-Kinzoku (Japan) and Ningxia Non-Ferrous Metals (China) plus various other Chinese groups.

According to the USGS, world mine production of Ta metal in 2009 and 2010 was 665-670t. From 2005-2008, approximately equal proportions were supplied as ores and concentrates, metal, and scrap.

Historically, Brazil and Australia are major producers of tantalum.

For concentrates, from 2006-2009, 66% were supplied by Australia. The major producer by metal content in 2010 was Brazil (~27%). In 2009, the biggest secondary producer (waste and scrap) was China (27%).

Australia's Wodinga Tantalum Mine, the world's largest, is set to reopen in 2011.

Until 2009, the major corporate producer of tantalum was Talison Minerals, from its Wodinga mine near Greenbushes in WA's Pilbara. However, this closed during the GFC. Obviously, the coincident downturn in Ta-intensive industries prevented any problems with undersupply. It was announced in Jan '11, with tantalite prices pushing close to US$120/lb, that Wodinga would reopen under the control of GAM (Global Advanced Minerals). Production will be 700,000lbpa (261t, or 39% of 2009 global demand). This will leave excess capacity at Wodinga; tantalite concentrate from Mt Cattlin (ASX:GXY) will also be processed there (75t over five years).

In recent times the market has been clouded by the considerable black market for Ta (about 20% of the global market), illegally supplied by artisanal mines in the Democratic Republic of Congo (DRC) and allegedly used to fund a civil war in that country, ie. "conflict tantalum".

DRC illegal production complicates the market but the US Conflict Minerals Bill should remedy the problem.

In July 2010, however, the US Congress passed the Financial Stability Act, which requires US companies to disclose if their products contain tantalum (and tin, tungsten or gold) that is sourced from the DRC or adjoining countries. This should prevent the use of DRC material and, due to the stringent supply chain reporting requirements of the Act, may also turn buyers away from the adjoining countries (being Uganda, Rwanda, Burundi, Kenya, Tanzania, Zambia, Angola, Republic of Congo [Brazzaville], Sudan and the Central African Republic).

By 4Q10, metal traders were widely reporting that DRC supply had dried up and that material from its neighbours was hard to obtain. This supply squeeze has led to price increases. The reopening of Wodinga should alleviate supply problems beyond 2012

Elemental Facts

Tantalum is used in high-tech applications such as capacitors and alloys.

Tantalum is used in diverse high technology applications. It is resistant to corrosion, has a low thermal coefficient of expansion, and a high dielectric constant, so its main uses are in capacitors (e.g. for consumer electronics), chemical plant and equipment, aviation turbine blades and, as tantalum carbide, for cutting tools. It can be substituted by niobium and titanium in some applications, thought at the expense of larger component size (Nb) and/or higher cost (Ti). The majority of the world's tantalum is sold via long-term offtake agreements.

Analyst: Dr Trent Allen

Market Update: Tungsten

Companies with advanced tungsten developments could benefit from elevated prices, flowing from Chinese control (i.e. ~85%) over the current supply.

Investment Comment

As we stated in November 2010, industry participants and commentators are bullish about the medium-term outlook for tungsten. For example, Icon Resources (III:ASX) recently stated: "The market price for [concentrates and APT] has improved from mid-2009 returning to pre-GFC levels. Recent market analysis has projected longer-term strength for tungsten, particularly for non-Chinese supply beyond 2012, with supply shortages indicated from 2013." Annual Report 2010.

These forecasts are based partly on concern about security of supply for manufacturers, in view of China's policy of falling export quotas and high tariffs (e.g. 20% on ferrotungsten), and its intent to boost manufacturing. This scenario favours existing producers, and companies with tungsten projects that can enter production within 2-3 years.

Prices held steady during the GFC due to synchronous falls in supply and demand.

Pricing

Prices have recovered to pre-GFC levels, during which they had a relatively soft landing due to simultaneous cuts in demand and production. For mine modelling, RCR has used US$150/mtu contained tungsten in 65% concentrate.

Concentrate prices are up 60% Y-O-Y.

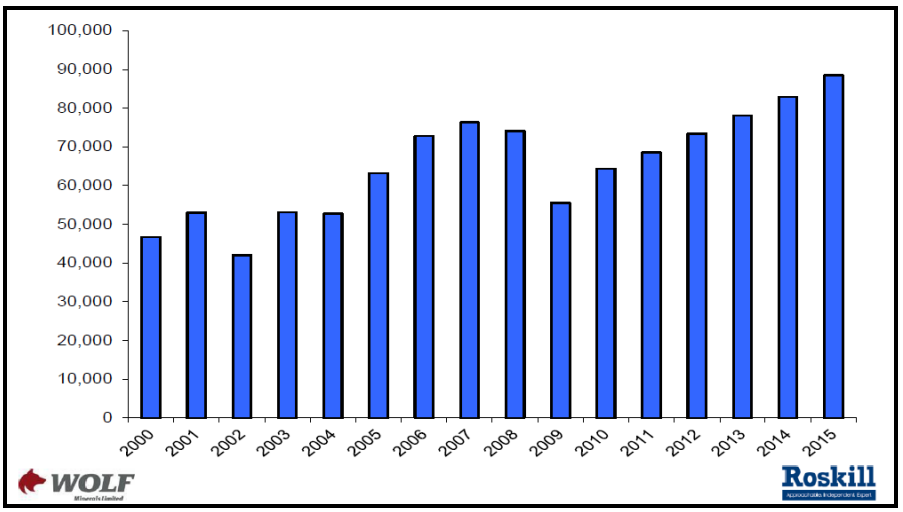
The price of ferrotungsten in Europe at 75% W is US$445-450/mtu (of contained W), APT to China (FOB) is US$338-343/mtu and concentrate in China at 65% W is US$280-281/mtu (contained W). These figures are typical of the value-add for increased tungsten processing (i.e. ~21% from conc. to APT, and ~30% from APT to ferrotungsten. Concentrate prices are up 60% year-on-year, 2010-2011, and 20% quarter-on quarter, as global demand continues its post-GFC recovery. In 2010, Roskill forecast that nominal APT prices could reach US$445/mtu by 2015, i.e. ~US$351/mtu for concentrate using the 21% value-add.

Market: Supply and Demand

Global consumption of tungsten in 2010 was ~55.5kt (Wolf Minerals, Nov '10) and is forecast to increase to 88.5kt in 2015 (CAGR 9.8%).

World forecast tungsten demand, 2000 to 2015 (t W).

The market outlook to 2015 is positive, with W demand forecast to increase from 55ktpa in 2010 to 88.5ktpa, i.e. CAGR 9.5%.

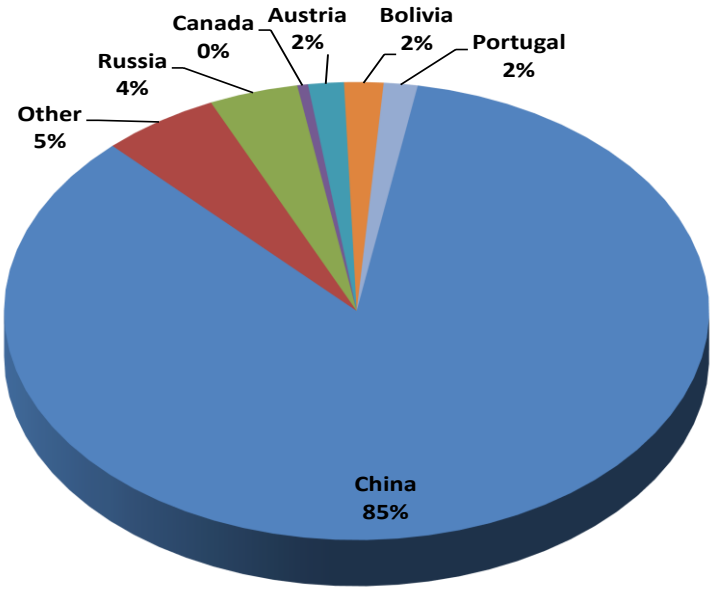


The world's largest consumer of tungsten is China (62% in 2009).

China is the metal's prime consumer, accounting for 62% of it in 2009. From 2002 to end-2007, global consumption of tungsten grew at 10% per annum, with the other significant tungsten consumers being the U.S., Western Europe and Japan. Consumption fell 25% Y-O-Y to 55kt in 2009, but was forecast to reach 66kt in 2010, and 80kt in 2013.

China dominated world tungsten production in 2010 (~85%).

Global 2010 mine production was ~61kt, of which China accounted for ~85%.



Source: USGS.

Global tungsten metal production in 2009 was 61.3kt (USGS) and an estimated 61kt in 2010. Of the 2010 estimate, China accounted for 85%, producing 52kt. It was followed by Russia (2.5kt), Bolivia (1.1kt) and Austria (1kt).

The main application for tungsten is in 'hardmetal', as tungsten carbide. In China, steel-making accounts for the highest % use.

Elemental Facts

Tungsten is the hardest metal, and has a high density (19.25g/cc; slightly less than gold, 19.3g/cc), melting point and tensile strength. Tungsten is mined from or adjacent to igneous rocks (e.g. in skarns). It has two economically important minerals: wolframite ($(Fe,Mn)WO_4$) and scheelite ($CaWO_4$). The majority of the world's 2.9Mt economic reserves are held by China (with 1.9Mt or 55%. Source :USGS).

Ferrotungsten is used for steelmaking, while APT feeds into the cemented carbide and chemical stream.

Tungsten is primarily used in wear-resistant cemented carbides aka hardmetals (56%) and steel/alloys (20%), as well as in lighting, heating, and welding applications. Tungsten chemical compounds are used in catalysts, inorganic pigments, and high-temperature lubricants. Tungsten is sold in five common forms – APT (ammonium paratungstate), ferrotungsten, tungsten concentrate (usually 65% WO_3), and tungsten carbide and oxides. Prices are quoted in $US or RMB and the main units are mtu (metric tonne units, of 10kg WO_3, ie 7.9kg W) and kilograms. It is usually sold on long-term contract.

Analyst: Dr Trent Allen

