



Molybdenum: Mighty Tough

Written by Tom Vulcan

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In our recent [interview](#) with Charles Swindon, chairman of the Minor Metals Trade Association, Mr. Swindon noted that - with the LME's board having appointed someone to look into this very question - cobalt, molybdenum and ferro-chrome were, indeed, "possibilities" for LME trading.

But why molybdenum?

A Mighty Metal

Over the last 100 years, and particularly in the last 50 or so, molybdenum has become an increasingly important metal in everyday life. It is also a metal upon which the appellation "minor" sits increasingly uncomfortably.

Among the 80 naturally occurring metals, molybdenum is one of the 40 or so that can be considered as having major industrial importance. There is one very particular and very good reason for this: The moly (rhymes with Molly) in molybdenum means tough, *mighty* tough.

Its unique properties (and those of its alloys) include:

- lightness
- high resistance to extreme temperatures
- exceptional incompressibility
- low thermal expansion
- environmental stability
- resistance to corrosion
- bondability & hardenability
- thermal & electrical conductivity

To cap it all, moly is somewhat irreplaceable. Because of its unique combination of properties, few metals can substitute for moly, especially as an alloying element in cast irons and steels.

A Short History Of Moly

While it has always been around, moly was only positively identified in 1778, by Carl Wilhelm Scheele, a Swedish scientist. It took an accident in 1782, by Peter Jacob Hjelm, to actually produce a dark metallic powder he termed "molybdenum."

Whether used by chance, or otherwise, moly has been found in the blade of 14th-century Japanese swords - some three centuries prior to Scheele's "discovery." In this context we have a clear endorsement of some of moly's signal properties: great strength, lightness and exceptional incompressibility. Anyone who has hefted a real traditional Japanese sword will no doubt attest to all three of these characteristics.

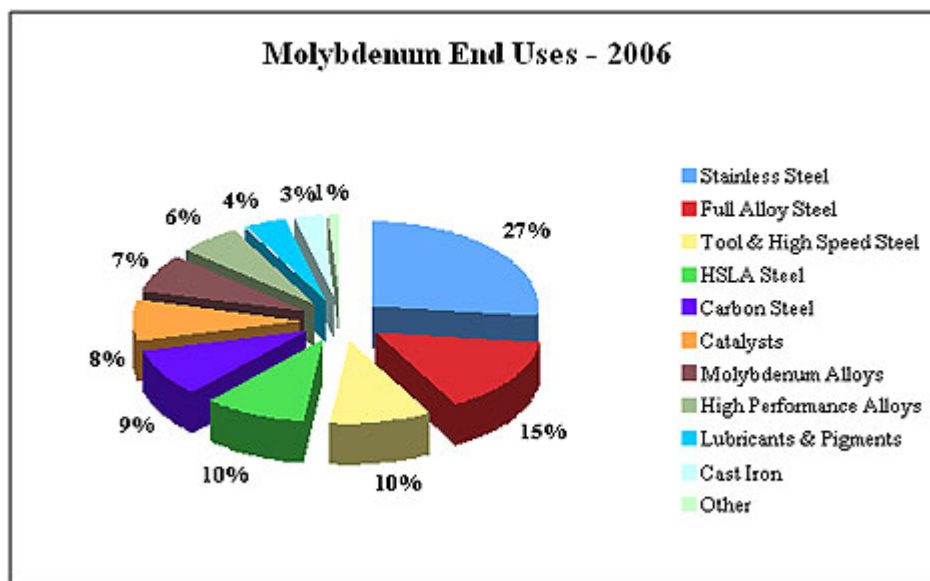
For much of the 19th century, moly lay about in labs, an unused curiosity. It was only at the end of that century that a French company started to use it as an alloy in the production of armor plate.

As such an alloy, moly really came of age during the First World War. During the war, it was used extensively as a substitute for tungsten, then in heavy demand for the production of impact-resistant and hard steels for production of armor plate and gun barrels. (The monster German gun Big Bertha was made of moly.)

Moly was more than a satisfactory substitute for tungsten; it also had the added advantage of being only just over half as dense. Indeed, equally as strong - if not stronger - moly is lighter than both tungsten and tantalum.

Since then, as more and more has been learned of moly's unique combination of properties, the range of its uses, alloys and compounds has greatly expanded.

Today, moly is now critical to the production of stainless steels, alloy steels, high-speed and tool steels, cast iron, electronics, chemicals, lubricants, super alloys, catalysts and pigments.



Source: CPM Group

Moly is used in a wide range of sectors. These include:

Sector	<i>Sub-Sector/Use</i>
Building and Construction	
Chemicals	
Defense	<i>Armor Plate</i>
	<i>Jet Engines: Turbine Blades and Discs</i>
	<i>Optics</i>
	<i>Supermagnets</i>
	<i>Gun Barrels</i>
Energy	<i>Catalysts</i>
	<i>Petrochemical Processing</i>
	<i>Nuclear Power Plants</i>
	<i>Oil Pipelines and Drill Stems</i>
Industrial Development	
Transportation	<i>Aerospace</i>
	<i>Automotive</i>
	<i>Rail</i>
	<i>Shipbuilding</i>

Water Industry

Drinking Water Distribution

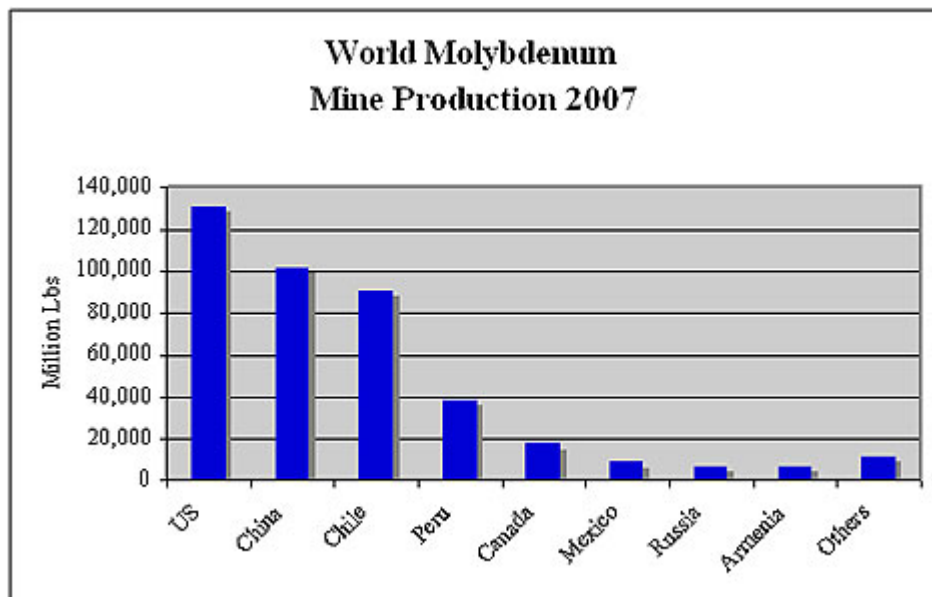
Sources include: CPM Group and IMOA

Moly Supply

The majority of the world's moly supply flows from two distinct types of mining operations:

- as a by-product - typically of copper mining (in Canada, Chile, Peru and the U.S.) - amounting to around [61%](#) of total moly output (2007)
- as a primary product (in Canada, China and the U.S.)

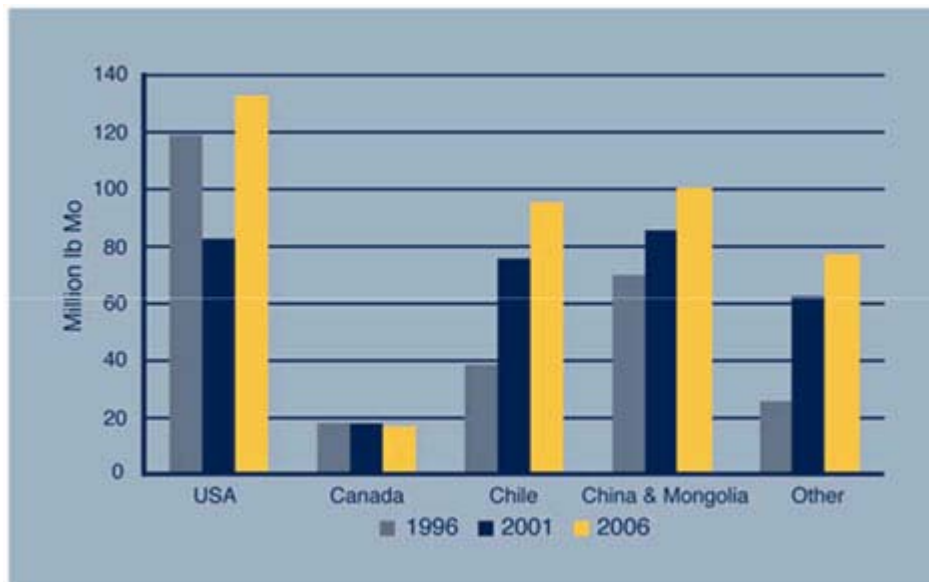
In January of this year, the [U.S. Geological Survey](#) estimated world mine production of moly for the last year at more than 412 million pounds.



Source: USGS, Mineral Commodity Summaries, January 2008

Historically, for the 11 years from 1996-2006, moly production increased in all regions, save for Canada.

Molybdenum Production by Region: 1996-2006



Source: IMO

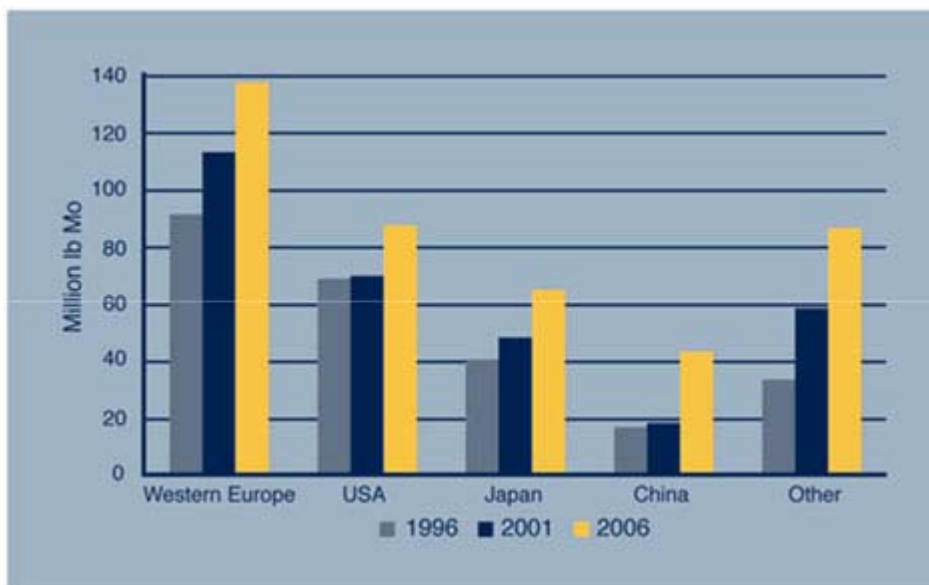
Note: Production includes new molybdenum resulting from mine production plus approximately 3% recovered from spent catalysts.

Moly Demand

Moly demand has been growing in all sectors. [In the last four years alone, demand of moly has climbed by well over 35%](#). Such growth has occurred both in already-established uses of the metal - those associated with the rapid industrialization currently taking place in China and India - as well as in a continuing stream of new uses, primarily in the energy, aerospace and [water distribution](#) sectors.

From 1996-2006, in particular, moly use has increased in all regions, especially in China.

Molybdenum Use by Region: 1996-2006



Source: IMO

Note: Based on average industry opinion of new molybdenum consumed resulting from mine production, plus approximately 3% recovered from spent catalysts. Does not include molybdenum contained in alloy steel scrap

which is recycled through the steelmaking process.

Looking at the energy sector alone, which accounts for around 38% of moly demand, moly use remains extremely robust.

Not only are higher oil prices encouraging oil exploration, they are also leading to the development of new facilities. With deeper drilling in remoter locations, more moly is needed for pipelines to bring oil and gas to the surface (from underground and beneath the ocean bed), as well as to transport it from the well heads.

In refineries, and, indeed, chemical processing plants, demand for greater efficiency has driven not only the use of higher processing temperatures, but also of higher pressures. The use of higher-content moly pipe allows for increases, while, at the same time, allows for the reduction of pipe diameters and wall thicknesses.

Post-processing, pipes are needed to transport oil and gas from the refineries. With some [80,000 kilometers of planned pipeline around the world, and about 1.6 million lbs. of moly needed for every 1,000 kilometers of pipeline](#), that's a lot of moly.

Durable As Well

Over the past several years, the oil industry has become increasingly reliant on heavy crude and tar sands - both extremely corrosive. Moly is highly resistant to corrosion. In corollary, with the increasing demand for a lower sulfur content in diesel and gasoline, demand for moly as a catalyst for sulfur reduction has also risen.

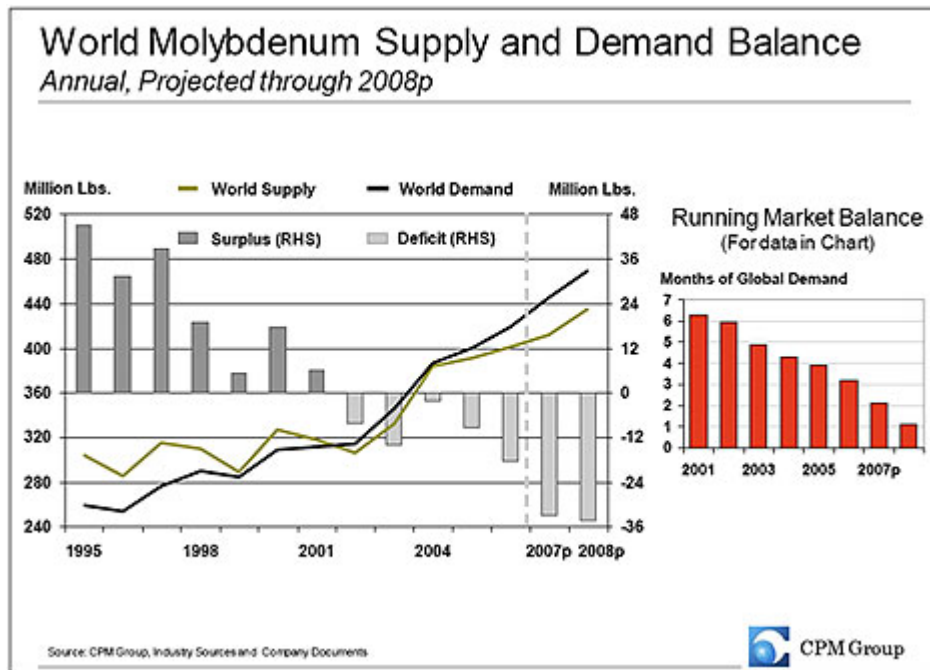
And then there are the nuclear power plants and their highly corrosive cooling systems. All pipe refits on existing plants now have to be moly pipes. And all *new* plants will need to use moly pipes. With a nuclear power plant requiring up to half a million pounds of moly, once again, that's a lot of moly.

Taking together all the sectors in which moly is currently used, demand for moly looks set for further growth. A [4.5%](#) growth figure was quoted at a moly conference in London last October for 2008. I venture to say that was conservative.

The Current Market Situation

Moly demand currently outstrips supply and, indeed, has done so for the last six years. The growing demand for the metal, especially after 2004, has not been matched by the development of new supplies.

Not only has by-product supply of moly declined (a trend which appears set to continue), but primary producers have been neither able to bring online new mines nor, as swing producers, restart mines that had been mothballed, fast enough. Combine these factors with rising cost bases for both types of producers, and the market finds itself faced with shrinking inventories and an increasingly tight supply of moly.



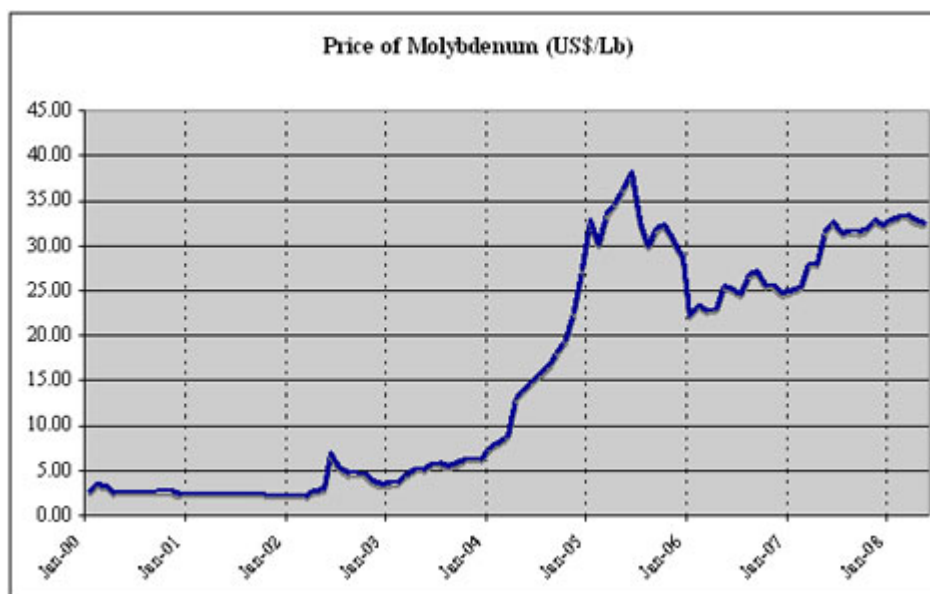
Source: CPM Group

The moly supply situation has only been exacerbated further by tightened governmental regulation covering exports from China, the world's third-largest moly producer. At 6.4 million pounds, exports of ferro-molybdenum from China in the first four months of this year are down some 55%, in comparison with exports for the same period last year.

With China's own need for moly growing strongly, and severe restrictions both on existing mine expansions and new operations, it remains to be seen just how much of the metal will be available in the future for export. According to Catherine Virga at the CPM Group: "The West can no longer rely on excess supply from China."

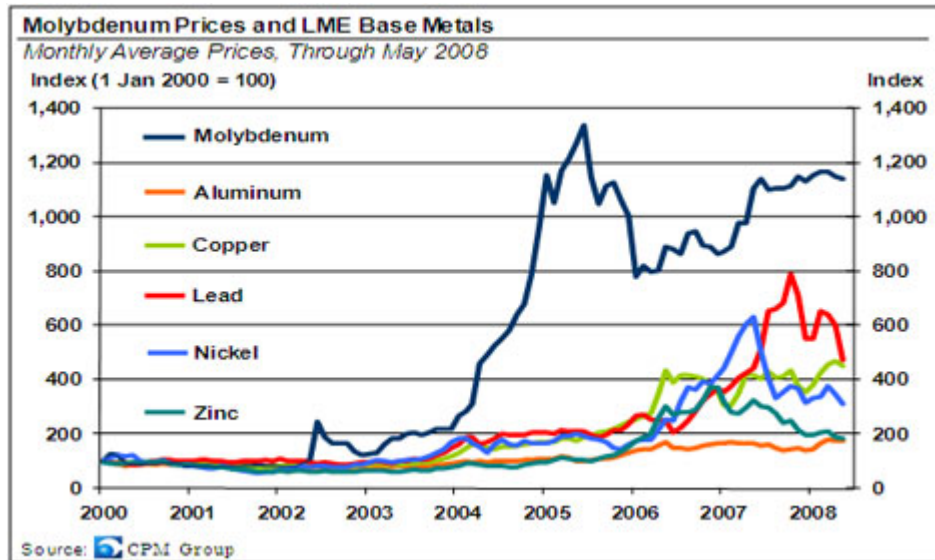
Result

There has been an eleven-fold rise in the price of moly since the start of the decade, with the steepest rise occurring between 2004 and now.



Source: Platts, LME and CPM Group

The rise in the price of moly has far outstripped that of any of the LME metals.



Source: CPM Group

Opportunities In Moly

Which brings us back to the LME.

Many questions remain unanswered as to the advisability and, indeed, the practicality of trading moly on the LME.

As to the former, one fear that has been expressed concerns "[the non-trade participation in the market that it will encourage.](#)"

As to the latter, deliverability alone poses a major problem. What moly product is deliverable: MoO₃ powder, ferro-molybdenum or MoO₃ briquettes? The steel sector, a sector that currently accounts for some 75-80% of moly use, trades in all three.

So, while the possible trading of moly on the LME remains under discussion, purchase or sale of the metal on an exchange is not yet possible. If not via the physical commodity, how, then, to gain exposure to this mighty metal?

The production of moly is dominated by a handful of companies. In 2006, some 10 companies produced over 75% of global production. Those publicly traded mining companies - with diversified mining interests and the production of moly as a by-product - are all familiar names (except, perhaps, for Jinduicheng Molybdenum). They included:

<i>Company</i>	<i>Bloomberg Ticker</i>	<i>2006 Production (Million Lbs)</i>	<i>Global Production (%)</i>
Freeport McMoRan (Phelps Dodge)	FCX: US	68	17
Rio Tinto (Kennecott)	RTPPF: US	37	9
Southern Copper	PCU: US	24	6
Antofagasta	ANTO: LN	22	5

The largest publicly traded primary moly producers were:

<i>Company</i>	<i>Bloomberg Ticker</i>	<i>2006 Production (Million Lbs)</i>	<i>Global Production (%)</i>
Jinduicheng Molybdenum	601958: CH	27	7
Thompson Creek Metals	TCM: CN	25	6
China Moly	3993: HK	22	5

With pure-play producers becoming increasingly important suppliers of the moly, for those seeking an "un-alloyed" exposure to the metal, such mining companies may be well worth considering.

Other, smaller, pure-play moly mines include: Roca Mines Inc. (Bloomberg Ticker - ROK: CN), General Moly (Bloomberg Ticker - GMO: US), and Moly Mines (Bloomberg Ticker - MOL: CN).

Conclusion

All the signs for the moly market appear to point both to continuing strong demand and a continuing tight supply scenario.

Since moly is not yet traded on any exchange, exposure to the metal can be achieved through investment in either a primary producer - a pure moly play - or through a producer for whom moly is a by-product. (In this last instance, however, it is important to realize that for mining companies where moly is a by-product, it is just that: a by-product. Such operations will, de facto, have different goals from primary moly producers; goals involving, not least, the price of copper.)

That said, moly appears set to remain strong, very strong.

Afterwords

- Moly is not represented in the National Defense Stockpile - the U.S. is an exporter of moly.
- For animals, plants and humans, moly is an essential trace element.

Resources

[International Molybdenum Association \(IMOA\)](#)

[Minor Metals Trade Association \(MMTA\)](#)

[CPM Group](#)

[U.S. Geological Survey](#)

Source: Photo of molybdenum on home page appears courtesy of IMOA.