

Molybdenum Market Outlook

December 2007

**Eric Sprott**  
**Maria Smirnova**

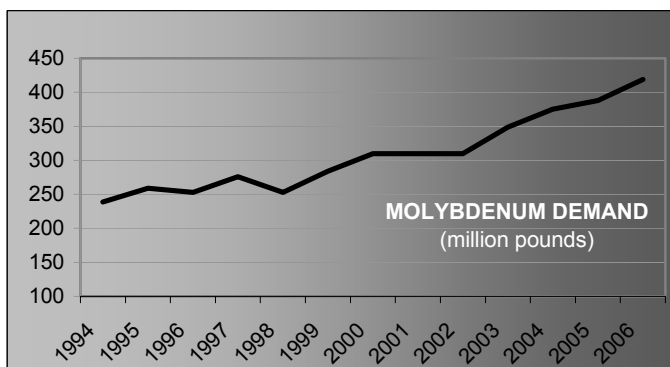
We at Sprott Asset Management are strong believers in the prospects for molybdenum. Over the last two years we dedicated a significant amount of time to studying the demand and supply factors for the metal and the companies that explore for and mine molybdenum. We have believed for a while that the fundamentals point towards a period of sustained elevated prices. Our convictions have never been stronger than they are now.

We are also questioning the widely held assumption that the moly market is growing at 4-5% per year. In this article we will attempt to dispel this assumption and to convince our readers of the bright prospects for this metal. We believe it may surprise people on the upside.

**Demand**

Denny Sabah, a research analyst for Metal Bulletin Research (MBR), UK, was recently quoted as saying that demand for molybdenum will be “going through the roof” in the next 5-10 years.<sup>1</sup> Management of China Molybdenum, a large publicly listed molybdenum producer in China, concurs. In October, management of the company stated that demand for moly remains robust, powered by strong growth in specialty metals and the global oil industry.<sup>2</sup>

The widespread estimate that moly demand will grow at 4% to 5% per annum has always puzzled us. Let’s look at past growth first. Annual demand grew at about 4.4% compounded annually from the mid 1990’s to 2000 and then leveled off for three years. But then from 2003 to 2006 growth was 7.9% per year. We wonder why market participants assume that the growth seen in recent years will trail off.



Source: marketfriendly, inc.

Royal Bank Plaza, South Tower  
200 Bay Street  
Suite 2700, P.O Box 27  
Toronto, Ontario  
M5J 2J1

T: 416 943 6707  
F: 416 362 4928  
Toll Free: 866 299 9906

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<sup>1</sup> “Buoyant Outlook”, Metal Bulletin, November 7, 2007.

<sup>2</sup> Morgan Stanley research note, October 29, 2007.

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We are pleased to note that some analysts are recognizing moly's potential for accelerated growth. Scotia Capital recently put out a report projecting the following demand growth rates:

<b>2007</b>	7.1%
<b>2008</b>	8.4%
<b>2009</b>	6.7%
<b>2010</b>	6.5%

Source: Scotia Capital

Scotia's projections are driven by the outlook for austenitic steels and non-steel applications, such as catalysts. The analysts are projecting austenitic steel growth of 7.4% in 2007 and 8.7% in 2008, while they believe the non-steel sector will grow 10% per annum to 2010.

We will go one step further and make the following statement: *MOLYBDENUM DEMAND IS EXPLODING*. This view stems from our beliefs about the energy sector fundamentals and the economic expansion taking place in Asia.

We have written at length about our belief in the Peak Oil theory in our *Markets At A Glance* monthly commentary<sup>3</sup>. This theory postulates that petroleum discoveries and production follow a bell-shaped curve, and that sooner or later world production will peak and begin declining rapidly. Therefore, the world needs to invest ever-increasing amounts of money into the exploration for and production of oil and other energy sources. Molybdenum is finding application in infrastructure such as pipelines, drill rigs and tubing, petroleum refining and coal and nuclear power generation. Mr. Denis Battrum, whom we consider to be a molybdenum expert, wrote an excellent paper titled 'Expanded Uses of Molybdenum in the Energy Industry'. This paper can be found at [www.sprottmoly.com](http://www.sprottmoly.com)<sup>4</sup>. Consider this data point cited by Mr. Battrum: there are more than 91,100 miles of pipeline projects planned or under construction in 2007 – a 30.4% increase from 2006, according to the *Pipeline and Gas Technology* (2007). These projects alone could represent over 220 million lbs of moly, or approximately half of the annual molybdenum market.

Further, if one considers the fact that oil companies have to go farther and deeper to find oil & gas (and to consequently deal with more corrosive and hostile environments), it becomes apparent that stronger steels are necessary. Again, here is where moly comes in. Its ability to impart strength at high temperatures while adding relatively little weight and its anti-corrosive properties make it an increasingly usable metal in energy infrastructure.

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F: 416 362 4928

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[www.sprott.com](http://www.sprott.com)

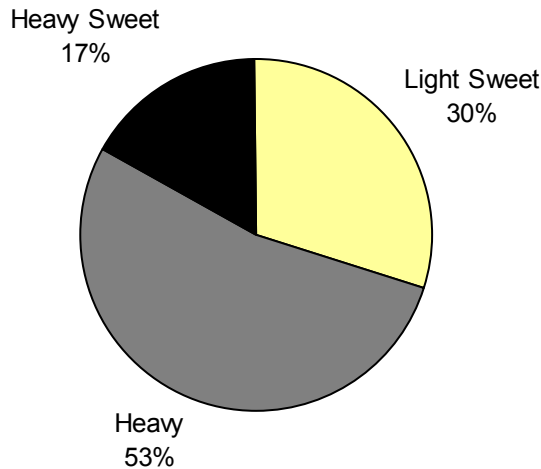
<sup>3</sup> Please refer to <http://www.sprott.com/pdf/marketsataglance/09-2006.pdf>, <http://www.sprott.com/pdf/marketsataglance/08-22-2005.pdf> and <http://www.sprott.com/pdf/marketsataglance/06-20-2005.pdf> for examples.

<sup>4</sup> Please go to [http://www.sprottmoly.com/pdf/molyoct12\\_07.pdf](http://www.sprottmoly.com/pdf/molyoct12_07.pdf) to view the complete report.

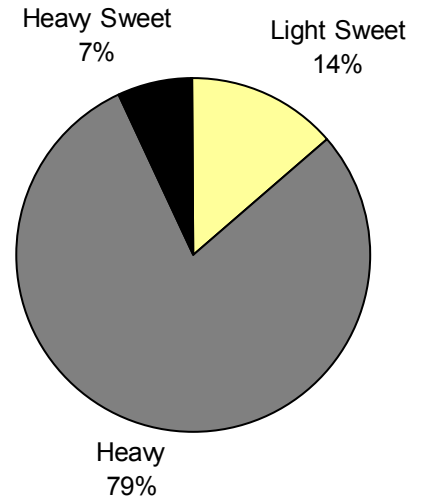
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In addition, sulfur content of crude oil is increasing. The chart below shows the current production mix vs. the reserve mix of crude oil. The proportion of heavy oil (which tends to be higher in sulfur) is significantly higher for reserves than for what the world is currently producing. This means that going forward we will need to produce larger and larger amounts of heavy oil.

**Current Production Mix**



**Reserve Mix**



Source: Sprott Asset Management Inc. estimates, EIA, DOE, Simmons & Co.

At the same time, gasoline specifications are moving towards lower sulfur content and demand for low-sulfur diesel is growing rapidly. Catalyst manufacturers are introducing higher-grade catalysts to meet this demand. The hydroprocessing catalyst market is projected to grow at 6-8% to 2010<sup>5</sup> in terms of weight, but we expect molybdenum demand to grow faster due to its increasing content.

Water desalination is another area that is contributing to fast growth in molybdenum consumption (moly is increasingly used in the various components of desalination plants). It is estimated that the global desalination capacity will grow by 9.6% to 2010 and will accelerate to 15% between 2015 and 2020<sup>6</sup>. Furthermore, moly-bearing grades of steel are increasingly chosen over non-moly steels due to their superior anti-corrosion properties, implying an even faster growth rate for moly demand<sup>7</sup>.

<sup>5</sup> Source: Albermarle Corporation.

<sup>6</sup> Source: Frost & Sullivan.

<sup>7</sup> For a full discussion of the subject please refer to 'Molybdenum and Desalination' by Denis Battrum at [http://www.sprottmoly.com/pdf/11\\_07\\_moly\\_writeup.pdf](http://www.sprottmoly.com/pdf/11_07_moly_writeup.pdf).

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## Molybdenum Market Outlook

Molybdenum demand growth has accelerated in the last several years. We do not believe that the market is growing at 4%, nor do we think that growth will slow down going forward. All indicators are pointing towards a 6%+ growth rate. Why is the debate about the growth rate important? Because every additional percentage point translates to at least 4 million lbs additional consumption compounded annually.

### Supply

**New Mines:** While there are a number of large primary projects being planned, we do not anticipate any of them to come online before 2010. The largest is the Mount Hope deposit being developed by General Moly, Inc. It is slated to produce 38 million lbs per year for the first 5 years beginning in the second half of 2010. Moly Mines is developing Spinifex Ridge in Australia, which is expected to produce 24 million lbs, and Adanac Molybdenum is working on its northern British Columbia Ruby Creek deposit with annual production of 10 million lbs. Adanac's guidance is for production in early 2009, but we do not believe it is achievable (due to lack of financing and permitting), and are assuming initial production one year later. While it may seem that these and other projects may flood the market in 2010, we think that companies will have a difficult time meeting their timelines due to permitting delays, difficulty in financing and manpower and equipment shortages. In addition, companies are facing rapidly increasing capital costs, potentially exacerbating the difficulty to finance large projects.

A case in point is the Climax molybdenum deposit in Colorado owned by Freeport McMoRan. Previous estimates for the restart of Climax were \$200 million to \$250 million for 20 to 30 million lbs capacity and an end 2009 startup. However, in its Q3 2007 earnings call Freeport McMoRan guided for a 100% increase in capital costs to \$500 million, demonstrating the industry-wide trend of exploding costs. Although Freeport McMoRan is a company of significant financial strength, moly juniors will have to rely on the capital markets and strategic partners in order to make the projects happen.

**Existing Mines:** While miners do their best to forecast production going forward, even the best laid plans of mice and men often go awry. Thus, we are not surprised when mining issues negatively affect production levels. As an example, Thompson Creek Metals, one of the largest moly producers, reduced production guidance for 2007 and 2008 when recently announcing third quarter earnings due to the mining of lower grade ore. The change is expected to reduce world supply by 3-4 million lbs in 2007 and by 2-4 million lbs in 2008<sup>8</sup>.

In addition to unexpected shortcomings in terms of grades, recoveries and throughput, we anticipate that some large mines will not be able to maintain their recent production levels due to high grading in previous years. We have heard that Bingham Canyon's production (operated by Rio Tinto's Kennecott Utah Copper) will decline materially in 2008 and beyond. Kennecott is maintaining that production will remain similar to 2007 or will decline 'slightly'. Our bias is that production will decline...here is why.

<sup>8</sup> Based on 100% ownership of Thompson Creek mine and 75% of Endako mine.

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Rio really cranked up production in 2005 by targeting areas of the ore body with high moly grades:

	2004	2005	2006	Q1 2007	Q2 2007	Q3 2007
Mo Head Grade	0.033%	0.058%	0.057%	0.056%	0.050%	0.050%
Mo production (millions of lbs)	15	34.4	37	10.4	8.4	7.7

Source: Rio Tinto 2006 Annual Report; Third quarter 2007 Operations Review.

We would like to point out that the reserve grade of moly at Bingham Canyon is 0.047% or approximately 18% lower than the grade mined in 2006. Eventually the reserve grade has to be mined, and we should see 6 to 7 million lbs evaporate from world moly supply. A similar argument can be applied to Codelco, the Chilean state-owned mega producer of copper and moly. By some accounts Codelco could lose up to 15 million lbs of annual production in the next 3 years after having already lost 20 million lbs from 2005 to 2006. Another source indicated to us that the company will lose 10 million lbs in 2008 alone. [Codelco's production in 2006 was 60 million lbs].

When mining moly together with copper in an open pit mine, there is a trade off between high copper zones and high moly zones, and a mine operator cannot always shift from one to the other. Therefore, we think operators of the large copper-moly mines will not be able to maintain elevated moly production levels forever.

Finally, we want to note that a large portion of new copper supply going forward is expected to come from Africa, where copper will be mined together with cobalt, not molybdenum. The ore is different there and does not contain moly.

**China**

No discussion of the molybdenum market would be complete without mention of the country that plays a key role in the supply/demand equation of many commodities. Historically, China has been a large exporter of the metal, but things are changing. China's economy is growing at an incredible pace. GDP is growing at over 11% and industrial production at 18%. Fixed Asset Investment (FAI) in urban areas grew a whopping 26.9% year-over-year in the first 10 months of 2007. Automobile sales jumped 36% year-over-year in October<sup>9</sup>. These numbers speak to the insatiable demand the Chinese have for all things real and their increasing purchasing power.

The Chinese authorities recognize the importance of the country's resources, such as energy and metals. They are implementing policy changes that are restricting the supply of molybdenum and other strategically important minerals to the Western world. This is being accomplished by placing restrictions on foreign investment and by limiting exports.

The National Development and Reform Commission (NDRC) and the Ministry of Commerce announced in November that foreign companies would be prohibited from investing in or exploring for tungsten, tin, antimony, molybdenum and rare earth metals beginning December 1,

<sup>9</sup> "China Commodities Weekly", Scotia Capital, November 19, 2007.

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2007<sup>10</sup>. The move came after China raised export taxes and instituted export quotas earlier this year.

The government reduced VAT tax rebates on certain molybdenum products effective July 1, 2007. The 5% rebate on ammonium molybdate, moly oxides and hydroxides was eliminated. The rebate for moly bar and stick, moly rolled products and moly filament was reduced from 15% to 5%. Export taxes for moly oxide are now 15% and for ferro-molybdenum are 10% (with rumours of a potential 5% increase for ferro-moly<sup>11</sup>).

The change that is expected to affect the moly market the most, however, is the imposition of export quotas. In late May, the Chinese government established a list of qualified exporters of molybdenum consisting of 32 companies. In late June, foreign trade bureaus informed traders that export quotas would come into effect on July 1, 2007. The total quota for the second half of 2007 is 16,800 tonnes, representing a significant reduction to 2006 export levels. The 2008 quota was announced recently at 26,300 tonnes. Whether or not the quota will be adhered to is still not clear, but we saw a drop off in net exports in the third quarter (when the quotas came into force). According to Ryan's Notes, exports fell 18% to 20,051 mt in the first ten months of 2007 compared to 24,413 mt<sup>12</sup>. This represents approximately a 10 million lbs reduction of supply to the rest of the world (or ~2.5% of the world market).

Why is China restricting moly supply to the rest of the world? The information coming out of China indicates that production of moly concentrates is growing, so should they not be encouraging exports? We believe the answer is in the growth rate of moly consumption. Scotia Capital estimates consumption growth at 18% for 2006 and 28% for 2007<sup>13</sup>, but we think their estimates may be conservative. Our analysis indicates that 2006 growth was 30% and over 60% in the first nine months of 2007.

Although these estimates may appear incredible, we think there are good reasons why they make sense. First, moly's largest use is steel, and China's stainless steel production is growing at around 40% per annum. Second, we believe that China is placing an emphasis on higher quality steel. Finally, as we discussed above, the need for more energy infrastructure and the fact that new uses are being developed, mean a higher growth rate for moly vs. overall steel production.

China and other Asian nations are increasingly worried about the supply of strategic resources. Resource-poor Japan is aiming to increase its molybdenum inventory. The government wants to increase reserves of molybdenum together with vanadium, tungsten and cobalt to 60 days of consumption. Currently, the country holds 21 days worth of molybdenum inventory. South Korea, too, has announced plans to build strategic resources of 13 metals, including moly.

Royal Bank Plaza, South Tower  
200 Bay Street  
Suite 2700, P.O. Box 27  
Toronto, Ontario  
M5J 2J1

T: 416 943 6707

F: 416 362 4928

Toll Free: 866 299 9906

www.spratt.com

<sup>10</sup> Xinhua, Reuters.

<sup>11</sup> "Beijing Mulls Raising FeMo Export Tax by 5%", Metal Bulletin, October 2007.

<sup>12</sup> Ryan's Notes, Ferrous and Nonferrous News and Prices, December 3, 2007.

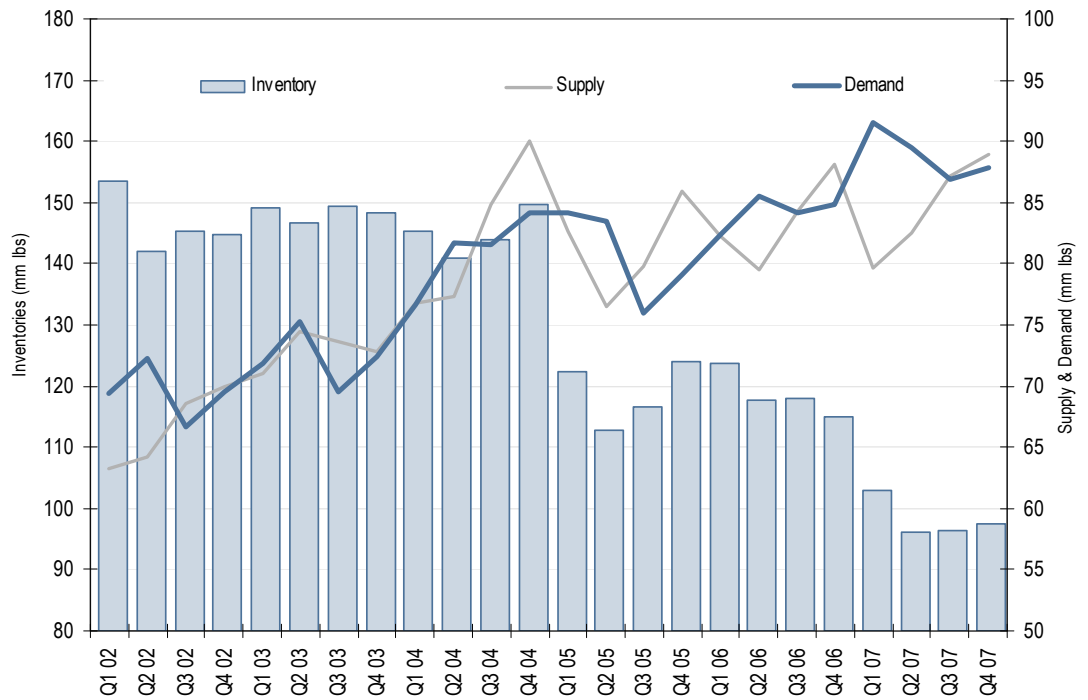
<sup>13</sup> "Molybdenum...The Evolution of an Industry", Scotia Capital, October 2007.

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**Inventories**

Moly inventories are difficult to track because, unlike metals such as copper, it is not on the London Metal Exchange (LME). However, we believe global inventories are low. The chart below illustrates the fact that inventories are forecast to fall by approximately 50 million lbs from the end of 2004 to the end of 2007. This means that demand has exceeded supply by about 17 million lbs a year for the last three years.

**Molybdenum Inventories and Supply versus Demand**



Source: IMO, GMP, CRU

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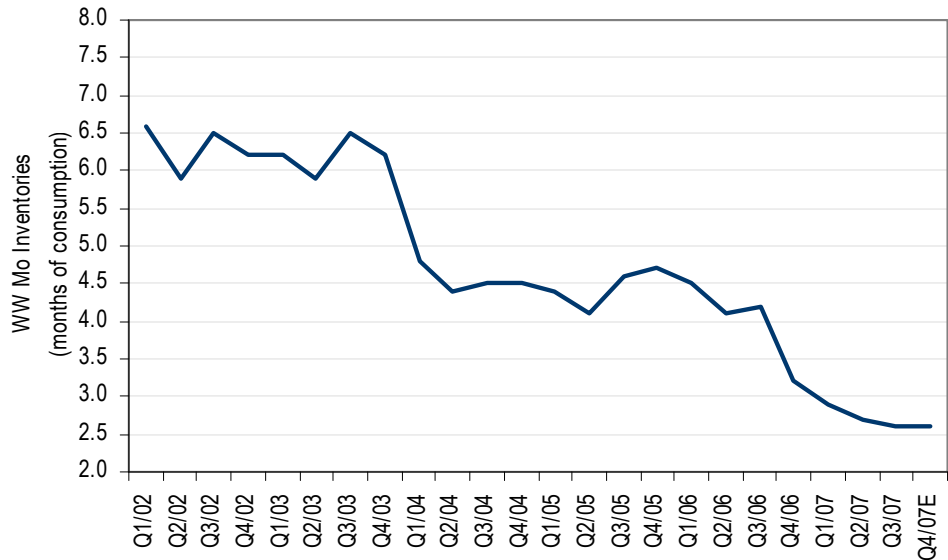
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The following chart illustrates inventories in terms of months of consumption – currently at around 2.5 months. We know that there is a minimum level of inventories that producers and consumers require in order to run their businesses smoothly. We understand that this level is 2 months, which leads us to believe that inventories cannot be drawn down much further.

**Global Molybdenum Inventories in Months of Consumption**



Source: IMO, GMP, CRU

**What’s the Bottom Line?**

Market sentiment is positive: almost everything we read indicates that demand is strong and is expected to remain so, while no significant new supply is expected to come on for two to three years. If we assume that world demand is growing at 7%, we will need ~30 million lbs of new supply in 2008 (of the 30 million lbs in incremental demand, approximately 15 million lbs can be attributed to China). Meanwhile, the Western world will potentially lose 15 to 20 million lbs from Codelco, Rio Tinto and Antofagasta and 10 million lbs from China.

Therefore, the Western world could face a 40 million lbs supply gap in 2008 alone. Where is the moly going to come from? With inventory levels at record lows and no new projects for at least 3 years, moly prices will exceed analyst predictions. Given current economic projections, we expect prices to exceed previous highs of \$40 per lb achieved in 2005.

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200 Bay Street  
Suite 2700, P.O Box 27  
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M5J 2J1

T: 416 943 6707  
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