

MOLYBDENUM

.....*The Big Secret*

Ken Reser, Sept. 30/05



Subsequent to my previous report, “**Molybdenum The 21st Century Metal**”
http://www.adanacmoly.com/articles/Moly_21st_Century_Metal-180KB.pdf

I have done further extensive research for information on current and future uses of Molybdenum. This has been an undertaking of continual frustration & magnitude due to lack of mainstream information on this Noble Metal. Outside of the continual references to Molybdenum being used in stainless steel and other specialty metal alloys, fertilizers, lubricants and all the other uses I previously outlined in the 321 report (some of which are not reported in mainstream media) I have found what I consider the ‘**Big Secret**’ in regard to Molybdenum.

This so called secret involves considering that few people in the mining industry pay much attention to the **Catalyst** market for **Molybdenum**, if any at all. It is considered a small portion of the overall world demand in any charts, graphs or articles one may see and read. This is **not** the case as I see it from all of my own research. Consider why, when so many pundits and experts have continually called for the same dramatic and rapid decline in Molybdenum prices as we have seen in past when it spiked in price, that it has confounded all the predictions and has remained high for months on-end, all the while outliving those same wrongful predications. Today I believe there are little known, but yet profound changes afoot in the world of energy due to scientific discoveries in catalyst

research that are outside the scope of most mainstream reports and articles on Molybdenum, and they are so dramatic and exciting that soon the entire Oil industry will soon be in shock. These changes being brought about by the new discoveries in the catalyst sciences involve coal, plastics and even used tires. The energy field I'm speaking of is '**Liquefaction**'. In the 1950's and even earlier, Coal Liquefaction to produce fuel oils was known and studied in the USA, Germany, Japan and S Africa among others. Japan in 1940 produced 30,000 T of liquefied coal oil. Production continued until the end of WW2. Immediately after the end of the war the US military banned further research into coal liquefaction, alleging that it was military research. The process was costly and compared to the price of a barrel of Oil, not yet feasible. It has been stated that for Coal Liquefaction to be cost efficient and profitable, a barrel of crude must sell for \$32.00. The Japanese have published reports stating \$20.00 p/barrel. The better the catalyst functions, the higher the liquid yield rate becomes. Through international cooperation coal liquefaction has gone from the research stage to commercialization in Japan. Today China, Japan, Germany, Indonesia, & the USA have all embarked on projects with coal liquefaction. Before I continue with this discussion on the Liquefaction process tho, I would like to dwell on crude oil for a moment.

Today thanks to the scientific study of new age band catalysts, and Molybdenum Oxide, Nickel, Iron, Carbon & Cobalt compounds in particular, we now have catalysts that are helping refiners meet the stringent EPA & EEU pollution emission standards recently established. Sulfur is the culprit and the enemy of clean air and consequently due to the 2005 EPA standards (Diesel sulfur content has gone from 300 ppm to 50 ppm) the demand for refinery & hydro-cracking catalyst is going to increase dramatically. There is also another factor at work when considering the crude refinery catalyst demand.

For the last 20 to 30 years very few refineries have been built worldwide, and none in the USA. As I write this I'm reading of **Venezuela** building three new refineries and expanding two existing ones. **China** in a JV with its own **Sinopec** and **Saudi Aramco & ExxonMobil** have begun building their multi-billion-dollar refinery and petrochemical complex in China's Fujian province. Meanwhile a JV between **Borealis & Abu Dhabi National Oil Co.** is advancing another ethylene cracking facility in Abu Dhabi. One should be able to see the picture unfolding, "More Refineries" to come and most likely in Europe, Canada and the USA first. Other nations will invariably follow suit in this age of peak oil and rapidly increasing demand from developing nations like China, India, Brazil & SE Asia etc coupled with growth in the western world. The more refineries and hydro-cracking facilities in operation obviously mean's more Molybdenum catalyst demand. With less sweet crude now available and more sour heavy crude & **Tar Sands Oil** that has to be refined, it is going to mean a **great increase in catalyst demand**.

Next is the new looming production and market for (NG) **Gas To Liquids Fuels (GTL)**. This market is fast becoming a reality and will invariably become a robust market for catalysts as well. **GTL** plants use catalysts of **Cobalt/Iron/Molybdenum** in the processes. Each **GTL** plant according to Bill Bell VP of Methanol & GTL Technology & Catalysts at **Johnson Matthey** “**With GTL ready for ascension a big market for catalysts is now emerging & we are looking at thousands of tons plus of catalyst as inventory in a single plant**”. **GTL** plants (in 2003) are being considered in almost every corner of the globe that has reserves of NG, especially in areas like the Middle East where there is little local market for it & there are no pipelines to market NG. **GTL** converts natural gas (NG) into an easily exported liquid form. **Shell** in 2003 had a plant in operation in Malaysia & pursuing another in Qatar, as is **Sasol Chevron**. **Chevron** is also considering other plants in Nigeria, Australia & Caribbean. **Exxon-Mobil** is also interested in Qatar and **Syntroleum** is looking at Bolivian gas fields. **BP** is experimenting with a test plant in Alaska. (As this info on the **GTL** market is from 2003 I have no idea which projects may now be completed) So now I have outlined **another** little spoken of and upcoming demand on Molybdenum. The refinery demand for catalysts is already in the Billions of dollars and the worldwide demand for all the different combined types of catalyst uses in 2003 was approximately **\$7.5 Billion** according to published reports.

According to a **Roskill Metals** report on catalysts (30/10/03) based on the steel industry states, Molybdenum demand has been growing at 2-4% p/a and in hydro-processing catalyst sector by 3-5% p/a. I believe now with higher emissions standards these latter catalyst demand percentages are now much higher if the truth be known. Also w/o going into detail for the sake of brevity in this report I will only touch on the fact that a Molybdenum/Ruthenium catalyst has been developed by **Hitachi** and other companies for a low cost Fuel Cell. We do know fuel cells will appear in cars, homes & industry in the near future. **Washington State University (WSU)** research teams have discovered an improved method of converting hydrocarbons (such as methane) into hydrogen and carbon dioxide using Molybdenum Carbide (Mo_2C) as a catalyst. This conversion is an important step in fuel cell systems and processes that convert natural gas (NG) into useful petrochemicals. This patent is pending.

On another front **Osiris** in France and others involved in the world nuclear industry are testing a **Uranium/Molybdenum** enriched fuel for Nuclear reactors worldwide. This fuel will do away with using weapons grade Uranium in reactors and once perfected will be used throughout the world. The cost savings from low enriched fuel as opposed to the current highly enriched fuel is substantial as well.

Now lastly before I return to the **Coal Liquefaction** aspect that gave inspiration for this report, you should realize that the global demand for Molybdenum rose by 7.2% in 2004 to

374 million lbs from 349 m/lbs in 2003 as outlined in a study commissioned by **International Molybdenum PLC** and performed by **CRU Strategies Ltd.** mining consultants. Further **CRU** states that conservatively Molybdenum demand thru 2009 will grow by 3.5% to 4.1% p/a and the projected demand will be up to 475 million lbs in the same year. They also (**CRU**) **project a deficit in Molybdenum production in 2008 and as much as a 14 million lb deficit in 2009.** The theory of the world entering a “**Super Commodities Cycle**” is supported by recent reports by **Citigroup-Smith Barney** (China – The Engine of a Commodities Cycle, March 31 /05) and **Goldman Sachs** (Metals & Mining March 21 /05) and **US Energy** (Oil March 30/05) and along with the likes of the renowned **Jim Rogers** I believe this super cycle in finite resources is well underway and will last for many, many years to come.

The mining industry has been slow in responding to current growth in Molybdenum demand and low inventories. Several new projects, both primary and by-product have been promoted in recent months. Given the need for financing and environmental studies it is questionable if any or most of these projects will be producing by 2009. One or two projects seem to have the thrust, reserves and capability to achieve production in 2007/08 nonetheless. As another aside to the focus of this report it is also noteworthy to mention that a memo from the **US Army Research Office: Research For Toxic Compound Destruction**, states that the **University of Pittsburg** has shown that Molybdenum, in the presence of oxygen, is a true catalyst for destruction of nerve gas stimulant. A patent has been awarded on this work.

Now back to the **Liquefaction** portion of this report. The **China Daily News** online on the 03/12/2004 carried an interesting article on China’s liquefaction projects. They stated in part that China has set up its first coal liquefaction research centre in Shanghai, a move to safeguard the nation’s increasing oil supply shortage. The centre will explore and develop direct and indirect liquefaction technologies to produce gasoline & diesel fuel. **Shenhua Corp.** one of China’s largest coal companies w/ an 80% interest in this centre, has almost completed construction of a US \$3.3 billion coal liquefaction plant in Inner Mongolia. Operations of this plant are expected to commence in 2005 to produce 1 million tons of gasoline and diesel fuel p/yr. By 2008 they expect to produce 5 million tons of oil with four more production lines. The second phase of the project will involve an additional investment of US \$7.3 billion. Plans for two more coal to oil projects are on the shelf.

In another article by **People’s Daily** news of Jan. 24/05 it is stated that by 2013, 10% of oil imports to **China** will have been replaced by coal liquefaction. The article also states that international indicators show that the process is profitable at between \$22.00 to \$28.00 US p/barrel and that the **National Reform and Development Commission** is considering making coal liquefaction one of China’s key construction projects this year.

The other aspect of this trend towards liquefaction is the use of recycled tires and plastics in the process. The plastics alone it is estimated comprise approximately 21% by volume of US landfill sites. There is obviously no need to mention the quantities of used tires in the world. The process for the liquefaction involving tires & plastic is called **Co-Processing** and is achieved by combining feed-stocks of coal with the other two products simultaneously.

Without going into a long scientific and technical overview of the coal liquefaction & the co-processing technologies it is important to realize that the present success and feasibility of coal liquefaction is hinged on the recent perfection of an **Iron/Molybdenum catalyst** used in the de-sulfurization portion of the process. Soon you will be reading about another new scientific field concerning **Molybdenum & Nano-Particle Technology**. After all I have written about here in this report, it is my estimation and firm belief that we are now witnessing a historic time in the new expanding uses and demands on Molybdenum in the ever changing world of the Catalyst & Alloy Metals markets and those changes/discoveries are becoming more intense as time passes. To this end I believe now more than ever that, ***“MOLYBDENUM IS THE METAL OF THE 21ST CENTURY”***

(Post Script Notes) This report is not intended to infer that there is some conspiracy of silence afoot in the Molybdenum or Catalysts markets. In the title ‘**The Big Secret**’ simply refers to the seeming secrecy in the catalyst markets and to the lack of mainstream attention paid by mining media to Molybdenum.

Remember Molybdenum IS the biggest percentage dollar gainer of ANY metal in the last 18 months, and we hear little but negativity from media and mining websites.

Over the last few days I have read of Chinese Molybdenum traders stockpiling product for the end quarter of 2005 in order to have supply.

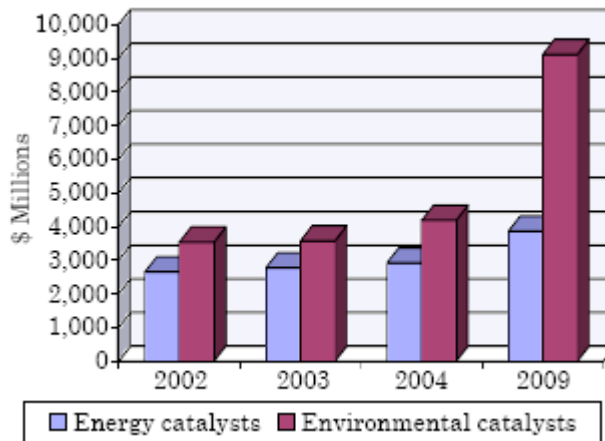
Sept 2/05 a London Mining article stated this in part- “Prices of Mo alloys all rose on Friday as buyers in search of large quantities found that the tightness of supply that had characterized the market in the early part of the year has not lifted.” End

Yes there is a bottleneck in Roasting facilities and it is having some effect on Mo price, but why is there a bottleneck? **Because demand is outstripping world roasting facilities.** Quite simple really! With 5-7% more demand projected by various industry participants, I’d say they better get busy building a lot more roasters, and bringing new Primary Molybdenum Mines in the world onstream or we may see \$50.00 p/lb Moly in future.

China's Metals Info Network, ANTAIKE on Aug 19/05 says new overseas roasting facilities will not be operational until after 2007.

Albemarle Catalysts of Louisiana who use approximately 10 million lbs of Molybdenum p/a, stated in a recent report- ***"We expect a 5% yearly growth rate in certain catalyst sectors"***... and so with the peak oil events facing the world and new refineries coming onstream (in Saudi Arabia & China) and expecting two more refineries in China as well as others around the globe, Tar Sands Oil, Coal Liquefaction, drilling exploration coupled with drill steel use & pipelines etc, the demand for Molybdenum & Cracking catalyst should continue to grow as will the specialty steel demand. Molybdenum has gained a new place of stature in the world's insatiable demand for noble metals.

New Update: According to the latest report from **BCC Inc. Research**, <http://www.bccresearch.com/enviro/C166R.html> they estimate that by 2009 the market for Environmental and Energy related Catalysts will grow by an average of **12.8% P/Yr**. This is far beyond previous industry estimates I have outlined. Molybdenum it would seem has a bright future indeed.



If anyone has information on the Molybdenum markets they wish to share or would like to follow any of the Jr companies I represent please feel free to phone or email me anytime.

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Note: If you wish to become part of my occasional mailing list on Molybdenum & Gold reports or previous writings on Gold Mining in Papua New Guinea & Shandong Province China, please send me an [email](#).