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Cobalt Market Review August 2009

Since our last market review in December the dynamics of the cobalt market have uncannily mirrored the dynamics affecting the global economy as a whole.

China has played a pivotal role in cobalt's fortunes both on a micro and macro level. On the macro side the stimulus package implemented by the Chinese government as a two pronged strategy - firstly to exit dollars and enter into commodities at a comparatively cheap level and secondly to kick start a moribund economy suffering from a lack of export orders - lead to a dramatic increase in cobalt metal demand. On the micro side the drop in the price differential between cobalt in the form of ores/concentrates and cobalt metal also positively impacted demand. As you will read in this review the imported tonnage of refined cobalt metal increased by some 112% from 1081 MT in 2008 to 2289 MT during the first half of 2009. The impact of this increase in demand on the price was positive with the market having bottomed out at close to USD 10/lb and then rebounding to the USD 16-17/lb on the first wave of buying. It then consolidated back to USD 12/lb before resuming its ascendancy to close to USD 20/lb, although on the second price move buying was not exclusively Chinese with a number of other sectors showing signs of life after a prolonged period of de-stocking.

At midyear prices are at year highs, the Chinese buying of metal appears to be over, for the moment at least, availability of cobalt units in ores/concentrates has increased and although economic indicators look more positive there is still worry that we are in dead cat bounce territory. As you will see the economic environment has certainly stalled the onslaught of new production and indications are that the re-stocking trend in the battery sector may well continue therefore any predicted surplus of units could well evaporate in the short term. For the balance of the year it looks as though the cobalt price range will remain at USD 12 - 15/lb on the downside and USD 20/lb on the high with perhaps momentum leaning more to a break on the upside than on the down.

We hope you enjoy the contents of this mid-term report and as always we welcome your comments/feedback on the contents.

If you have any queries or require clarification on any of the enclosed information please don't hesitate to contact either Andries Gerbens agerbens@dartoncommodities.co.uk or Guy Darby gdarby@dartoncommodities.co.uk. We also welcome any feedback or comments that you may have on any of the information provided herein.

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Executive Summary

Supply - Refined Cobalt Production

- In 2008, total refined cobalt production increased 2,851 MT or 5.3%. A 1,675 MT decline in production of CDI member producers was offset by an increase of 4,940 MT from non-CDI member producers. Refined production in China grew almost 5,000 MT or 38% during 2008.
- Refined cobalt metal supply is estimated to fall to approximately 51,000 MT in 2009, some 9.8% from the level seen in 2008. Production increases are only expected at Katanga Mining and Sumitomo Metal Mining, all other producers are expected to reach an annual output that is similar to or (substantially) below the output reached in 2008.

Supply - Key Developments

- The global financial crisis has had a significant impact on the cobalt supply structure during the first six months of 2009. The suspension of DRC mining operations led to substantial cutback in the production and exports of cobalt concentrates. While CAMEC operations resumed by end of March, an estimated 2,000 - 3,000 MT of unrefined cobalt production was lost in the DRC during the first quarter of 2009.
- Refined metal output at Chambishi Metals is yet to restart following the closure of its mining and smelting operations in December 2008. Refined cobalt metal production at Chambishi operations is likely to be down some 2,000 MT in 2009, assuming operations recommence in August / September as per the company's estimate.
- Refined output at non-African producers is estimated to be down for the year due to a reduction in third party feed supply (Xstrata), the closure of the Ravensthorpe mine (BHP Billiton) and reduced downstream demand for refined cobalt products (OMG, Umicore).
- Progress in the development of various cobalt projects has been delayed as mining companies focused on liquidity and cash retention - Tenke Fungurume now being the only project expected to commence new cobalt production in 2009.

The China Factor

- During Q1 2009, some 20-30% of Chinese refining capacity was suspended as both domestic demand and export orders collapsed. While downstream demand has gradually recovered in Q2, estimates for 2009 suggest that total refined output may be down some 15% from 2008.
- The import of cobalt concentrates dropped 42% during Q1 but gradually recovered during Q2. Imports totalled some 5,500 MT of cobalt contained during the first 6 months (versus 15,300 MT for the whole of 2008). However, higher metal imports offset the reduction in concentrate imports, with imports during H1 already exceeding 2008 imports by some 112%.

Demand

- Demand fell some 2.5% in 2008 and basis initial estimates is forecasted to drop a further 9% during 2009, falling just below 50,000 MT. While practically all consuming sectors were impacted by supply chain destocking and a continued decline in downstream demand during H1, recent market data suggests that some sectors may experience a stronger than expected demand recovery during the second half of 2009.
- Battery industry forecasts estimate a 41% growth in the lithium ion battery market and restocking from this sector during Q2 combined with stronger cobalt metal demand from China has led to stronger market prices during the June-July period.

Prices

- Cobalt prices dropped to a five year low during December 2008 on the back of deteriorating market sentiment and a severe decline in downstream demand. Cobalt prices recovered back to a \$17.50 - \$19.00 range by end July 2009 following renewed demand from the Japanese and Korean battery sector, a substantial increase in Chinese metal demand and high grade availability concerns. During the first six months of 2009 cobalt prices averaged \$14.30/lb. and \$15.71 for low and high grade respectively.



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1.0 Supply

1.1 Supply 2008 - Final Data

Final production data suggest that global refined cobalt supply increased by 2,851 MT during 2008, a 5.3% increase from 2007. A decline in refined output of 1,675 MT (-5%) by CDI-member producers was offset by a production increase of 4,940 MT (+25%) by non-CDI member producers. While the majority of producers reported a reduction in refined output during 2008 (- 2,981 MT combined), a considerable increase in Chinese refined output (+ 4,994 MT) and new production from Katanga Mining (+630 MT) resulted in an overall increase in refined cobalt availability of 2,851 MT.

Refined Cobalt Availability								
CDI Member companies	2004	2005	2006	2007	2008	Difference yoy MT	Difference yoy in %	2009(E)
CTT, <i>Morocco</i>	1,593	1,613	1,405	1,591	1,711	120	8%	1,600
Xstrata, <i>Norway</i>	4,670	5,021	4,927	3,939	3,719	-220	-6%	3,500
ICCI / Sherritt, <i>Canada</i>	3,225	3,391	3,312	3,573	3,428	-145	-4%	3,650
Vale Inco, <i>Canada</i>	1,562	1,563	1,711	2,033	2,200	167	8%	2,000
OMG, <i>Finland</i>	7,893	8,170	8,580	9,100	8,950	-150	-2%	8,100
BHP Billiton, <i>Australia</i>	1,900	1,400	1,600	1,800	1,600	-200	-11%	1,400
Sumitomo, <i>Japan</i>	429	471	920	1,084	1,071	-13	-1%	1,450
Norilsk, <i>Russia</i>	4,524	4,748	4,759	3,587	2,502	-1,085	-30%	2,350
Chambishi, <i>Zambia</i>	3,769	3,648	3,227	2,635	2,591	-44	-2%	600
Gecamines, <i>DRC</i>	735	600	550	606	300	-306	-50%	400
Eramet, <i>France</i>	199	280	256	305	311	6	2%	350
Umicore, Belgium ⁽¹⁾	2,947	3,298	2,840	2,825	3,020	195	7%	2,500
Total	33,446	34,203	34,087	33,078	31,403	- 1,675	-5%	27,900

Non-Member companies	2004	2005	2006	2007	2008			2009(E)
Tocantins, <i>Brazil</i>	1,155	1,136	902	1,148	994	-154	-13%	900
Various, <i>China</i> ⁽²⁾	8,000	12,700	12,700	13,245	18,239	4,994	38%	15,500
Various, <i>India</i>	545	1,220	1,184	980	858	-122	-12%	680
Mopani Copper, <i>Zambia</i>	2,022	1,774	1,438	1,700	1,250	-450	-26%	1,200
South Africa	300	214	257	307	250	-57	-19%	250
Kasese, <i>Uganda</i>	457	638	674	698	663	-35	-5%	600
Minara, <i>Australia</i>	1,979	1,750	2,096	1,884	2,018	134	7%	1,900
Katanga Mining, <i>DRC</i>	-	-	-	-	630	630		1,800
Total	14,458	19,432	19,251	19,962	24,902	4,940	25%	22,830

Other Sources of Supply								
DLA Deliveries	1,632	1,199	294	617	203	-414	-67%	250
Total Supply	49,536	54,834	53,632	53,657	56,508	2,851	-10%	50,980
Change year on year (MT)	4,641	5,298	-686	25	2,851			-5,528
Change year on year (%)	10.3%	10.7%	-2.2%	0.0%	5.3%			-9.8%

¹⁾ Includes / ²⁾ Excludes Ganzhou Yi Hao Umicore production

Refined Cobalt Availability – Source: '04 – '08 Cobalt Development Institute / '09 (E) Darton Commodities Ltd.



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1.2 Supply 2009 - Key Developments

Estimates indicate that during 2009 global refined cobalt availability will decline by approximately 9.8%, to just under 51,000 MT. The fallout of the credit crisis impacted market demand and metal prices, forcing a growing number of producers to cut back and, in some cases, suspend refining operations. An estimated reduction in refined cobalt output of some 5,000 MT is likely to push supply in 2009 back to a level that is only just above the level seen in 2004.

1.2.1 Africa

- The most significant reduction in refined cobalt metal output has been at **Chambishi Metals PLC** in Zambia. Chambishi, Africa's largest cobalt metal producer in 2008, announced suspension of its smelter and mining operations in December 2008 as a result of deteriorating cobalt and copper prices. While Chambishi has not been producing since then, company officials have announced that it expects to commence metal production again in August. Following the sale of Luanshya Copper Mines to China Nonferrous Metals Mining in May, feed for the Chambishi smelter shall now be sourced through the import of concentrates from neighboring DRC. The prolonged closure of the Chambishi operations may contribute to a reduction in metal output by some 1,800 MT during 2009, and possibly more if production resumes any later than August.
- **Mopani Copper Mines**, majority owned by Glencore International, laid off some 1,700 miners as part of major cost cutting efforts at its Nkana and Mufulira mines. In April Mopani announced that it would stop production at the Mufulira mine and place Nkana, its concentrator and cobalt plant under care and maintenance. Early May this decision was reversed following a gradual improvement of the copper price and implementation of rigorous cost cutting measures.
- Mining operations in the DRC have been severely hit as the meltdown in the financial markets triggered a major global economic crisis, in turn resulting in an unprecedented drop in global demand for natural resources. Commodity prices rapidly plunged with copper prices collapsing from around USD 4.10/lb in mid 2008 to USD 1.28/lb by the end of 2008 and cobalt peaking above \$50/lb. in March, dropping below \$10/lb. by end December. At the beginning of 2009, over 60% of copper and cobalt mines in the DRC were forced to shut their production, leaving over 300,000 people unemployed. Production and exports of cobalt concentrates have seen substantial cut backs following the suspension of production at Central African Mining & Exploration Co. (CAMEC), Katanga Mining, Compagnie Minière du Sud Katanga (CSMK) and other, smaller mining operations.
 - **CAMEC** halted its cobalt and copper operations at its Mukondo mine and Luita plant in November 2008, resuming mining operations by late March 2009. Prior to the closure Camec reported a monthly average cobalt production of 422 MT. While mining operations were suspended, production of concentrates continued using stockpiled feed. As a result, CAMEC says it is still on track to produce 8,000 MT of cobalt contained in concentrate during the 2009 / 2010 financial year. Additionally, commissioning of CAMEC's 3,200 MT p/a SX/EW line is said to be on target for production commencing September 2009, with full production expected in March 2010. In addition to the concentrates produced at the Kakanda concentrator, this line is scheduled to produce a 99% purity cobalt metal. In July 2009, CAMEC entered into an exclusive off-take arrangement, allowing it to supply its entire annual production of cobalt concentrates from its Mukondo operations to China's Zhejiang Galico Co & Ni Materials Co Ltd.
 - **Katanga mining** reported Q1 2009 sales of 460 MT cobalt metal and some 17,000 MT of cobalt concentrates, coming from stockpiles produced prior to the closure of the Kolwezi concentrator. While refined metal output is thought to have averaged at approximately 150 MT p/m for the first 7 months of 2009, company forecasts suggest a rapid ramp up in metal production during the second half of 2009 when phase 2 of its Lululu Metallurgical Plant refurbishment project is completed.



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Targeted for end September, completion of the project would allow the company to achieve an annual output of 4,000 MT of cobalt metal by the end of Q4. Financing for completion of phase 2 was secured through a \$250 million rights offering issued to Glencore, increasing its stake in the company to 78.1%. Glencore is currently in negotiations with an unnamed party to sell half of its stake in Katanga to form a 50/50 joint venture.

1.2.2 Rest of world

- Production estimates for **OMG and Umicore**, the world's two largest cobalt refiners, suggest that overall output during the first half of 2009 may have been significantly lower compared to the same period in 2008. A sharp drop in downstream demand from the rechargeable battery, construction and automotive markets has led to an overall reduction in sales volumes and ultimately refined output. The impact on sales volumes was amplified by extensive downstream de-stocking and OM Group saw net sales fall 60% in the first quarter of 2009 as a result of lower cobalt prices and end-market demand. In terms of volume, their Advanced Materials division saw sales volume fall by 19%. While OMG saw some encouraging signs of demand improvements during the course of Q2, the company still sees 'tremendous uncertainty in the markets served, not expecting that to change anytime soon...'. Revenue at Umicore's Advanced Materials division was 26% lower in the first quarter compared to that of 2008.
- **BHP Billiton** announced the indefinite suspension of the Ravensthorpe nickel-cobalt mine in January in an attempt to battle the collapse in commodity metal prices. The mine was scheduled to feed the Yabulu refinery with an additional 1,400 MT of cobalt during 2009. However, the processing of the mines' mixed nickel and cobalt hydroxide at the Yabulu refinery was soon halted, leaving the Yabulu refinery to treat third party materials only. Beginning of July, BHP Billiton announced the sale of its Yabulu nickel and cobalt refinery to Australian mining magnate Clive Palmer for an undisclosed amount. The Yabulu refinery has an annual production capacity of some 2,700 MT of cobalt in an oxide / hydroxide form.
- **Sumitomo Metal Mining (SMM)** announced in June that its second nickel / cobalt processing plant at Coral Bay in the Philippines has ramped up to full commercial capacity. This unit joins another plant at the Coral Bay complex, taking total processing capacity to some 22,000 MT of nickel and 1,800 MT of cobalt metal. Total cobalt metal production for 2009 is estimated to be around 1,450 MT.
- **Xstrata** produced 6% less cobalt in 2008 due to a reduction in cobalt-content feed to its Nikkelverk refinery. During the first quarter 2009, the total amount of cobalt derived from Xstrata's own mining operations increased to 398 MT, from 315 MT in Q1 2008. However, Xstrata is largely dependent on third party feed material for its cobalt refining operation in Norway (e.g. Ni / Co sulphides from the BHP Billiton Kwinana mine, toll produced into Falconbridge grade cathode). End July Xstrata announced a 16% reduction in the intake of third party feed at Nikkelverk during the first six months of 2009 and it is therefore likely that 2009 output will see a further reduction to that seen in 2008.
- **Minara Resources** production dropped 11% during the first quarter to 450 MT, down from 506 MT in the last quarter of 2008.
- **Vale Inco** may potentially loose as much as 220 MT per month of cobalt metal production as a result of strikes at Vale Inco's Sudbury and Voisey's Bay operations in Canada. A strike started at Sudbury in July and union members at Voisey's Bay are also scheduled to strike from August 1.



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1.2.3 New projects - progress update

Much of the additional refined cobalt output that was scheduled to come on stream in the course of 2009 has gradually been delayed as producers have cut capital expenditure and are struggling with cost overruns and technical complications related to feed and processing issues. A significant part of the incremental cobalt production that was initially scheduled for 2009 is now being delayed into 2010 and beyond.

- **Tenke Fungurume Mining** is developing the Tenke Fungurume project which is believed to hold the largest undeveloped cobalt / copper ore body known today. The project, owned by Freeport-McMoran (operator, 57.75%), Lundin Mining (24.75%) and Gecamines (17.5%) entails an open pit mining operation with expected annual production capacity of 8,000 MT of cobalt in hydroxide. Mining commenced in October 2007 and as of May 2009 some 8,000 MT per day of ores are delivered to the process plant. Production of the first copper cathode was achieved in March 2009 and full commercial production is expected in the second half of 2009. Commissioning of the cobalt circuit and production of its first cobalt hydroxide (44% contained cobalt) is expected later this year. Unconfirmed reports suggest that first deliveries will be shipped to China to feed the Jinchuan Group Ltd refinery (see 1.3 The China Factor).
- **First Quantum Minerals** continues its development of the Kolwezi Tailings Project and the project was approximately 56% complete on March 31, 2009. Due to the decline in copper price and a deteriorating economic climate, FQM reduced its capital expenditure on the Kolwezi project, consequently increasing the length of expected construction period. Project commissioning is now expected for Q2 2010, with an initial production of 7,000 MT p/a of cobalt in hydroxide form, with a planned ramp up to 12,000 MT within 12 months following commissioning.
- **Ruashi Mining**, operated by Metorex has delayed commissioning of the Ruashi II plant following liquidity issues and the company is currently looking for a strategic partner in China to secure the finances to fund the \$100 million higher than expected costs to develop the DRC Ruashi project. Cobalt production at Ruashi grew to 527 MT in carbonate over the Jan-May period and, upon completion of the Ruashi II plant, cobalt output should ultimately grow to 3,500 MT in hydroxide form.
- At the **Ambatovy** project in Madagascar, owned and operated by Sherritt International, Sumitomo Corp., Korea Resources Corp. (Kores) and SNC-Lavalin Group, engineering was 95% complete and construction was 48% complete by March 31, 2009, increasing project expenditures to US\$2.6 billion. Mechanical completion of the Ambatovy Project is on schedule for the latter part of 2010, after which it is scheduled to produce 5,600 MT of cobalt in powder and briquette form.

1.3 DLA (US Defense Logistical Agency)

During 2008 the DLA sold 203 MT of cobalt metal from its strategic stockpile, its lowest sales figure for more than 10 years. As per January 1 2009, the DLA had 474 MT of high grade cobalt cathodes left in its strategic stockpile of which it sold a further 96 MT during 2009. According to the 2009 Fiscal Year Annual Materials Plan the DLA is authorized to sell its remain stock in its entirety during 2009. However, with 378 MT left to sell it will probably not be until late 2010 or 2011 until these stocks are fully depleted.

1.4 Supply - The China Factor

- During 2007, Chinese supply was characterized by a structural tightness in feed material for refining purposes, resulting in record prices for both cobalt bearing concentrates and intermediate products, ultimately restricting growth in refined output to 13,245 MT according



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to CDI data. Availability and thus imports of refining materials grew dramatically during 2008 and combined with stronger downstream demand, refined cobalt supply in China increased significantly to 18,239 MT, a 38% increase year on year. If one includes Umicore's production at its Ganzhou YiHao operation, refined cobalt production in China was in excess of 20,000 MT during 2008.

- In 2008, the import of cobalt ores and concentrates more than doubled from 118,353 MT to 254,735 MT. Due to a reduction in the average cobalt content of the materials imported, overall cobalt contained in ores and concentrates increased an estimated 99% to 15,284 MT in 2008. Imports of alliage blanc (a raw material containing anywhere between 15-35% cobalt, copper and iron as its main constituents) increased some 52% to 1,716 MT of cobalt contained.
- The significant cutback in concentrate production in the DRC during late 2008 and beginning of 2009 led to a relatively sharp drop in imports during Q1 with total imports being 42% below the level seen during Q1 of 2008. However, concentrate imports showed a strong recovery during May with imports having doubled from those recorded during March. Some 91,628 MT or close to 5,500 MT of cobalt in concentrate form has been imported into China during the first 6 months of 2009.

Cobalt Imports into China, 2007-2008, 2009 YTD

Product	Jan-Dec 2007		Jan-Dec 2008		Y.o.y. change	Jan-June 2009	
	Quantity (KG)	Co cont (MT)	Quantity (KG)	Co cont (MT)		Quantity (KG)	Co cont (MT)
Cobalt Acetate	-	-	-	-		-	-
Cobalt Carbonate	456,146	205	32,787	15	-93%	15,723	7
Cobalt Chloride	-	-	-	-		-	-
Alliage Blanc *	4,512,444	1,128	7,742,875	1,936	72%	3,446,145	862
Cobalt Metal **	1,550,937	1,543	1,086,613	1,081	-30%	2,300,354	2,289
Cobalt Nitrate	12,830	2	3,902	1		1,976	0
Cobalt Ores	118,353,215	7,693	254,735,955	15,284	99%	91,628,414	5,498
Cobalt Oxide & Hydroxide	518,214	337	475,216	285	-15%	589,466	354
Cobalt Sulphate	157,836	24	165,254	33	40%	192,794	39
Cobalt Waste & Scrap	-	-	-	-		-	-
Intermediate Cobalt 1	13,544,576	2,709	14,590,032	2,407	-11%	7,313,665	1,207
Intermediate Cobalt 2 ***	-	-	-	-		968,455	629
Other Cobalt	111,983	105	206,039	200	90%	43,346	41
Total Imports of Co (MT)		13,746		21,242	55%		10,925

Source: General Administration of Chinese Customs, Co contents estimate Darton Commodities Ltd. -

* Assumes DRC imports with HS Code 81052090 to be in Alliage Blanc form

** Assumes non-DRC imports with HS Code 81052090 to be in metal form

*** Assumes majority of imports ex-Australia with HS Code 81052090 to be in intermediate form at ~ 65% Co

- The reduction in concentrate imports has been off-set by a dramatic increase in metal imports. Over the first six months of 2009, China imported more than twice as much cobalt metal than during the whole of 2008. An estimated 2,289 MT of metal has been imported into China during Jan-May 2009, already up 112% from 2008. Various factors have contributed to this surge in metal demand;
 - The reduction in DRC concentrate exports led to relatively high market prices for concentrates, narrowing the price differential with metal. This in turn has led some refiners to substitute concentrates with metal as raw material in their production processes.
 - China's RMB 4 trillion (US\$585 billion) stimulus plan, record bank lending of RMB 5.84 trillion in the first five months (almost triple the amount in the same period last year) and the government stockpiling program all helped to restore optimism about China's economic recovery and growth rate, leading to an extensive period of commodity restocking. Base metal prices surged as a result, with copper prices gaining 63% this year.

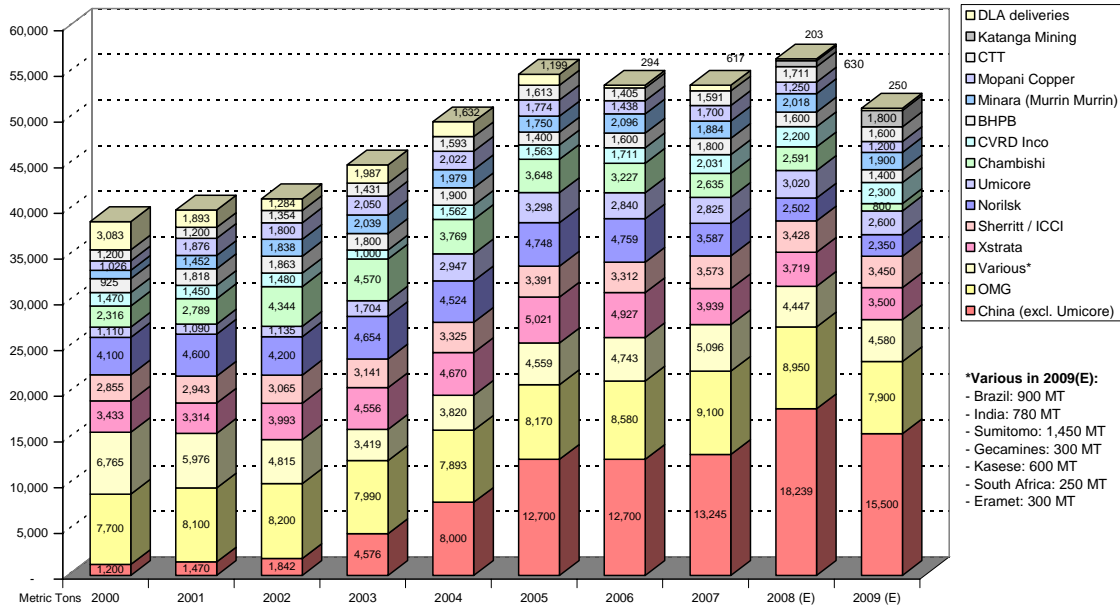


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While it is believed that a significant share of the cobalt metal imported into China this year has been bought speculatively, it is not clear how much of the metal would have been processed and how big the accumulation of cobalt metal inventory is in China.

- Jinchuan Group Ltd, China's largest cobalt metal producer has reduced its cobalt output due to raw material supply issues. Unconfirmed reports suggest that Jinchuan is having problems with adjusting its processing facilities to the feed material that will be supplied by Freeport McMoRan's Tenke Fungurume mine. Jinchuan reduced its imports of concentrates substantially this year in anticipation of supplies commencing from the Tenke project. Jinchuan is now said to be idling some of its cobalt capacity in August to make the necessary process alterations. While the extent of the impact on its cobalt output is not known (estimated at 4,400 MT in 2008), Jinchuan has not been offering cobalt metal into the spot market in recent months, only fulfilling long-term contract supply commitments. Some 40% of its refined cobalt output is met by the supply of domestic ores but for the balance of its output Jinchuan is dependent on foreign, third party feed.
- Over the January-June period, Jinchuan exported a total of 746 MT of cobalt cathode compared to just below 700 MT over the same period last year. However, exports are expected to fall from June onwards as Jinchuan is trying to meet its domestic delivery obligations and taking advantage of a higher domestic market price. As a result of reduced Jinchuan supplies, some 235 MT of the 746 MT of metal it exported has been sold and imported back into the Chinese market.
- By the end of 2008, China had seen a rapid deterioration in downstream demand for cobalt based chemicals and alloys. The slowdown continued well into 2009 as both domestic demand and export orders collapsed, resulting in a suspension of between 20-30% of refining capacity by the end of Q1 according to CRU estimates. While downstream demand showed robust signs of recovery during Q2 resulting in an overall increase in Chinese refined output, estimates suggest that overall refined cobalt production in China could be down by as much as 15%, therefore not exceeding 15,500 MT in 2009.

Global Refined Cobalt Production



Source: Cobalt Development Institute + 2009 (E) Darton Commodities Ltd.

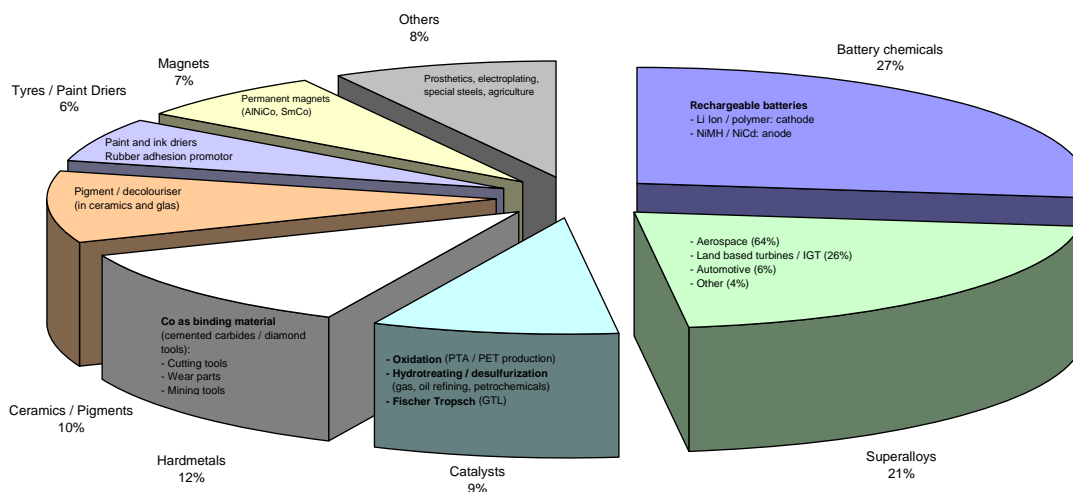


2.0 Demand

2.1 Demand - 2008; Final Data

Cobalt demand during 2008 has been estimated at just over 54,600 MT of cobalt, down 2.5% from the estimated 56,300 MT consumed in 2007. Approximately 53% of this was consumed in the chemical sector, the balance in alloys, cemented carbide, diamond tools, magnets and special steels. While the beginning of 2008 still saw reasonable demand growth in most of the cobalt consuming sectors, downstream demand slowed abruptly during the last few months of the year. The fallout of the credit crisis spread over to the global economy, fuelling a full scale global economic recession. By mid October 2008, the Baltic Dry Index, a measure of shipping volume, fell by 50% in one week as letters of credit were mostly unobtainable as a result of the credit crunch. The financial crisis eventually produced a manufacturing crisis with the strongest declines in industrial production occurring in export-based economies. For the first quarter of 2009, the annualized rate of decline in GDP was recorded at 14.4% in Germany, 15.2% in Japan, 7.4% in the UK and 9.8% in the Euro area. However, recent forecasts suggest that the worst of the recession may have passed and that most economies, albeit on government life-support, can move back into expansion territory during the second half of 2009. In this scenario we are likely to see a higher total consumption figure for 2009 than the 49,700 MT initially forecasted (year-on-year reduction of 9%).

Cobalt Demand by End Use 2008



Source: Cobalt Development Institute / Darton Commodities Ltd

2.2 Demand 2009 - Key Developments

2.2.1 Superalloys

- Initial forecasts suggested demand from the superalloy sector would grow by some 4-5% in 2009, whereby aerospace related demand was to remain the primary growth driver as order backlogs for airplanes and aeroengines reached new record levels by early 2008. However, the commercial aerospace market was soon impacted by pushouts and uncertainties as the supply chain adjusted to revised commercial airplane build schedules and rapidly falling demand from the aeroengine aftermarket, in turn impacting order books in the superalloy sector.



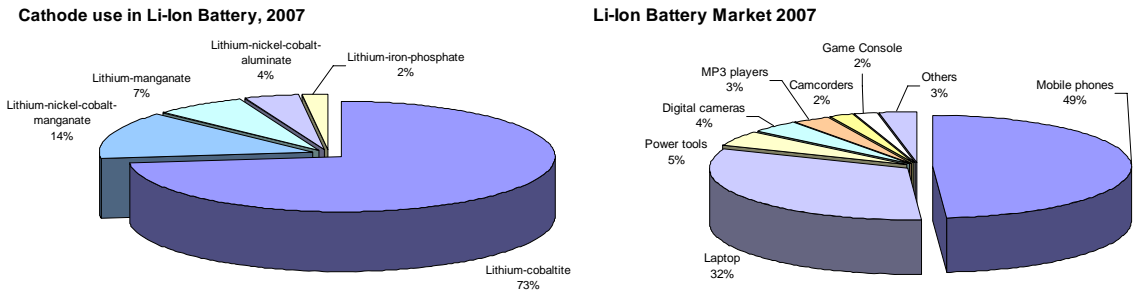
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Carpenter Technologies reported an overall reduction in Q1 2009 alloy sales of 44.4% compared to the same period in 2008. Its aerospace division saw a 17% reduction in sales volume, reflecting reduced airplane builds and lower overall passenger miles, compounded by excess inventory in the jet engine supply chain. US producer Allegheny Technologies Inc. saw its overall value of H1 2009 sales drop 51% due to lower raw material surcharges and alloy shipments, or a 29% drop in volume of superalloy shipments.

- The airplane manufacturers' order backlogs are holding up well despite of what has been referred to by the airline industry as the worst crisis it has ever faced. In July Boeing announced that its contractual backlog was \$257 billion, more than seven times it's expected 2009 revenues. Nevertheless, orders for new airplanes have dropped dramatically during 2009 whereby Boeing recorded net sales of 4 new aircraft by mid July, versus net orders of 638 and 1,397 planes during 2008 and 2007 respectively. With a net order book of 68 planes for the first half of 2009, Airbus orders were higher but still substantially below the 900 and 1,458 net orders recorded in 2008 and 2007. Contrary to the commercial sector, sales in the defense sector are keeping up with those levels seen in 2008.
- According to a recent IATA survey airlines do not expect any improvement in international air travel until the end of 2009 at the earliest, with some respondents not seeing a significant recovery before early 2011. The global recession is cited as the main reason for deteriorating demand but the impact of a swine flu pandemic could further impact air travel. Premium traffic – business class or first class travel where carriers typically make their money – fell some 23.6% in May and 22% in April. The impact of the swine flu has been particularly noticeable in Central America where passenger travel fell some 62% in May. According to IATA data, overall international air passenger travel fell 9.3% year-on-year in May and it estimates that airlines are expected to lose 9 billion dollars in 2009, following an estimated loss of 10.4 billion dollars in 2008.
- The power generation market has been experiencing a period of sustained growth, driven by growing demand for additional generating capacity. This in turn has stimulated demand growth for superalloys used in industrial gas turbines. Between 2000 and 2007 the gas fired power generation market more than doubled and while growth slowed significantly in 2008, market analysts suggest that the global market for industrial gas turbines is still anticipated to grow at a compound annual growth rate of 4.7% between 2008 and 2015. Yet superalloy producers have seen sales into this sector being impacted by customer re-scheduling, destocking and a tighter credit market impacting the financing of big industrial turbine projects.
- Sales to the automotive sector fell dramatically as sharply lower consumer spending and a tighter credit market continued to suppress car sales. Carpenter Technologies reported a drop of 57% in alloy sales to this sector during the first quarter of 2009.

2.2.2 Batteries

- The battery sector consumed close to 15,000 MT of cobalt during 2008, slightly up from the volume consumed in 2007. While the market for Li-ion batteries continued to see double digit growth during the first half of 2008, global sales slumped dramatically during the fourth quarter following a sharp decline in consumer electronic sales and compounded by severe destocking throughout the supply chain. Anecdotal evidence suggests that battery manufacturers cut raw material supplies by as much as 60% during the last quarter of 2008 in a response to deteriorating market conditions, a trend which continued through the first quarter of 2009. OMG reported a drop in first quarter battery chemical revenues of 57%, with overall sales volume of its Advanced Materials Segment falling 34.5% year-on-year.



Source: Roskill Information Services, Umicore

- While cobalt is still used in the production of cathode materials for NiCd and NiMH batteries, over 90% of the cobalt currently consumed in the battery industry is in the production of lithium-ion batteries. Roskill estimates suggest that the Li-ion battery market grew an average of 22% per year over the 2000-2008, contributing up to 60% of year on year demand growth for cobalt. While global production saw a significant fall during late 2008 and the first quarter of 2009, recent market forecasts from battery manufacturers suggest that a strong recovery in battery sales is anticipated for the second half of 2009. This has resulted in a noticeable demand recovery for cobalt products from downstream battery chemical manufacturers during the second quarter. Samsung SDI announced a 33% increase in 2nd quarter operating profit on the back of stronger battery sales and announced it expects demand for its Li-ion batteries to grow 41% in the second half of 2009. Meanwhile Sanyo, the world's largest Li-ion battery maker, is forecasting strong sales growth for the balance of the year as a result of a recovery in the mobile phone market and a 20-25% increase in notebook computer sales in 2009.
- Substitution of the traditional LiCoO₂ cathode material continues, decelerating the demand growth for cobalt in the battery sector. In 2005 over 90% of the cathode material used in Li-ion batteries was based on LiCoO₂ (containing up to 60% of cobalt), falling well below 70% in 2008. The replacement materials that are increasingly used are LiNiCoMnO₂ (10-20% Co), LiNiCoAlO₂ (9% Co), LiMn₂O₄ and LiFePO₄, both containing no cobalt. For 2012, Umicore is forecasting that the use of LiCoO₂ as cathode material for Li-ion batteries will have dropped to 36%, while use of LiNiCoMnO₂ and LiNiCoAlO₂ will have grown to 34% and 10% respectively. In addition to the shift towards lower or no cobalt cathode materials, increased recycling efforts (EU target = 40% of batteries recycled by 2016) will ultimately reduce the amount of primary cobalt required.
- Whilst the use of rechargeable batteries for automotive applications (HEV, EV and PHEV) remains a significant potential growth market, the actual usage of cobalt will strongly depend on the battery technology that will eventually dominate this market and how vehicle sales will develop in the coming years. Although Li-ion technology is expected to become the predominant technology in HEV batteries, producers have yet to prove this technology on a large commercial scale. While Toyota and Matsushita were developing a Li-ion battery for the latest Prius model they ultimately opted for a NiMH battery over performance and safety concerns. While the global car industry was being faced by a devastating slump in sales, hybrid vehicles remained a small bright spot with Toyota and Honda seeing relatively robust demand for its latest models. Toyota's latest Prius model was Japan's best selling car in May and Ford reported record sales of hybrids during June, up 91% from a year earlier. To meet stronger than expected demand, Sanyo announced end June that it will increase its capacity for NiMH batteries for use in HEV's by 75% over the next 12 months.



2.2.3 Hard Metals

- Just under 6,500 MT of cobalt is estimated to have been consumed in the hard metal sector in 2008, primarily as binder material in cemented carbide and diamond tool applications. Escalating cobalt prices have stimulated industry efforts to substitute the traditional cobalt binder with more economical materials (i.e. lower cobalt content) resulting in lower demand growth in this sector. Furthermore, it is believed that this sector has been particularly hard hit by global destocking and demand cuts coming from the automotive, construction and mining industries. Demand for fine cobalt powders fell dramatically by the end of 2008 and reduced shipments were seen throughout the first half of 2009. OMG saw its revenue in this sector drop by 79% year-on-year during the first quarter on lower sales prices and volumes, yet estimated an upward trend with 10-20% growth during the balance of the year following an end to massive destocking in the sector and a gradual recovery in automotive and construction markets.

2.2.4 Catalysts

- Just over 5,000 MT of cobalt was consumed by the catalysts industry in 2008, of which the majority was used in the production of polymerization catalyst. The market for purified terephthalic acid (PTA), which in turn is used in polyester fibers and polyethylene terephthalate (PET) packaging materials, saw healthy growth rates of 6-8% per year up until early 2008 when inventory reductions started to impact global sales. Demand continued to deteriorate as it was hit by a severe downturn in polyester fiber and PET resin markets and the collapse in energy and feedstock prices resulted in further inventory reductions. While the market for PTA catalysts has started to show signs of recovery, a major challenge that will continue to face the PTA industry is the growing threat of overcapacity caused by huge capacity additions of nearly 9 million tpa that are currently under development, mainly in China. More advanced recycling technologies and the increased regeneration of spent catalyst means cobalt consumption in this sector will grow more gradually than global PTA demand.
- The market for cobalt salts used in hydro-desulphurisation catalysts remained reasonably healthy as the oil refining industry intensified maintenance replacements on its installations. In previous years the soaring oil price was seen as a major driver for oil companies to fast-track the development of commercial gas to liquid (GTL) production facilities. However, the sharp fall in oil prices last year put pressure on liquid fuel substitutes, delaying further planning and development of the various scheduled projects. Sasol (Chevron) and Shell are the only two oil companies currently producing GTL products on a commercial scale. Construction of the \$15 billion Shell Pearl Project in Qatar is on track and expected to be operational by end 2010. The Sasso Oryx plant in Qatar is now closer to producing at its 34,000 bpd capacity. In July of this year Sasol set up a new JV in Uzbekistan to develop a 40,000 bpd GTL production facility in the country.

2.2.5 Others

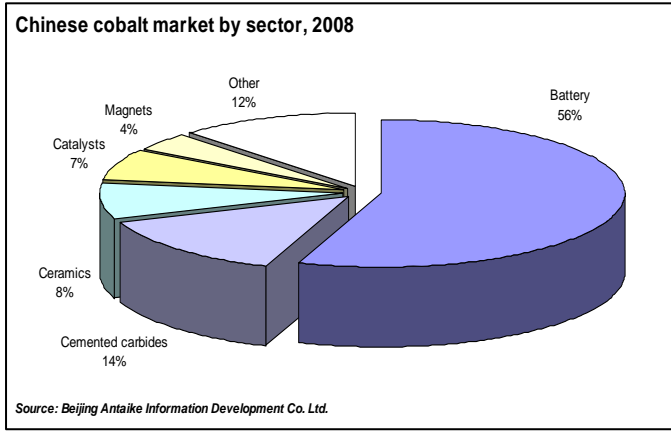
- All other cobalt consuming sectors have been more or less impacted by demand reductions in downstream markets following the outbreak of the worst global economic recession seen since the 1930's. As a result, demand cuts in the first half of 2009 were seen for AlNiCo and SmCo magnets, tire adhesion promoters (both heavily dependent on automotive industry), cobalt oxides for use in the glazing, ceramics and electronics industry, as well as in high speed and tool steels for use in the construction and building sector. One application bucking the trend has been the medical alloy sector. The use of cobalt in this application continued to grow as a result of higher demand for CoCrMo alloys used to form orthopedic implants, in turn driven by the rapid growth in implant procedures in the EU, US and Japan due to the ageing population.



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2.3 Demand - The China Factor

According to data presented at the 2009 CDI conference by Antaika Information Development Co., cobalt consumption in China fell 2.5% in 2008 to 14,373 MT. This represents a significant slowdown from the double digit growth rates seen in previous years (+15.8% during 2006-2007 period).



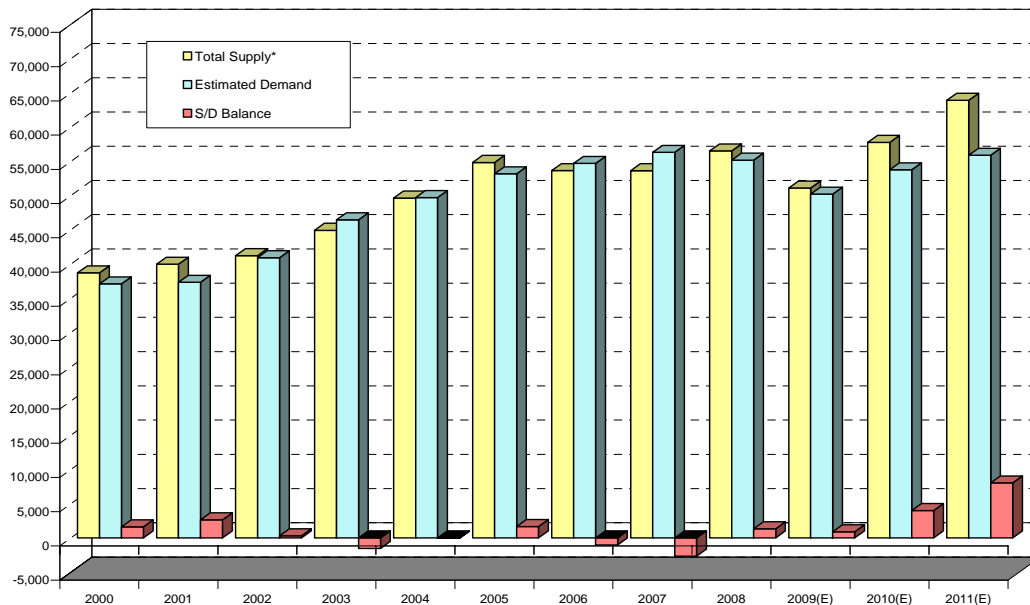
Consumption of cobalt for the production of battery chemicals rose to just over 8,000 MT in 2008, an increase of approximately 10%. This growth was partly driven by strong export growth of LiCoO₂ from China. In 2008, China exported 1,400 MT of cobalt content in this form, compared to just 400 MT in 2007. This signifies an important trend of improved technology and quality leading to greater acceptance by primarily the Korean and Japanese battery manufacturers. As a result of the economic slowdown impacting Chinese markets in 2008 and early 2009, Antaika has forecasted

cobalt demand in China at just over 12,000 MT - a 17.3% drop from 2008. However, the massive stimulus package from the Chinese government and gradually recovering end use markets has caused China's GDP growth to accelerate to 7.9% in the second quarter, leading JP Morgan to revise its GDP forecast for 2009 to 8.4% in 2009 and 9.0% in 2010. This suggests that estimates for Chinese cobalt demand during 2009 may have to be revised upwards.

3.0 Supply / Demand balance

During 2008, refined cobalt production is thought to have exceeded global demand by approximately 1,900 MT. This represents a significant surplus compared to the deficit of 2,675 MT seen in 2007. The forecast for 2009 would suggest a further surplus of 1,400 MT, based on an approximate supply figure of 51,100 MT and demand of 49,700 MT.

Global Cobalt Supply / Demand Balance

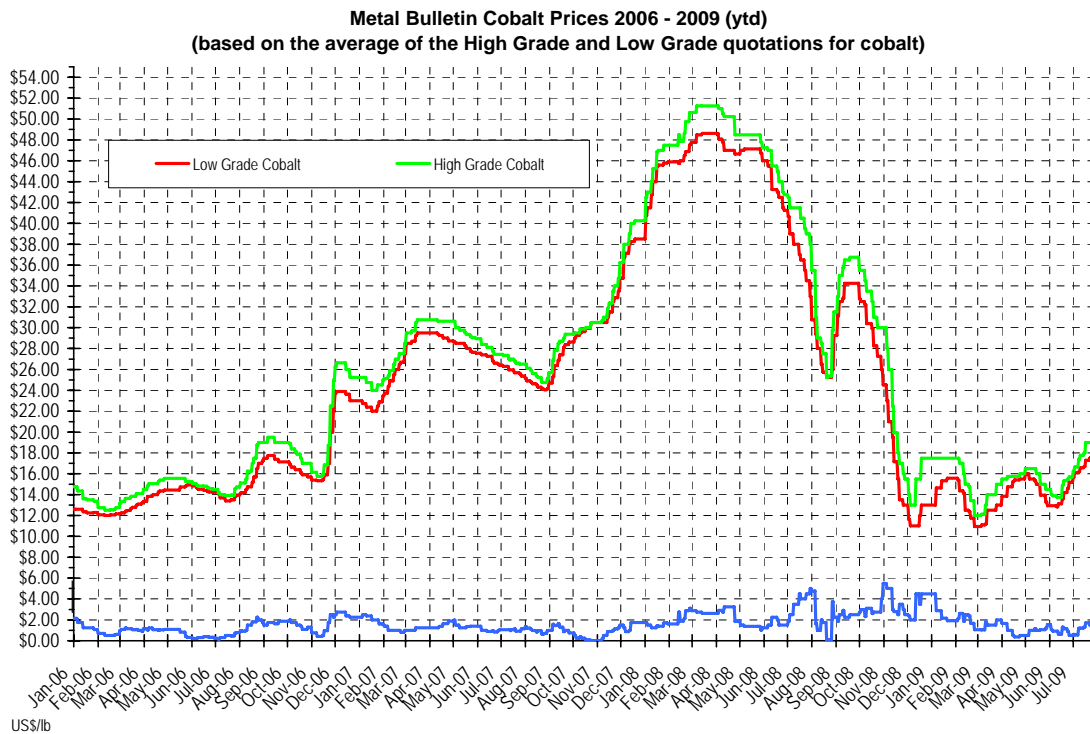


Source: Darton Commodities Ltd.



4.0 Market Prices

Cobalt prices were extremely volatile during 2008. The firmly established bull trend which commenced early September 2007 and lasted a little over seven months pushed prices to a peak of \$51.25/lb. for high grade and \$48.63/lb. for low grade by mid March. Soaring concentrate imports, deteriorating market conditions in China and profit taking pushed prices down to \$24.00/lb. by late August, after which prices quickly gained \$10.00/lb. on the back of restocking and availability concerns. Market prices briefly consolidated during October but this was soon followed by downward price pressure as growing concerns over the financial system and the global economy kept many consumers out of the market. While consumer demand quickly slowed, traders and producers looked to liquidate stocks with some selling aggressively into a further weakening market. An unprecedented lack of consumer buying, anxious supplier selling and rapidly deteriorating market sentiment drove the cobalt metal price into freefall - in little more than two months the Metal Bulletin Low Grade low cobalt price fell 72%, from \$32.50/lb. to \$9.00/lb.



Source: Metal Bulletin

From late December, market prices gradually recovered during January on the back of renewed consumer and trade buying, in part prompted by supply concerns resulting from the numerous production cutbacks and mine closures. However, industrial buying continued to suffer as a result of poor downstream demand and further destocking throughout the supply chain. The severe decline in consumer buying seen in the European, US and Far East markets was to a large extent offset by strong buying interest in China; in part to substitute concentrates as refining material, the balance being bought speculatively as credit became more readily available and metal prices were considered relatively cheap. Chinese buying and trade restocking pushed cobalt metal prices back to a \$15.50 - \$17.00/lb. range by early February, before sliding back to a \$11.00 - \$12.00 range by early March, followed by a similar cycle over the March - June period.



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At the time of writing this report, cobalt metal is trading in a range of \$17.50/lb. to \$19.00/lb., a level not seen since mid November last year. A perceived tightness of specific metal grades, a relatively strong demand recovery in the Japanese market and improved market sentiment all provided further support to the upward momentum seen since the beginning of June.

Cobalt Metal Prices US \$ per lb. - Metal Bulletin Monthly Averages

	Low Grade Cobalt			High Grade Cobalt		
	Low	High	Average	Low	High	Average
2008						
Jan-08	\$43.22	\$45.08	\$44.15	\$44.50	\$46.75	\$45.63
Feb-08	\$45.67	\$47.24	\$46.46	\$47.33	\$49.89	\$48.61
Mar-08	\$46.62	\$47.94	\$47.28	\$48.83	\$51.06	\$49.94
Apr-08	\$46.62	\$47.94	\$47.28	\$48.83	\$51.06	\$49.94
May-08	\$46.53	\$47.36	\$46.94	\$47.78	\$48.78	\$48.28
Jun-08	\$42.72	\$43.84	\$43.28	\$44.50	\$45.50	\$45.00
Jul-08	\$35.98	\$37.83	\$36.91	\$40.11	\$41.11	\$40.61
Aug-08	\$26.79	\$28.31	\$27.35	\$28.28	\$30.24	\$29.26
Sep-08	\$32.59	\$34.33	\$33.46	\$35.09	\$36.66	\$35.88
Oct-08	\$28.65	\$30.18	\$29.41	\$31.90	\$33.30	\$32.60
Nov-08	\$16.00	\$17.91	\$16.96	\$19.44	\$21.29	\$20.37
Dec-08	\$9.50	\$13.38	\$11.48	\$13.33	\$15.50	\$14.42
Average	\$35.19	\$36.86	\$36.01	\$37.58	\$39.38	\$38.48
2009						
Jan-09	\$13.83	\$16.21	\$15.02	\$16.00	\$19.00	\$17.50
Feb-09	\$11.69	\$13.91	\$12.80	\$13.64	\$15.78	\$14.71
Mar-09	\$10.53	\$13.66	\$12.09	\$12.63	\$14.66	\$13.64
Apr-09	\$14.26	\$15.78	\$15.02	\$15.00	\$16.50	\$15.75
May-09	\$14.15	\$15.07	\$14.61	\$15.17	\$16.17	\$15.67
Jun-09	\$13.26	\$14.11	\$13.68	\$14.20	\$15.00	\$14.60
Jul-09	\$16.44	\$17.34	\$16.89	\$17.63	\$18.59	\$18.11
Average (to date)	\$13.45	\$15.15	\$14.30	\$14.90	\$16.53	\$15.71

However, it appears as if the appetite for metal from Chinese importers is beginning to stall as the price differential between concentrates and metal has widened and the stocks of metal that were built in previous months are being liquidated. This, in combination with an anticipated industrial slowdown associated with the summer months would seem to suggest that further upside potential may be limited in the short-term. Whereas the availability of high grade metal is expected to remain relatively tight while Jinchuan looks to address its supply issues, profit-taking from Chinese suppliers and industry destocking during the balance of summer may ultimately result in a price correction before prices can firm once again during the third and / or fourth quarter. However, the strength or weakness of the cobalt price during the

Source: Metal Bulletin.

remainder of this year will primarily be determined by the recovery rate of demand, if any, in the key consuming industries and the extent to which curtailed supply can restart and new supply is commissioned.
