Antimony – Critical or Strategic or Both?

China has a very strong position in Antimony and long has had. Indeed this is the metal it has been dominant in for the longest. However, like so many other resources this was squandered through overproduction, predatory pricing and high-grading. China now finds its domestic share of global production plunging and to prop up its dominance it has become a leading importer of artisanal and "conflict" ore from all around the world. It then processes this imported ore/concentrate and manages to hold a still dominant position in processed end-product Antimony Trioxide and other products.

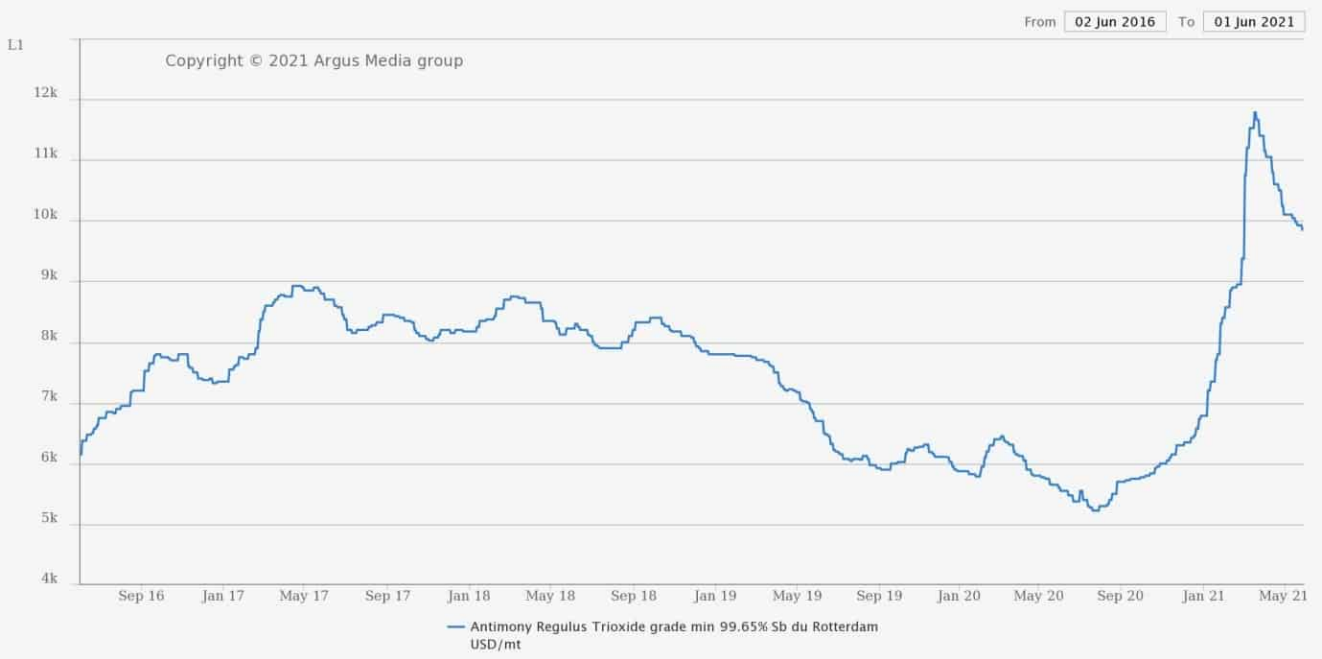
Is the metal strategic? Thus far it does not have the type of sexy applications that other high-tech metals possess, but it is still a key component in the things it is used for such as fire retardants and its historical application as an alloy used to harden Lead in ordnance/ammunition and Lead-acid storage batteries.

And now the latest new technology to utilize the metal is Antimony molten salt batteries for mass storage. The potential here is for a quantum surge in demand. This new application may be its own undoing if the price of the metal goes too high and unravels the economics.

Lighting a Fire Under the Price

After a price slump that lasted several years, and sank the prospects of several Antimony wannabes, the price of Antimony started to uptick in 2016. It got to around $8,500 per tonne and then plunged again to around $5,500. That price was the result of a regulator-induced swoon over the use of the metal in fire retardants in children's pajamas (the culprits being the EU and State of Massachusetts), however the main

application in fire retardants has not gone away and in the wake of Grenfell Tower fire in London the regulators act against fire retardants at their own peril. This was further complicated by the ever-looming liquidation of the FANYA stockpile, which amounted to around 19,000 tonnes, which was finally sanctioned by Chinese courts in 2019. The talk in the trade was that the FANYA stocks were bought by one of China's largest Sb producers.



Source: Argus Metals

In the wake of the pandemic and with the marketplace dry of product, the price has had a fire lit under it by Molten Salt batteries capturing the *Zeitgeist*. This move was compounded by global shortages caused by the Pandemic, the coup in Burma, long term underinvestment, declining Chinese production and the arrival of Molten Salt batteries in the commercial marketplace.

The worries about regulators evaporated like Gorillas in the Mist in the last quarter of 2020 and a stampede to rebuild stocks occurred sending buyers (notably in the US) into a feeding frenzy with Antimony becoming the hottest metal in the last six months (though tussling with Tin for that title)

doubling in price from around $5,500 in late 2020 to nearly $11,000, from where it has eased back slightly.

On the supply-side protracted low prices have stymied anything beyond small-scale production by artisanals outside China.

Molten Salt Batteries as Icing on the Cake

We have written before on how Molten Salt batteries, based on Antimony are starting to make waves. If Liquid Metal Batteries become the “killer application” in grid-linked storage (or non-grid linked) then it potentially lights a fire under Antimony demand and pricing. The announcement that United States Antimony Corporation (NYSE: UAMY) had secured an offtake deal with Ambri for its output lit a fire under the price of that stock in late 2020.

To mix some metaphors, molten salt batteries have flown under the radar thus far but definitely have a place in the evolving battery universe and hopefully will take the Antimony market along for the ride.

In this Third Wave of battery metals, Antimony (the prime component in Molten Salt batteries) has joined the ranks of battery metals and the hunt is on for that scarce commodity, the non-Chinese Antimony miner.

Each GWh of Ambri batteries requires around 1% of current annual production of these (calcium and Antimony) anode and cathode materials. This is the closest we have to divining how much Antimony that the Ambri product line might consume if it gains traction. Current Sb production is around 170,000 tonnes per annum, implying that a Gigawatt of Ambri cell utilizes 1.7 tonnes of Antimony.

Thin Pickings amongst Actual & Wannabe Producers

Despite the metal price excitement, the equities markets are starved for options in this metal. The small field consists of

the gold/silver miner, Mandalay Resources Corporation (TSX: MND) that has Antimony as a by-product from its Costerfield mine in the Australian state of Victoria, and United States Antimony with its curious focus upon the Los Juarez Silver-Antimony mine in Mexico. Red River Resources Limited (ASX: RVR), another developer basically focused on gold is trying to revive the Hillsgrove mine in New South Wales (which has Sb as a by-product) and Perpetua Resources Corp. (NASDAQ: PPTA) which was formerly called Midas Gold, has a mega project in Idaho (again with a gold focus) that also has the potential to supply half the current US demand for Antimony displacing China as the main supplier to the US. It will be interesting to see if the price surge broadens the offering in equities markets.

Molten Salt Batteries – Hot but not Flammable

When we first wrote for InvestorIntel on Molten Salt battery technology almost half a decade ago, the technology was already five years in the making, but it has now taken a further five years for it to get traction amongst end-users.

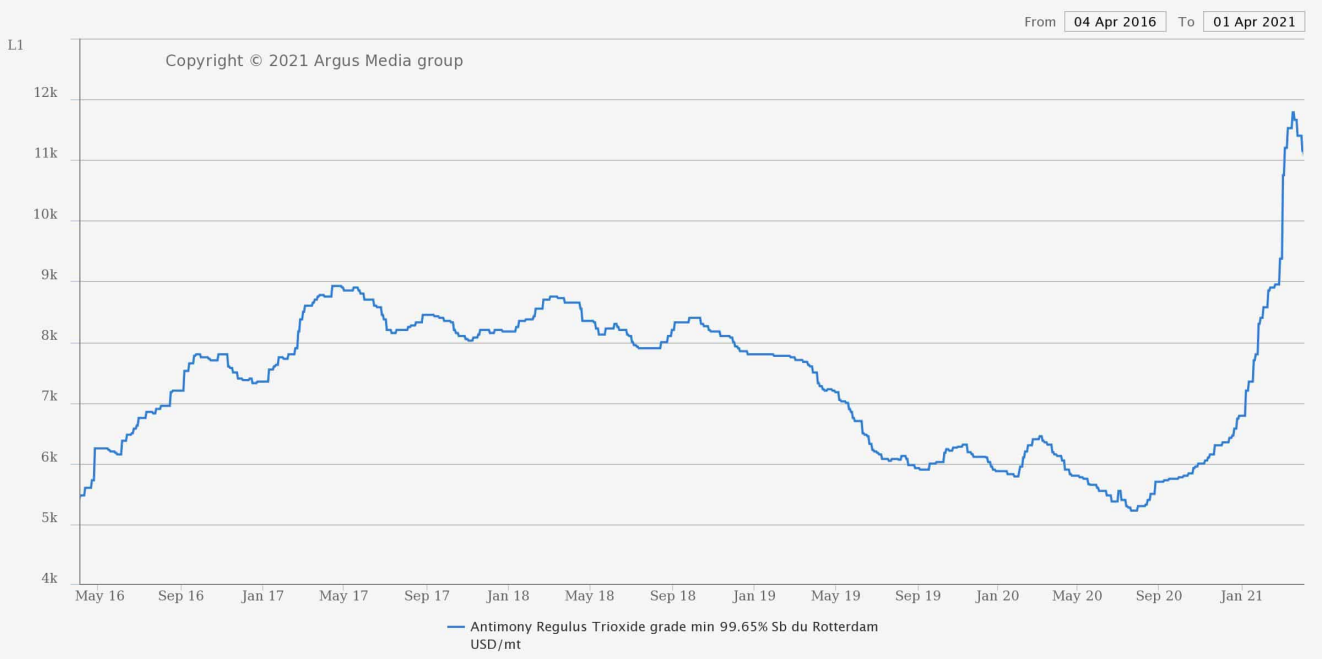
However, in this Third Wave of battery metals, Antimony (the prime component in Molten Salt batteries) has joined the ranks of battery metals and the hunt is on for that scarce commodity, the non-Chinese Antimony miner.

Antimony – Lighting a Fire under the Price

The price of this metal has taken off in recent times on a combination of global shortages caused by the Pandemic and the coup in Burma, long-term underinvestment, declining Chinese

production, and the arrival of Molten Salt batteries in the commercial marketplace.

The effect was stunning, with Antimony breaking out of a multi-year malaise and becoming the hottest metal in the last six months (though tussling with Tin for that title).



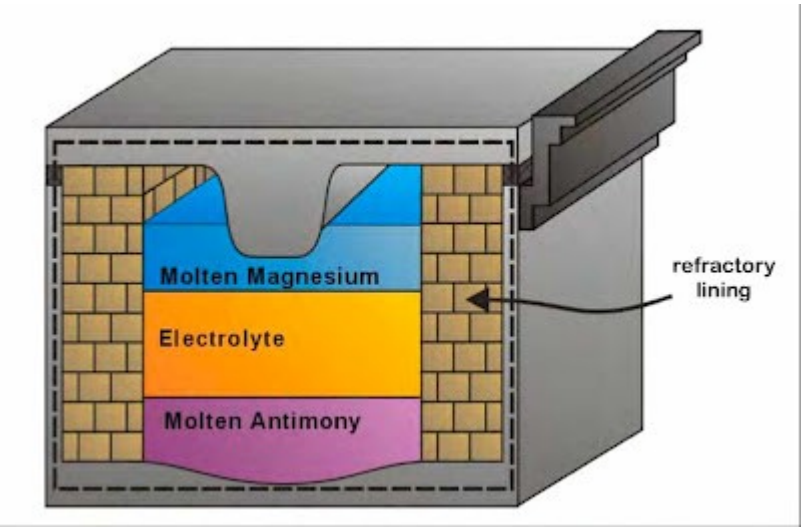
Mass Storage Devices

The important consideration is that mass storage devices do not even need to be connected to the grid and thus can be in the middle of nowhere bridging the infrastructure gap (and cost) that weighs on emerging economies (and isolated mine sites).

And then there are liquid metal batteries using molten salts. The origin of using these salts for storing energy goes back to the Second World War.

Molten salt is a solid at standard temperature/pressure but enters the liquid phase under elevated temperatures. Liquid metal batteries can be stored indefinitely (over 50 years) yet provide full power in an instant when required. Once activated, they provide a burst of high power for a short period (a few tens of seconds to 60 minutes or more), with

output ranging from watts to kilowatts. The high power is due to the high ionic conductivity of the molten salt, which is three orders of magnitude (or more) greater than that of the sulphuric acid in a Lead-acid car battery.



A team of researchers at MIT led by Professor Donald Sadoway worked on a liquid battery system that could enable renewable energy sources to compete with conventional power plants.

The research was put into a commercial venture, called Ambri, which was funded to the tune of $15M by Bill Gates, energy giant Total, the US Department of Energy's Advanced Research Projects Agency and Khosla Ventures (run by Sun Microsystems co-founder Vinod Khosla).

What this means for antimony Demand

Each GWh of Ambri batteries requires less than 1% of current annual production of these (calcium and antimony) anode and cathode materials. This is the closest we have to divining how much Antimony that the Ambri product line might consume if it gains traction. Current antimony production is around 170,000 tonnes per annum, implying that a Gigawatt of Ambri cell utilizes 1.7 tonnes of Antimony.

Higher prices are rather a "chicken-and-egg" issue for the likes of Ambri. To be sure of adequate supplies of metal higher prices are needed (probably over $8,000 at least) and

yet if they go too high then the viability of the economic equation is cast into doubt.

United States Antimony Corporation (NYSE American: UAMY) – Collateral Beneficiary?

As the main Antimony producer in North America (and we use the word “producer” very generously) this company was finding it hard to get two dimes to rub together in 2020. To add to the woes its long-term CEO (who was in his 80s) died.

The price of the stock started to rise slightly on the Antimony price rally but then…. in February of 2021 it announced an offtake deal with Ambri… then followed a massive financing ($14.3M) with Roth Capital Partners… the stock then soared and the rest is history. The fact that it doesn’t have a proper mine is a mere detail.

Despite all that such is the uplift that Antimony stocks can achieve in a market starved for options in this metal. The only other plays are the gold/silver miner, Mandalay Resources Corporation (TSX: MND | OTCQB: MNDJF) that has Antimony as a

byproduct from its Costerfield mine, and Perpetua Resources Corp. (NASDAQ: PPTA | TSX: PPTA) (formerly called Midas Gold – that is controlled by the famed Paulson hedge fund group) but is not in production at its Stibnite Mine.

Conclusion

If Liquid Metal Batteries become the killer application in grid-linked storage (or non-grid linked) then it potentially lights a fire under Antimony demand and pricing.

To mix some metaphors, molten salt batteries have flown under the radar thus far but definitely have a place in the evolving battery universe and hopefully will take the Antimony market along for the ride.

Precious Metals versus Base Metals – The Prizefight of 2017

In a year in which we lost Mohammed Ali (aka Cassius Clay) we can't help but be drawn to the likeness of the gold price to an aged prize fighter that decides to refill the coffers via a career-reviving bout in Las Vegas with punters paying big bucks in the hope of seeing that old spark of genius.

Gold strode back into the ring in 2016 full of brash confidence, and ended the year carried off on a stretcher having barely lasted two rounds and being KO'ed by reality. Like an old slugger, gold needs to find some new tricks because the old ones are well-known and tired and can be pre-empted.

Political or event risk… doesn’t work anymore… monetary base degradation.. yawn.

Precious metals bears see the gold space’s self-appointed loons coming with their $2,000, $4,000 or even $10,000 per ounce scenarios and know that they can knock these arguments over with a feather.

When 2016 began the gold price was $1,080 and we ventured a twelve month target price of $1,180 for which we had scorn heaped upon us by the gold fanatics. As it has turned out our estimate overshot for the year end number, and the gold enthusiasts have gone away to lick their wounds and await another opportunity to tout their wares.

The two stimuli for gold during the year were the Brexit vote in July which inexplicably fired gold up by over one hundred dollars per ounce in a matter of weeks and then the Trump victory, which contrary to expectations, pulled the rug from under a gold price that was already on the slide from its post-Brexit highs. Both moves were made upon false premises so is it no wonder that gold has “gone the wrong way” in both cases? Brexit was not the end of the world and ironically it was gold bugs listening to “elite” opinion on a Doomsday scenario that led to gold being pushed up ahead of the economic slump, which failed to materialize. Then in the case of Trump, we had a surprise result, but that result was supposed to signal instability and a rise in risk (which may yet happen) but instead gold went down because of an interpretation (rightly) that interest rates would rise because of loose fiscal policy. In that they were not wrong but they failed to carry through the scenario to its inflationary end.

A Trump administration promises the greatest chance of an inflationary breakout since the early 1980s (and with it an interest rate upcycle) and while a jump in interest rates will crimp those gold bulls who buy on borrowed money (we can’t

imagine who they are) the prospect of inflation and a rebalancing of asset distribution away for the multi-decade "no-brainer" of property towards savings in either fixed income or ingot form should be welcomed by gold bulls. Inexplicably though they are dumbstruck by the new scenario and unappreciative of the potential of inflation to be a real motor for the gold price. Our estimate for the yellow metal is for it to end 2017 around $1,270.

Now for the Real Story

Base metals came roaring back to life in 2016 and the outlook for 2017 looks as promising if not even more so. For us the most pleasant surprise was our favorite, Zinc, actually managing to outperform our target of $1.05 per lb for the year end. Hidden by the actual result ($1.15) was the fact that the metal had even reached a price of over $1.30 per lb if only fleetingly. Most of our other estimates were out slightly, to the upside or downside, by less than 10%. Our notable "fails" were Uranium which plunged and spent most of the year wallowing in abject misery until a last gasp recovery on a Trump tweet in December and Tungsten which managed to climb above $200 per MTU and then slipped back. We perceive the hidden hand of Chinese manipulation as being involved in this malaise.

Hallgarten & Company - Commodity Estimates Out Three Years

	Unit	Jan 2016	End 2016 Estimate	End 2016 Actual	Undershoot/ Overshoot	End 2017	End 2018	End 2019
Lead	lb	$0.80	$1.00	$0.916	-8.4%	$1.10	$1.15	$1.02
	tonne	$1,763	$2,204	$2,019	-8.4%	$2,424	$2,535	$2,248
Zinc	lb	$0.70	$1.05	$1.152	9.7%	$1.33	$1.45	$1.50
	tonne	$1,543	$2,314	$2,539	9.7%	$2,931	$3,196	$3,306
Copper	lb	$2.11	$2.72	$2.503	-8.0%	$3.05	$3.10	$3.20
	tonne	$4,650	$5,995	$5,517	-8.0%	$6,722	$6,832	$7,053
Gold	oz	$1,080	$1,180	$1,146	-2.9%	$1,270	$1,300	$1,330
Silver	oz	$14.02	$14.78	$16.00	8.3%	$17.00	$17.50	$18.00
Platinum	oz	$890	$1,050	$904	-13.9%	$1,250	$1,280	$1,300
Palladium	oz	$544	$770	$669	-13.1%	$1,050	$1,080	$1,150
Uranium (spot)	lb	$34.40	$31.50	$20.25	-35.7%	$36.00	$44.00	$55.00
Antimony	tonne	$5,100	$8,700	$7,740	-11.0%	$8,700	$9,400	$9,700
Tungsten APT	MTU	$175	$325	$198	-39.1%	$260	$310	$330
Tin	tonne	$14,540	$18,700	$21,100	12.8%	$22,000	$22,100	$22,800
Cobalt	lb	$11.50	$14.10	$14.75	4.6%	$16.00	$16.70	$17.20
Nickel	lb	$3.93	$4.45	$4.58	2.8%	$4.60	$4.50	$4.25
	tonne	$8,662	$9,808	$10,086	2.8%	$10,138	$9,918	$9,367
Moly	lb	$5.44	$7.20	$6.69	-7.1%	$8.50	$9.30	$9.40

Notably Platinum and Palladium also undershot our expectations. Three metals we did not make estimates for, Manganese, Chromite and Vanadium, proved to be stellar risers in the latter part of 2016. With good reason we would expect them to do well again in 2017 as it seems it shall be what we term the Year of the Infrastructure Metal as Trump promises to out-FDR on building programs. Easier said than done but we shall see.

Other base metals will also be invited to this party with us holding high expectations for Zinc and Copper as well (but not Lead). Specialty metals should also be counted amongst the winners. Some of these metals however have made their move and should see little in the way of gains like they may have just enjoyed.

Conclusion

The surge in gold in the middle of 2016, made financial markets back into a happy hunting ground for gold juniors that were staring at enfeebled bank accounts after the long drought from 2011. Investors were prepared to throw ever larger

amounts at the financings on the back of the thesis that gold had definitively turned up. All that cash is sitting in companies' bank accounts now and execs are on record as saying that it was "for exploration and general administrative purposes" however with gold looking so flaccid and even bulls unable to enunciate a story that might fire up the price, the very strong temptation will be for execs at gold juniors to "fake" some low level exploration in early 2017 and basically keep their cashpiles *virgo intacta* so that they don't face the danger of running out of cash and crimping their own lifestyles. A lack of work eventually produces a lack of results and thus announcements…. and accordingly no progress towards production or expanded resources. Investors should maybe brace themselves for a frustrating period where juniors sit on the cash they have gathered in 2016 and don't spend it (at least not on exploration work).

The contrast will be poignant with the base and specialty metals sectors. One should note how investors throw credulity to the four winds when gold moves. The slightest gain is the start of a "major uptrend" and yet base metals spent 2016 consistently rising and still they are always suspected of being a flash in the pan. Zinc more than doubled and yet it was only near the end of the year that financings started to take place and talk of RTOing assets into shells began to surface. Copper's move happened even later. Nickel also started to get a tailwind. The problem there is that projects in recent decades have tended towards the gargantuan so investors have stopped believing in the more bite-sized plays. One should not discount though that the base metals movers in 2017 will be those with miniaturized projects, rather than those thinking (or talking) big.

All that being said, we are tempted to go prophetic and utter the words "the last shall be first and the first shall be last" and predict that Uranium (and Tungsten) will be two of the largest movers (upwards) in 2017.

How the demise of the Dodd-Frank Act impacts conflict minerals

The surprise ascendancy of Donald Trump has brought with it a slew of pronouncements made in the preceding months of campaigning that (maybe) give a sign of the shape of things to come. One of the pieces of legislation singled out for change or repeal was the Dodd-Frank Act of 2010. Besides some stultifying rules that made proprietary trading difficult in some commodities, the Act was of less import to the mining community than Sarbanes-Oxley for example, except in one respect, and that was on the question of conflict minerals.

The four most commonly mined conflict minerals (known as 3TGs, from their initials) are cassiterite (for tin), wolframite (for tungsten), coltan (for tantalum), and gold ore, which are extracted from the eastern Congo, and passed through a variety of intermediaries before being purchased by, amongst others, multinational electronics companies.

Everything but the Kitchen Sink

The Dodd Frank Wall Street Reform and Consumer Protection Act was born out of the 2008 financial crisis and the excesses that preceded it and conflict minerals had nothing to do with the financial debacle but in the time-honoured tradition of the US cobbling together omnibus bills that include everything but the kitchen sink and serve as a mass transport for the pet projects of any legislator who has enough pull (or blocking) power to get their hobby horse grafted on.

In the final wash, Dodd-Frank, was passed by the US Congress

in July 2010, and included a provision – section 1502 – aimed at stopping the national army and rebel groups in the DRC from illegally using profits from the minerals trade to fund their fight. Section 1502 is a disclosure requirement that calls on companies to determine whether their products contain conflict minerals – by carrying out supply chain due diligence – and to report this to the SEC.

The mutterings from the incoming Administration indicate that all or parts of the Dodd-Frank structure may be repealed and send to the Great Paper Shredder of history. The intriguing thing is whether the conflict minerals aspects will "end up on the cutting room floor".

The Paradoxes

Zeroing in on just the DRC is to take a mere snapshot in time of one global hotspot. Indeed (though unlikely) in five years from now the DRC may be a haven of peace, and crisis may have moved off somewhere else. Conflicts come and conflicts go and the minerals involved in them change. We have read that Niobium was considered for inclusion in the original minerals list. Bizarrely this is a metal that largely comes from Brazil and Canada and which we have never heard of a DRC connection. More paradoxical is that the DRC is renowned for its copper/cobalt deposits and thus the metals are mined together and yet the US congress members somehow felt it was important to track the cobalt but not the copper. This smacks of ignorance at best (how can you have conflict cobalt and non-conflict copper from the same open-pit) and hypocrisy at worst (going for cobalt because its sexy.. and because China is the principal buyer of Congolese cobalt). And to what extent is this mere expedience, as adding copper to the list would create an administrative nightmare. Were they then really interested in conflict minerals or making a token gesture?

Beyond the DRC there are numerous conflicts around the world and minerals appearing out of those conflict areas. We could

target two areas that are obvious and egregious but which Dodd-Frank does nothing to remediate.

Firstly we have the not so clandestine oil sourced out of the ISIS controlled parts of Iraq and Syria. It was very well known which country this was exiting the war zone through. Moreover it was very strongly suspected that the son of the president of this country was the chief intermediator with streams of tankers lined up at the border of his father's domain. The US essentially turned a blind eye to this and let the brutal regime fund itself through this trade. We might also mention North Korean tankers loading up with oil from ISIS-dominated areas of Libya.

Secondly, we have the metal closest to our hearts, Antimony. I have written in the past that potentially 14,000 tonnes per annum (or a bit under 10% of annual global production) comes out of rebel areas in the far north of Burma, where a bloody war of attrition between tribes, warlords and the army of the central government has been waged. In recent years China has played a shell game with Antimony and production statistics while taking an increasing flow of this "Conflict Antimony" and passing it off as its own to create the illusion that it still dominates production. Originally this was just artisanal mining and some clandestine smuggling. Last month however we heard that a number of the shuttered highly polluting Chinese roasters had been dismantled and moved across the border into Burma adding environmental air pollution to the degradation caused by the Antimony *garimpeiros*. Truly a nightmare overlaid with a civil war and Chinese meddling. If this isn't a case for a conflict minerals designation then we do not know what is!

There is quite clearly a galloping double standard at work here. Moreover the Dodd-Frank designation of the DRC and its narrow group of metals is overly focused and totally non-dynamic.

Some Solutions

A mechanism is obviously lacking for adding (or subtracting metals). In theory though all metals should be on the list and it is the conflict zones that should change. Thus if Yemen produces zinc from a conflict zone then “Yemenese Zinc” should be regarded as a conflict mineral until this is deemed to no longer be a conflict zone. The mistake of the current structure is targeting the metal rather than the conflict!

With the degree of cluelessness in Washington as to what minerals come from where (e.g. not knowing the copper/cobalt mineralogical combination in the DRC) the task of decreeing what and where would probably better reside with an international commission rather than some State Department factotum. Essentially, the task of verifying the audit trail on a specific input to an electronic device is passed to a corporation/manufacturer and this is far from ideal and places a big time and skills burden upon smaller component makers.

Conclusion

It is said that a camel is a horse designed by a committee. Dodd-Frank is somewhat similar having been born out of the addled collective mind of the US Congress. Therefore it is no surprise that conflict minerals should have been thrown into the witches brew at the last minute. It’s all well and good that this grievous problem should have been brought to attention but it was very much a case of too little too late and too narrowly focused, both geographically and in terms of the minerals that are deemed to be of a conflict nature.

Dodd-Frank was the type of legislation you get when you really need the reinstatement of Glass-Steagall but don’t want to offend your friends on Wall Street. Hillary Clinton has paid the price of pandering to this crowd (and it was her husband who dismantled Glass-Steagall through some subtle legerdemain) and now we have Trump attacking Dodd-Frank and yet he is not

necessarily a friend of Wall Street either. He has railed against big banks (and three at least are in breach of the 10% limit on share of national deposits) so getting rid of Dodd-Frank and reconstituting Glass-Steagall might bring the collateral "benefit" of the demise of the half-cooked semi-ossified Conflict Minerals provisions. This should either be properly constituted, or not constituted at all.

LME Week – Infrastructure Metals to the Fore

Let the cliché's flow… a week is a long time in politics, what a difference a day makes, the past is another country but when it comes to mining a year ago it seems like another universe. The last week of October is LME Week which has gone from a humble promotional effort by the London Metals Exchange to become a major jamboree of the Great and Good of the metals trading space, whether their metals are traded on the LME or not. The mood this year was the polar opposite of last year. For those who recall this time last year Glencore was teetering on the brink and Noble was hotly rumoured to follow it down the plughole. Fortunately the fears proved not to come to fruition though the gravity of the situation could not be underestimated. That period also coincided with the five-year nadir of a swathe of metals.

The rest, as they say, is history. The clouds parted and sun's rays dropped upon the scorched earth and mining markets have been on the mend ever since. Indeed, the near-death experiences of two of the world's major trading houses seemed to be the cathartic event that was required to turn the mining Titanic away from its date with destiny. Indeed it makes one

wonder if the sidelining of these large players was what was needed to turn the market upward. Those who thrive on conspiracy theories have often maligned traders (and big banks) as being the hidden hands that would wish the metals markets ill, even when logic might indicate that higher prices would be better for them.

Whatever it was it did the trick. Closures of mines, particularly in base metals, have been given credit for prompting the recovery, but many of the announced closures never actually happened and there was an element of smoke and mirrors to the whole retrenchment process. Still it seemed to work.

The Chief Takeaways

This year LME Week was bordering on the euphoric but tinged with a sense of trepidation with "easy come, easy go" being the thought on everyone's minds. Some of the moves had been so sudden and so stunningly good that it was almost too good to believe. The chief things that struck us were:

- Infrastructure spending is the new mantra with steel potentially being the biggest beneficiary, so much so that we are declaring 2017 to be the year of "Infrastructure Metals".
- Companies are frantically attending as many shows as they can, unsure as to who the investors are these days or what they are interested in
- Loads of unemployed geologists roaming around as money raised is not really trickling down into fieldwork or hiring (yet)
- Coking coal has soared in value while iron ore has continued to languish (excluding some speculative runs fired by Chinese retail interest)
- Alloy metals have moved up strongly. Manganese, Chromite, Vanadium and Zinc have done really well and now nickel has also come to the party. Manganese has

rocketed and is at its highest level since 2010

- Electricity industry problems in South Africa have not gone away but low demand for metals has obscured the issue. Now it will come back into play.
- Antimony has moved up strongly due to a secular decline in Chinese production and the shuttering of many polluting roasters
- Tin is very healthy these days as alluvial mining in South-East Asia runs towards the buffers. Hand-wringing as to where future production might come from has not generated much interest from miners
- Lithium has bottomed after a brief sag
- Someone presented the famous "resources clock" showing that ASX-listed golds, in particular, were on the verge of heading into the overvalued end of cycle period

And some important charts presented by Argus Metals at their event:

Manganese:

Vanadium Pentoxide prices rising (Europe up 88.1%, China up 100% YoY):

Lithium prices coming off their bottom:

Antimony picking up again after its swoon:

Conclusion

There were more than a few who, at times, claimed that the slump of the last five years was the end of mining as we know

it. Our response was “cut the drama”. I can vaguely recall the 1970s when many miners on the ASX stayed mired, trading at half a cent for the whole of the decade. My first mining share purchase was around $300 worth of BHP shares in 1981 and they were just over $2 per share.

Mining always comes back and sure as day follows night, the light has dawned. Some have attributed the turn to production cuts but we have suspected that many of the announced cuts and disposals were somewhat fake (maybe the reason why copper took longer to rebound than other metals). Our suspicion is that the real reason for the rebound was that production in China of many metals (e.g. Antimony) is now well past its peak. Meanwhile the Chinese, in rebalancing away from US Treasuries, have been stockpiling or hoarding metals as a store of value. Destocking by corporations around the world has also left many end-users operating on a Just-in-Time basis that has now left them scrambling for material for their processes.

A perfect storm of excess cast the mining industry onto the rocks and holed the ship threatening to send it to the bottom. Now a new high tide is sweeping in and lifting most boats (Uranium and Iron ore being obvious exceptions). LME Week partygoers were right to feel ebullient but after the bitter experience of recent years they were not about to go crazy and start counting on markets evolving as they did under the now defunct Supercycle.

In Metals, China Domination = Criticality of Supply

Even ten years ago the British Geological Society was a very

low profile institution and scarcely figured on the radars of mining folk, with the USGS being far better known and cited far more often. However, while the USGS was known for its annual individual metals summaries, the BGS appeared on the scene with a wallop at the end of the last decade with its broad reaching study and ranking of criticality of metals, which came to be known as the “Risk List”. The first of these to glean notice was the one that staked out Rare Earths as being the world’s most critical metal in terms of supply problems. This made the list, the favoured bedside reading of every Vancouver promoter for a fleeting moment.

Here is the latest version of the Risk List.

Despite having fallen out of favour with investors, the Rare Earths have remained at the top of the rankings of criticality over the more than half a decade since their first flush and the debut of the “risk list”. Well they might because if one weighs up the metals that are most important (in terms of volumes and breadth of applications) and yet still the most tenuous in having an open supply source, then Rare Earths justifiably rank as those with the most critical supply outlook. Frankly reading between the lines of the BGS list the prime characteristic that gets any metal rated critical is NOT a lack of supply, but that the Chinese have any sort of dominance in a metal, and thus the ability to turn off most or all supply in a situation where countries are “fixing bayonets”.

The China Syndrome

We cannot fault the BGS’s targeting of China as the main driver of criticality. The Chinese brought this designation upon themselves when they escalated the fishing boat incident of several years ago into a full-blown ban upon Japanese companies receiving exports of REEs sourced from China. When

they took that action they signaled that they could and would repeat this across the whole spectrum of strategic metals in which they have a dominance of either production and/or processing. Hence when one looks at the current list of metals ranked by criticality there is a heavy weighting at the top towards metals in which China has a dominant position like REEs or Antimony (or is perceived to have a dominant position, like Tungsten). Amongst the other top ranked metals where there is perceived to be Chinese dominance are Gallium and Germanium, both with valuable high-tech application. Nine out of the top ten metals are China dominated in the BGS's opinion. The 10th is Cobalt where fears have stirred in recent years that the DRC's key position is being cultivated by China as an almost exclusive offtaker. Bismuth, Antimony and Indium are infamously remembered for having been the three horseman of the apocalypse at the FANYA Exchange with Chinese retail investors piling in to real or imagined positions in real or imagined warehouse stockpiles with negative blowback for the prices of the metals in question.

Exposure

The big issue, as always is how to get exposure to these metals. Is exposure to the metal alone (through an explorer) as good as being exposed to production or potential production? In many cases though the choices of producers can be narrowed down to a finger on one hand.

Starting at the top, there are still some REE companies around. Of these only one (Lynas) is a producer while there is a chance that several of the juniors will actually move up to the front ranks. Almost all of the potential producers are represented frequently in the commentary on InvestorIntel's pages. This reinforces the general feeling that InvestorIntel is the go-to place for this metal.

In Antimony the number of plays outside China is a sparse choice indeed. There is one US-listed company with no

production of its own and some processing in Mexico. There is one TSX-listed company which has by-product Sb production in Australia.

Bismuth is largely a by-product of base metal processing, while Gallium and Germanium are almost totally Chinese sourced.

Vanadium exposure is obtainable via Largo Resources (TSX: LGO) (OTCQB: LGORF), a primary producer in Brazil but much of the rest of production is by-product in nature (including, strangely, as a result of gasoline processing). The upcoming source that a number of companies are talking of is as a byproduct of revived uranium/vanadium mines, of which there is a strong potential in the Mountain States of the US. Those are dependent upon the Uranium price coming to the party. Vanadium though has potential to become an “energy-metal” in its own right if Vanadium Radox batteries start to gain traction on a larger scale (pardon the pun).

Tungsten has been written of extensively by us in the context of Almonty Industries (TSXV: AII), the consolidator in the space. Tough pricing in recent years has thinned out the number of juniors significantly. The producer ranks have also been winnowed by the collapse of Malaga and the bankruptcy of North American Tungsten. There are a number of sizable projects still going around but these require higher prices to get funded and that is not happening for the moment. This leaves China with the whiphand and explains why end-users have anointed Almonty, and the new producer that has come on-stream in England, as their favoured suppliers.

Moly is a strange appearance so high up the rankings. Pricing has been so bad in recent years that producers have almost been giving away the product while the largest primary producer in the West, Thompson Creek shuttered its mines. The bulk of non-Chinese output is ex-Chile as a by-product of copper

The Second Decile

This group contains a heavy weighting of more accessible metals that we cover with frequency on InvestorIntel. Lithium and Graphite come in at 15th and 17th respectively. These rank as critical due to their importance in the battery applications. While the Chinese don't have anything like the amount of Lithium that they need they have been hyperactive in securing access to supplies. Neometals (ASX: NMT) is an obvious case in point of a company that has an arrangement with them. Graphite is a mineral long dominated by Chinese output that should shortly see more diversified in its non-Chinese sources. Ironically, as mines in the West fire up the criticality will probably decline due to China's reduced control on supply. Beryllium we speak of often is totally dominated by the US. This in itself is a restriction because, from what we hear, the US actively discourages the evolution of alternative sources of supply to maintain this dominance. As a result almost all the processing of the metal also takes places in the US with two companies dominating that converting/alloying activity.

Finally, the survey sort of undermines its credibility with Silver ranked in the top 20 of metals by criticality. Frankly even a silver-nut would not argue that this metal is in short supply. There is not only substantial supply from mines, but there are also large passive investment holdings and there is a vast stock of jewelry that holders would release if the price rises. The spike to $50 several years ago (and the Hunt Brothers corner decades ago) shows that high prices produce a tsunami of supply from householders at the right moment.

If we have any criticisms beyond that we would say that Tantalum (a conflict mineral) and Tin (with declining alluvial production and Indonesia restricting concentrate exports) are far more near the edge of a supply crisis than many of the metals ranked as having a higher risk. Both should definitely

be in the second decile. Scandium does not even feature on the list, but as applications expand it could be a prominent feature in five years from now.

Conclusion

I thought it might be an interesting exercise to run the BGS Risk List as a filter over the universe of InvestorIntel companies at the current moment. Here is how it turns out.

Understandably with the first decile so dominated by obscure metals under Chinese domination the representation suffers a big gap between the Rare Earths companies and the Vanadium players. Not surprisingly the Lithium and Gold spaces are the most densely populated due to them being the most favoured by markets in recent times.

The task for companies and promoters (and dare I say, governments) is to encourage companies to go forth and fill up the gaps in the strategic and critical metals matrix. The Chinese don’t dominate Gallium, Germanium and Antimony because they are the only country that has these metals. It is only because of a conscious policy on the part of the Chinese government and an unconscious acquiescence on the part of West that has allowed this situation to evolve. A goal for 2020 (dare we call it a Five Year Plan) should be to break the Chinese dominance in the top ten metals on this BGS list.

Specialty Metals: There is a

Season – Turn, Turn, Turn

With the blizzard of noise in the Lithium space and the generalized feel-good in the mining space in general, it is easy to fall into the trap of thinking that all is well in the world. As we all know Uranium remains in the dog house but quite a lot of specialty metals are not exactly in the rudest of health either.

A key factor missing from the specialty metals scene, that would give it an upward boost, is a generalized economic recovery. Sure the US is doing OK and Europe is struggling out of its mire but many emerging economies (e.g. Brazil) have been going backwards and China is still in its swoon.

Tin

The price of this key minor metal has moved up by a third from its lows around the start of this year. To get back to its average price over the last five years it would need to rise another 20%. Therefore it looks like there is still good upside potential. The fact that should be overlaid upon this proposition is that the supply situation has considerably weakened over the last five years with the still-dominant Indonesian and Malaysian alluvial deposits in terminal decline and with the former country particularly intent upon squeezing the supply situation by insisting that concentrates be processed and upgraded within the country rather than in China.

The best upcoming Tin deposits are in Africa, most particularly in the DRC and Burundi, neither of which inspire massive confidence in investors. Some underground mines are on the drawing boards (or are old mines that might be reactivated) but they will inevitability skew the average cash cost of production higher. Tin is destined to be a tighter market with higher prices.

Tungsten

It is simplistic to link Tungsten's fate solely to machine tools and thus to activity or lack thereof in the Chinese economy. More countries' economies use machine tools than just China's. Additionally the use in drill-bits etc. took a double blow in 2015 with miners virtually ceasing to do exploration while the oil industry's long boom came to an end with the steep falls in oil and natgas prices. While oil remains in the dog house, mining is stirring to life and while the drilling is not as frenzied as before it is reviving and there is money to fund it. That alone gives encouragement to those keen on this tough metal.

The chart below shows the Ferro-Tungsten price and it's clear that this is far from being in boom mode with a rise of only 10% off its bottom and half the level of four years ago.

Antimony

This metal largely has its application in alloys (with Lead amongst others) and in fire retardants. The plunge from early last year to its nadir in early 2016 was brutal and I believe prompted by the FANYA debacle. The applications that Antimony is used for are not in any sort of swoon and indeed the auto industry (a major fire retardant user) is booming all around the world. Therefore the blame can most probably be laid at the door of FANYA. The problem with that issue is that the market place never really knew the extent of the FANYA overhang and probably never will. The fact that prices have rebounded nearly 30% in recent months probably means that the overhang is gone.

Supplies are reputedly tight and therefore the chances of the price returning to early 2015 levels is good, not that $8,000 per tonne is all that ritzy a price for this commodity.

Rare Earths

This group is down and out purely at the discretion of the Chinese who have decided to bankrupt and drive out the Western players. The turn in this group of metals could be as basic as some Beijing official getting out of the bed one morning and thinking it's time to lift prices. It has very little to do with supply/demand and almost everything to do with an industrial policy. However the policy has now gone beyond beggaring the *Gweilo* and China is now beggaring itself in a scarce resource.

The scene is ripe for this bedside conversion as the Chinese could easily hike prices by 50% in the entire Lanthanide group (excepting Cerium and Lanthanum) and there would be no negative effect on demand and only one non-Chinese company would benefit (Lynas) while all the Chinese producers would be banking significantly higher incomes. There is no chance that even such a hefty rise would bring another Western player into contention for 3-4 years and even then whatever new source of production appeared would not be disruptive in terms of volumes added to the global supply.

Therefore, with timing unknown, we would still sustain that a REE breakout is more likely to happen than not with the decision not in the "lap of the gods" but within the purview of a Chinese apparatchik.

Niobium

This metal is joined at the hip with the steel complex and frankly it's hard to see why there should be an upsurge in demand for the foreseeable future. Added to that is that the

biggest player in the metal keeps a tight rein on prices and operates on a Goldilocks principle of “Not too cold, not too hot, just right”.

One matter that is rarely mentioned is that CBMM is like a one-company cartel (somewhat like Materion in Beryllium) and that it tolerates Niobec and the other small players in the interests of an “orderly market” and not appearing to be a total monopoly. That said, one should not discount that CBMM controls the levers of the Niobium price and if it sees a threat to its dominance from too many players appearing on the scene then it may well (and certainly could afford to) lower the price 20-30% to throw wannabe producers into confusion. Thus any new Niobium player that appears and talks about their massive potential production then that wannabe and its shareholders should watch out that the Brazilians don’t decide to play Whackamole with their project via the pricing mechanism.

Conclusion

One should not discount that the FANYA Exchange debacle is still having some lingering effects on specialty metals and it has definitely sidelined a lot of the speculative players in China who lost their shirts and ended, metaphorically, up to their eyeballs in Bismuth and Indium (and Antimony). The overhangs may have been cleared away but the creative destruction of “locals” in the marketplace for specialty metals has returned trading to the producers and end-users who have failed to provide liquidity to specialty metals in the past and who indeed seem to prefer prices that are set by a combination of smoke signals, nods & winks and Masonic handshakes.

Despite this the signs are there that specialty metals were oversold at their worst and are now in recuperation mode even though the words “boom” or “surge” could not be employed. And that is probably all to the best after past “pump and dumps”

in thinly traded commodities.

The lack of pure plays continues to be a problem in some spaces and we continue to admire the consolidation strategy pursued by the likes of Almonty which should be a model for those companies operating in all the specialty metal sub-spaces.

The tide has lifted (almost) all boats in the precious metals space and specialty metals now await their turn. The lack of investment in recent years and the exhaustion of some traditional sources of supply means that any resurgence in prices will need to be fed with new projects to ensure that supply crises do not eventuate again sending prices to the levels seen late last decade. Its up to the hardy survivors to re-emerge from the bunkers and set to work providing this new supply.