

Kaolin, HPA, Data Centre Cooling and Graphene

The US markets broke to new highs during the week but understandably, there was a heavy correction on Friday. Correlating these moves with the ASX is not directly helpful as the US markets are being driven by technology e.g. AI and semiconductor chips. Domestically, the thematic of defence related stocks continues to attract attention in a fast emerging sector, but we are more concerned with the resources sector.

Gold has been showing volatility as opposed to a discernible trend. The Iran War continues to add to volatility generally. The Sentiment Oscillator is showing recovery from the earlier lows and is now hanging around the equilibrium. That means the market is neither overbought or oversold. Individual stock selection will depend upon specific merits.

The Federal Budget was delivered but not received well. Some have said that it proves how deceptive the Government has been as the Budget it was laced with broken promises. The Prime Minister is denying that deception by saying that he is being honest with the public. You be the judge. The new term intergenerational equity is being thrown around as if it as a serious issue. Let me think about that a little longer before I tell you what I think about its merits.

Kaolin, HPA and Data Centre Cooling

We have been digging around the emerging data centre cooling sector recently as this seems to be a hot spot that is attracting some investor interest, largely inspired by the huge valuations being put on Firmus and associated publicity. Our story this week takes into account a number of earlier strands that have evolved over the last 10 years. We look at kaolin first.

A Sit Rep on the Kaolin Sector

A little over 10 years go a new kaolin sector emerged with a focus on making high purity alumina (HPA) for use as separators in batteries. Altech Chemicals (ATC) was the first company to become involved, quickly followed by FYI Resources (FYI) and Alpha HPA (A4N). Andromeda Metals (ADN) was the star stock market performer but it crashed and burned after getting as high as \$1bn in market capitalisation. Altech evolved into a company advancing the use of silicon in batteries. FYI did a good deal with Alcoa that added credibility, but Alcoa pulled out and FYI changed its name to Cadoux (CCM), but still stayed in the business. A number of other companies have dabbled in the sector.

Basically the kaolin sector turned into a train wreck. The ambitions were too lofty. The process to make HPA product was too difficult and there was no shortage of the raw material - kaolin. That is before you even consider the high capex and expertise required in making HPA.

Not every company failed though. Alpha HPA, led by the veteran Norm Seckold, has diligently stuck to its guns and is tracking well to become a near term supplier of saleable HPA. However, it didn't go down the kaolin route, circumventing the mining step in the production chain. Instead its feedstock the an "off the shelf" product, aluminium hydroxide, though it doesn't like to advertise it. Similarly, Advanced Energy Minerals (AEM) is using the same material, thereby avoiding kaolin, in its Quebec-based operation.

So, interest in kaolin has been significantly diminished in recent years. Forget its use for HPA. You need to go back to the traditional low-tech industrial uses to come to grips with kaolin's future.

WA Kaolin (WAK) is progressing its production facility. Suvo Strategic Minerals (SUV), acquired the Pittong kaolin operation in Victoria that was initially developed in 1972, by the French company, Imerys. Both of these company supply kaolin product for traditional industrial applications .

More recently both Suvo (with a recent name change to Green 360 Tech (GT3), and Zeotech (ZEO) have been experimenting with their kaolin for use in concrete. Kaolin was first mixed with cement in the 1930s, famously for the Hoover Dam. So, it is not a new high tech development. However, it can reduce the amount of carbon emissions in making cement, but there is generally a limit to what proportion of cement meta-kaolin can occupy - about 20%. This is due to the viscosity issues if the proportion exceeds this level.

Whether or not these companies can develop an economic product is yet to be established. Even if the economics work, there is some legwork involved in getting cement manufacturers to adopt the product. Kaolin alone will not be a game changer of the cement industry. If it is based on carbon emission reductions, there is a need to be cynical about what the big cement companies are actually saying, and what they really intend to do. None of them really want to be anti-carbon warriors. They are just being politically and environmentally correct in their public stance. I say this with direct experience in dealing with the cement companies in First Graphene's endeavours to get graphene into cement. It works well, but achieving industry takeup is a slow process.

Getting back to HPA - the sector and the companies

Having dismissed the merits of using kaolin as the feedstock for HPA, we get back to the only two realistic contenders on the ASX; Advanced Energy Metals and Alpha HPA. The operations of the former are based in Quebec and the latter is in Brisbane. Both have already spent in excess of \$300m to date on processes that are similar but different, though equally complex. Much more money needs to be spent on completion and expansion of the facilities over the coming years.

Alpha has a mighty market capitalisation of \$929m and AEM is much more modest at \$248m (including escrowed stock). At first glance the economics look better for AEM because of the much cheaper hydropower costs, and cheaper labour in Quebec. We all know how the Government has made it more difficult for power consumers in Australia. However, we need to determine whether we are comparing “apples with apples” as AEM employs a chloride route (aluminium chloride) whereas A4N uses an aluminium nitrate process. Both companies then have kilns and pyrometallurgical steps.

Growth in demand and uses for HPA

The global HPA market is currently about 44,000 tpa and has recently been growing at 13% p.a. Some people estimate future growth may be as much as 20% p.a. Recent prices of US\$32/kg may rise to US\$40/kg at some point.

Quality of production will vary with the use of different manufacturing processes, with modifications of specs also dependent upon final tailoring for a specific customer. The qualification process for any particular customer, or project, could be 1-2 years. The saleable product is therefore quite specific to customer requirements and therefore not fungible in the market place. That emphasises the value of incumbency i.e. once a supplier has a position, it is not easily pushed aside by new competitors.

What has all this got to do with the data centres?

Since the earlier days when HPA was in demand for use in battery separators, we are now seeing the same material becoming increasingly important in cathode coating and semiconductor chip manufacturing. The superior thermal conductivity properties of HPA over silica are notable.

The most recent chips are now consuming up to 20x the electricity of earlier chips. Heat is the non-digital by-product of the processing task and is the limiting factor in their performance. That is why better chip efficiency requires faster heat removal. Air cooling is no longer enough and that is where Firmus comes into play with its liquid cooling abilities. It has the next generation of cooling capability but there is nothing to suggest we are at the end of the road. There will be continual advancements and there is no monopoly on the technology.

Could this be an opening for graphene?

Graphene has been known as a super fast conductor of heat (and electricity). It is possible that it could feature in the next generation of liquid coolants. In another six months of research we should start to have some answers

and this could provide a great growth curve for this wonderful nanomaterial. I have invested in a private company that is doing that testing, now.

Summing Up

Having a kaolin deposit and intending to use this as a feedstock to make high purity alumina is a no go, largely because of the impurities that come with the geology of each deposit. Therefore, that leaves the field to companies using aluminium hydroxide as the feedstock. There are two of these listed on the ASX, both a long way down the path to becoming commercial producers. We will dig deeper into their relative merits next week.

The data centre business is becoming increasingly important due to the expanding demand for semiconductors that are needed to progress AI, but heat management of the chips is becoming more demanding. As HPA can be up to 30x more conductive than silica, it is increasingly becoming an important component in the chip structure.

Liquid coolants offer great improvements and opportunities. The use of graphene in liquid coolants could be the next generation.

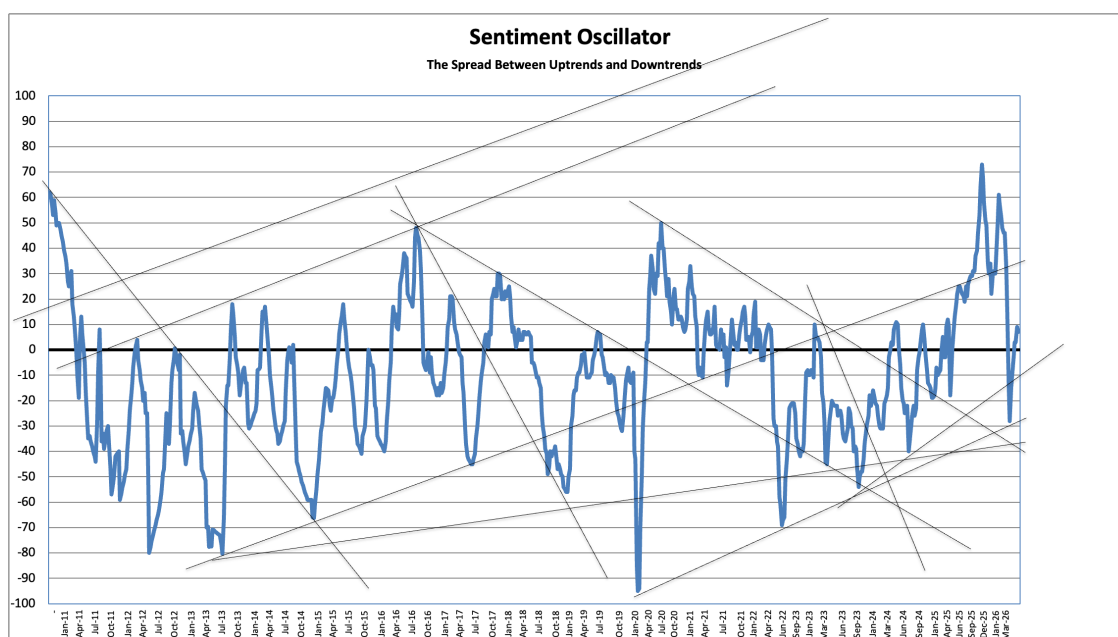
NB: If readers want to know more about the private company, or want to invest in it, email me on wgrigor@fareastcapital.com.au, or call 0417-863187.

What is this talk about intergenerational equity?

I'm suddenly hearing people - politicians in particular - talk about intergenerational equity? I was always told in my younger days that if you have nothing, and you work hard, you have the opportunity to grow and build so that your later years can be more comfortable. Hard work and endeavour build success. The emphasis is on working hard.

Suddenly this intergenerational term is suggesting that it has nothing to do with hard work. It is all about entitlement - a bit like Afterpay. The younger generations should get what they want now, before doing the hard yards.

At the same time, we have been conditioned to work hard, contribute to superannuation and be self reliant in our retirement. Now the government wants to take from our assets to look after those poor youngsters who haven't yet had the time or opportunity to accumulate wealth. It wants to discriminate against the older generations to spoil the younger ones. Is it thinking that it can buy the younger voters this way? That is a highly corrosive strategy.



Sentiment Oscillator: Sentiment eased slightly last week. There were 38% (39%) of shares under coverage in uptrend, and 31% (30%) in downtrend.

Detailed Chart Comments











NB. Only the bold comments have been updated. Comments in grey type are from previous weeks and will be less relevant. Please note that this list is a cross section of the market. It IS NOT a list of recommendations.

Indices	Code	Trend Comment	
All Ordinaries	XAO	rallying	
Metals and Mining	XMM	strongly higher	
Energy	XEJ	correcting lower	
Stocks	Code	Trend Comment (updated comments in bold)	Main Interest
Aguia Resources	AGR	testing uptrend	phosphate, gold
Akora	AKO	breached uptrend	iron ore
Alkane Resources	ALK	correcting lower	gold
Alicanto Minerals	AQI	recovering uptrend	base metals, silver, gold
Alligator Energy	AGE	testing downtrend	uranium
Alpha HPA	A4N	down	HPA
American Rare Earths	ARR	rising again	rare earths
American Tungsten & Antimony	AT4	testing downtrend	antimon
Anax Metals	ANX	recovering uptrend	copper
Andean Silver	ASL	rising again	silver
Arafura Resources	ARU	shallower uptrend	rare earths
Ardea Resources	ARL	testing support line	nickel
Ark Mines	AHK	down	rare earths
Astral Resources	AAR	breaking downtrend	gold
Aureka	AKA	weaker	gold exploration
Auric Mining	AWJ	testing uptrend	gold

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Aurora Energy Metals	1AE		testing downtrend	uranium
Aurelia Metals	AMI		improving	copper + base metals
Aurum Resources	AUE		correcting lower	gold exploration
Australian Gold and Copper	AGC		down	base metals, silver, gold
Australian Rare Earths	AR3		collapse through support	rare earths
Australian Strategic Materials	ASM		testing downtrend	rare earths
BHP	BHP		back in uptrend	diversified, iron ore
Ballard Mining	BM1		testing short term downtrend	gold
Ballymore Resources	BMR		rallying	gold exploration
Barton Gold	BGD		testing downtrend	gold exploration
Beach Energy	BPT		sideways	oil and gas
Beetaloo Energy	BTL		pullback on placement	gas
Bellevue Gold	BGL		recapturing uptrend	gold
Besra Gold	BEZ		off its highs	gold
Black Cat Syndicate	BC8		down	gold
Boab Metals	BML		breaching uptrend	silver/lead
Brazilian Rare Earths	BRE		heavy pullback	rare earths
Brightstar Resources	BTR		strong rally	gold
Caravel Minerals	CVV		down	copper
Carnaby Resources	CNB		breached downtrend	copper
Castile Resources	CST		testing downtrend	gold/copper/cobalt
Catalyst Metals	CYL		down	gold
Cazaly Resources	CAZ		testing downtrend	rare earths
Centaurus Metals	CTM		new high	nickel/cobalt/HPA
Challenger Gold	CEL		sideways	gold
CNG Resources	CGR		down	gold exploration
Cobalt Blue	COB		down	cobalt
CuFe	CUF		new high	bismuth, Cu, Au
Cyprium Metals	CYM		risen to resistance line	copper
Emmerson Resources	ERM		new high	gold
EQ Resources	EQR		strongly higher	tungsten
Estrella Resources	ESR		sideways	manganese
Evolution Mining	EVN		pullback	gold
Felix Gold	FXG		down	gold exploration, antimony
Finder Energy	FDR		correcting lower	oil/gas
First Graphene	FGR		down	graphene
Flagship Minerals	FLG		new high	gold
Gateway Mining	GML		down	gold exploration + gallium
GBM Resources	GBM		down	gold
Genesis Minerals	GMD		recovering	gold
Globe Metals and Mining	GBE		testing uptrend	niobium
Gold 50	G50		rising again	gold exploration + gallium
Golden Horse	GHM		down	gold exploration
Great Boulder Resources	GBR		recovering	gold exploration

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Green360 Tech	GT3		breached downtrend	kaolin
Hamelin Gold	HMG		spike out of downtrend	gold exploration
Hawk Resources	HWK		down	scandium
Heavy Minerals	HVY		breached downtrend	garnet
Hillgrove Resources	HGO		rising	copper
Iltani Resources	ILT		down	antimony
Iluka Resources	ILU		rising again	mineral sands
Investigator Resources	IVR		falling	silver
Jupiter Mines	JMS		breached uptrend	manganese
Kairos Minerals	KAI		recaptured uptrend	gold
Kaiser Reef	KAU		correcting	gold
Kingfisher Minerals	KFM		rising	copper expl.
Kalamazoo Resources	KRZ		good rally	gold
Kalina Power	KPO		breached downtrend	data centre power
Koba Resources	KOB		testing downtrend	uranium
Larvotto Resources	LRV		testing uptrend	gold, antimony
Litchfield Minerals	LMS		rising	copper exploration
Lindian Resources	LIN		down	rare earths + bauxite
Lode Resources	LDR		down	antimony, silver
Lotus Resources	LOT		collapse	uranium
Lynas Corp.	LYC		surge higher	rare earths
Mammoth	M79		strong recovery	gold exploration
Many Peaks	MPK		new high	gold exploration
Marmota	MEU		down	gold/uranium exploration
Matsa Resources	MAT		down	gold
Meeka Gold	MEK		down	gold
MetalsX	MLX		rising	tin, nickel
Meteoric Resources	MEI		on support line	rare earths
Metro Mining	MMI		sideways	bauxite
Midas Minerals	MM1		rising	lithium
Mithril Silver & Gold	MTH		pullback	silver, gold
Native Mineral Resources	NMR		turning down	gold
New Murchison	NMG		testing downtrend	gold
New World Resources	NWC		rising	copper
Nexgen Energy	NXG		breaching downtrend	uranium
Novo Resources	NVO		placement & heavy correction	gold exploration
Omega Oil	OMA		rising	oil
Pacific Gold	PGO		rising	gold exploration
Pacific Lime & Cement	PLA		rising	renewables, cement
Paladin Energy	PDN		pullback	uranium
Pantoro Gold	PNR		breached downtrend	gold
Patriot Battery Metals	PMT		breached downtrend	lithium
Peninsula Energy	PEN		down	uranium
Perseus Mining	PRU		down	gold

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Phosco	PHO		rising	phosphate
PolarX	PXX		down	gold exploration, base metals
QMiner	QML		breached downtrend	copper
Regis Resources	RRL		rising again	gold
Revolver Resources	RRR		softer	copper
Richmond Vanadium	RVT		spiked higher	vanadium
RIO	RIO		new high	diversified, iron ore
Rox Resources	RXL		testing uptrend	gold
RTG Mining	RTG		strong rally	copper
Rumble Resources	RTR		rising	zinc, gold, tungsten exploration
S2 Resources	S2R		down	gold exploration
Santana Minerals	SMI		correcting lower	gold
Santos	STO		rising	oil/gas
Sarytogan Graphite	SGA		sideways	graphite
Scorpion Minerals	SCN		softer	gold exploration
Siren Gold	SNG		down	gold exploration
Skylark Minerals	SKM		down	gold exploration
Somerset Minerals	SMM		back to support line	copper exploration
Southern Palladium	SPD		rising	PGMs
Stanmore Coal	SMR		down	coal
St George Mining	SGQ		recovering	rare earths, niobium
Stellar Resources	SRZ		on support line	tin
Sun Silver	SS1		down	silver
Sunrise Metals	SRL		surge higher	scandium
Tamboran Resources	TBN		lower	gas
Theta Gold	TGM		breaching downtrend	gold
Tivan	TVN		breached downtrend	fluorite
Toro Energy	TOE		rising again	uranium
Torque Metals	TOR		surge on management changes	gold exploration + lithium
Toubani Resources	TRE		steep rise	gold
Verity Resources	VRL		down	gold
Vertex Minerals	VTX		down	gold
Waratah Minerals	WTM		regaining uptrend	gold exploration
Westgold Resources	WGX		down	gold
West Wits Mining	WWI		breached uptrend after share consolidation	gold
Whitehaven Coal	WHC		breached uptrend	coal
White Cliff Minerals	WCN		sideways	copper exploration
WIN Metals	WIN		down	gold
Yandal Resources	YRL		down	gold exploration
Totals	38%	55	Uptrend	
	31%	44	Downtrend	
		143		

Guides to Chart Interpretations

- Charts usually go pass from one trend (up or down) into the other via a period of indecision and uncertainty during which the trend can either recover or change. This period is signified by the orange colour. The orange represent both the greatest risk and greatest reward possibilities.
- Once a chart is in confirmed up or downtrends it is not uncommon for 10-20% of that trend to have already transpired.
- There are trends within trends. The focus of this chart review is the immediate trend that affects the sentiment i.e. it can be a downtrend within a long-term uptrend.
- Not every chart warrants a new comment every week. The new comments are in bold type. Grey type comments may be dated.
- Individual charts provide a single view. It is valuable to look at charts of other companies in similar commodities, and the overall sentiment is also very valuable. Not many stocks can swim against the tide.
- We periodically add or delete charts, some times for obscure reasons. If a chart consistent gives poor signals or is very erratic, we may delete it. Sometimes we add a chart because we want to see what all the fuss is about. We do have a preference for charting stocks that we cover in our research as well.
- Errors and omissions may occur from time to time, especially in fast moving markets.

Amber Lights in Tables: Just a reminder if when the amber light is used in the table – it is when the charts are ambiguous or when there is a change of trend taking place. If a chart is breaching a downtrend it can either be a positive sign or a trap. Only once it has done more work can it be confirmed as a new uptrend. Maybe it is a new uptrend (or conversely a new downtrend); the risk takers can decide to jump on board early (or sell). They will maximise their profits (or minimise their losses if indeed it is the start of the new uptrend (downtrend). More risk-averse investors should wait a little longer, being prepared to give up some of the gains in return for greater certainty.

Weightings of Sectors Represented in the Company Charts			
Sector	No. of Companies	Weighting	
Gold	35	24.5%	
Gold Exploration	26	18.2%	
Copper	14	9.8%	
Rare Earths	11	7.7%	
Uranium	8	5.6%	
Oil/Gas/Hydrogen	6	4.2%	
Silver	6	4.2%	
Iron Ore/Manganese	5	3.5%	
Antimony	4	2.8%	
Lithium	2	1.4%	
Graphite/graphene	2	1.4%	
HPA/Kaolin	2	1.4%	
Nickel	2	1.4%	
Scandium	2	1.4%	
Tungsten	1	0.7%	

Tin	2	1.4%	
Coal	2	1.4%	
Bismuth	1	0.7%	
Niobium	1	0.7%	
Potash/Phosphate	2	1.4%	
Vanadium	1	0.7%	
PGMs	1	0.7%	
Mineral Sands	1	0.7%	
Bauxite	1	0.7%	
Cobalt	1	0.7%	
Other	4	2.8%	
Total	143		

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