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FAR EAST CAPITAL
The Mining Investment Experts

Weekly Commentary

15 April 2023 *Chart comments at Friday's close* Analyst : Warwick Grigor

Taking solar power into the next generation

Markets have mostly been well behaved in the last week, with Easter and school holidays being a distraction.

Gold continues to do well near the top of its historical trading range, courtesy of US headline inflation being slightly lower than expected. ETFs continued with their gold purchases, taking their buying streak to six days last week.

1. Greatcell Energy - pioneering perovskite cells

On Wednesday I drove down to Wagga Wagga to see the Greatcell Energy research and pilot production facility, to assess its progress. You may recall previous notes on this exciting and innovative energy company, that promises to take solar energy into the next generation. To access the an earlier detailed note click on the following link. There has been good progress since this was written, in 2021. http://www.fareastcapital.com.au/imagesDB/newsletter/WeeklyComm2October2021_1.pdf

Why do we need to look beyond silicon?

There is nothing inherently wrong with silicon cells. They form the basis of almost all solar energy collection at present but it is a mature technology. Future improvements are more likely to be about efficiencies in production costs rather than expanding technical capabilities. As an example, there is an Australian company out there proposing to cut the production costs by 30%.

You may ask why we should bother with newer technology, but the answer is simple. Backing innovative companies can lead to great profits for those who pick the winners. It is good to get in at the ground floor.

Perovskite solar cells open up new opportunities

Perovskite solar cells (PSCs) open up new operating areas and markets to solar electricity, ones that silicon solar cells are not well suited to. The basic advantages of PSCs are;

- ability to operate efficiently under low light conditions e.g. indoors, effectively recycling power from indoor lighting,
- potential to replace batteries in many devices, especially 2036 type batteries used for IoT devices, thereby reducing the number of used batteries going to landfill (or recycling),
- ability to capture a broader range of light bands for conversion and wider angles of light radiance, whereas silicon cells operate in more stringent bands with the sun overhead,
- flexibility in positioning, being able to generate electricity from any light source without the need to precisely position them, as required with silicon cells
- lower cost materials and local thin film manufacturing processes that are far simpler and less energy intensive than Chinese silicon solar panels,
- lightweight and flexible physical characteristics, being dramatically lighter and thinner than silicon panels,
- no need for supporting fittings and infrastructure to attach them to rooftops or other assets and applications, and
- far superior "cradle to grave" environmental impact - less energy to make, less materials to install, much simpler to recycle and no toxic materials in landfill.

Perovskite solar cell technology has demonstrated that it can be at least as efficient as silicon technology in specialist areas e.g. indoor, low-light, and ongoing research is improving its performance characteristics in other areas at a rapid pace. Thus it is an expanding opportunity that will benefit from continual advancement in the underlying technology.

The life of PSCs is tested to be equivalent to five years minimum, but the team is working on methods for subsequent generations to be 10 years and more. While this is less than the 25 years standard that silicon cells demonstrate, considering all the advantages above and considering the forecast growth in solar energy, there are plenty of applications for PCS to take meaningful market share in, and be the most superior renewable energy generation source. The levelised cost of energy for PSCs will be lower in many cases, even if the materials needs to be recycled once or twice to match silicon's life cycle.

How does the business model look?

Greatcell is working to a business model that delivers 30% gross profit margins in the near term while still working medium and longer term versions. If you look at the cells for a TV remote control unit as an example, they may be able to sell these at US$1.00 each. At a 30% gross profit margin, and sales of 30 million p.a. to one identified potential company in Korea, that works out at a A$14m p.a. margin.

Another potential near term market opportunity is the labels on supermarket shelves that are connected to a central computer for pricing and inventory control. The current market for these is about 36 million p.a., but the lower costs availed by the Greatcell technology could dramatically improve the economics and expand the market many fold. Again, applying a 30% gross profit margin, there is easily the potential to generate gross margins of $20m p.a. in the short term.

What about capex?

The roll-to-roll production methodology is expected to provide excellent production efficiency. Greatcell could establish a commercial scale plant at not more than $10m, to meet the demand from the aforementioned products. How much capex is needed over time, to meet an expanding market, is dependent upon market demand. The main point is that upfront capex is not a barrier.

FEC's and First Graphene's involvement

FEC has raised money for Greatcell in the past and has invested in the Company previously. It is being mandated to assist in the next round of funding, which will be in the order of $2m.

First Graphene fits into the equation with its ability to supply high quality graphene that has been shown to dramatically reduce the cost of materials in the manufacturing of perovskite solar cells, to the tune of 60-80%.

The Bottom Line

Greatcell is a good example of Australian ingenuity leading the world with ground breaking advancements in solar power technology. It has been making excellent progress on the technical fronts and it is now scaling up production methods in preparation for commercial operations. It has identified initial markets where its products will work well to improve the customers' economics whilst at the same time providing improved environmental benefits e.g. reduced reliance on batteries.

Greatcell is still an unlisted company, so there are no readily tradeable shares yet. There is no set timetable for an IPO, but that may be a possibility at some point. In the meantime, investors can participate in a small fund raising that is being launched soon. Please feel free to contact FEC if you would like more details.

Disclosure: Interests associated with the author own shares in Greatcell and First Graphene. Capital raising fees have been received. The author is a director of First Graphene.

2. Harena Resources - a credible rare earths company doing a pre-IPO raising

We received a presentation from another rare earths company last week; Harena Resources. It is not yet listed on the ASX, but it hopes to achieve this status in several months time with a $10m IPO. Those readers who are on the Gold Card list will have received an invitation to participate in an attractive pre-IPO raising by the time this commentary is distributed to the general reading list.

The Ampasindava Ionic Clay Project, Madagascar

Harena has purchased a 75% interest in the Ampasindava Ionic Clay Project for A$3.5m, from the Administrator of Reenova Investment Holdings Limited (formerly ISR Capital Limited), a tech company that was listed on the Singapore Stock Exchange. It is understood that $50m has been spent on the project by previous owners.

Ampasindava is located in the Antsiranana Province in NW Madagascar, some 500 km north of the capital city. The nearest town is 40 km distant. The project area is relatively rugged with the elevation rising from sea level up to 700m altitude.

Infrastructure facilities are limited with there being no grid power. Water is available from local bores. The nearest port is 20 km away. A sealed highway lies 18 km to the east of the licence area.

Back in 2017, Behre Dolbear Australia (BDA) completed an Independent Technical Valuation, commissioned by ISR Capital. At the time the Measured, Indicated and Inferred Mineral Resource was 627 Mt at 895 ppm TREO, with the M & I component being 197.7 Mt, or 31.5% of the resource. This estimate, calculated by SGS Canada, was based on 4,412 sample pits (1m^2) and 359 drill holes. BDA assessed the value of the project to be in the range of US$25-74m, which compares favourably with Harena's purchase price of $3.5m for its 75% interest.

Description of the geology and previous exploration

The resource lies within a shallow weathered regolith lateritised clay horizon with an average thickness of around 14m; the average thickness of the mineralised zone is approximately 6.0m.

The mineralisation appears to have come from intrusions associated with a caldera that has weathered in-situ as opposed to being transported sedimentary clays.

The Ampasindava regolith REE mineralisation has been recognised to have similarities to the ion adsorption clay-type rare earth mineralisation in China, meaning that it could be amenable to low cost heap leaching recovery techniques.

Metallurgy and bulk sampling

Metallurgical test work has been undertaken by the University of Toronto, Outotec and SGS Lakefield, showing that the rare earth oxides can be readily leached. A 1,000 tonne bulk sample of lateritic and saprolitic clays was extracted from a grid of sample pits. Leaching tests were undertaken using ammonium sulphate, $(NH_4)_2SO_4$, and sodium chloride (NaCl) solutions. Composite samples grading around 2,000 ppm achieved recoveries in the range of 50-80% for the heavy rare earths. Column leach tests (0.5m diameter, 1.8m height) were conducted to simulate heap leaching conditions. The feed was agglomerated and the tests ran for 218 hours. Extractions ranging from 50-88% were achieved.

Development possibilities - heap leach most likely

Having only recently acquired the project, Harena is yet to make any decisions on possible development scenarios, though the previous owners did envisage producing a mixed earth concentrate containing up to 10,000 tpa of rare earths. Harena will need to embark upon the usual list of studies as it progresses the project, but its early guess is that capex need not exceed US$100m in the first instance. The first step is to continue with the review of the previous work and the earlier 43-101, to assess its relevance going forward.

At the moment the most likely development scenario will be the establishment of a heap leach operation that will obviate the need for tailings dams, as the heaps will be returned to the pits once they have been washed of chemicals. A four month cycle of mining, leaching and rehabilitation is being considered. It is anticipated that there will be no drill and blasting needed in the pits.

While a heap leach project offers a lower capex figure, there are a number of parameters that need to be considered. Here, the design will need to account for monsoonal rainfall events with average annual rainfall of 2 metres p.a. Care must be taken to ensure an absence of channelling within the heaps that can lead to incomplete contact with the solutions and therefore, lower recovery rates. It is already understood that the clays will need to be agglomerated to improve percolation.

As previously stated there is not an overabundance of water, so Harena thinks that sea water will be sufficient in a two stage leaching process; salt water flush first then an ammonia sulphate solution with a pH of 2.5-3 to achieve a 60-70% recovery of the rare earths into a carbonate concentrate for shipment to market.

It would be normal to establish a trial heap leach on location to scale up the test work before committing to a full commercial development, to iron out any localised operational issues and to confirm the leachability at scale. A 3-5,000 tonne demonstration facility could cost in the order of $10m, if estimates by companies such as IXR are any indication.

The Bottom Line

The first point is that Harena is an advanced project with a good chance of progressing to project development. That distinguishes it from the literally dozens of exploration projects being announced by junior companies over the last 12 months - most of which will never be much more than talking points. So, Ampasindava looks like a credible project, worthy of being taken seriously.

Madagascar is a little more exotic than W.A., but there is a long history of serious mining projects run by major mining companies. While I haven't much experience in that country myself, I am assured by Harena that the geopolitical risk is not a problem.

The technical aspects of the project look manageable, based on earlier studies, but we will look to additional studies to be undertaken by Harena over the next year or two to provide a better picture.

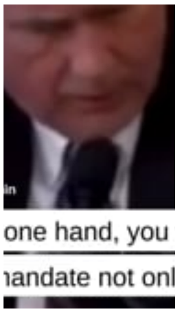
So, that brings into consideration what the economics of an operation will look like. The studies will give us project information on capex and opex, but where will rare earth prices be in 2-3 years time? The more positively the Company promotes its merits, the better the share price will perform. Investors should be looking for rare earth projects with substance, like Harena, while the rare earths market is on the back foot.

3. Chilwa Minerals prospectus is now live.

Recall that we mentioned Chilwa Minerals a couple of weeks ago, with its mineral sands and rare earth projects in Malawi. For those who are interested, the prospectus is now live. You can access the application form on the following link. https://apply.automic.com.au/ChilwaFarEastCapital. The actual prospectus is available on https://www.chilwaminerals.com.au/about-4

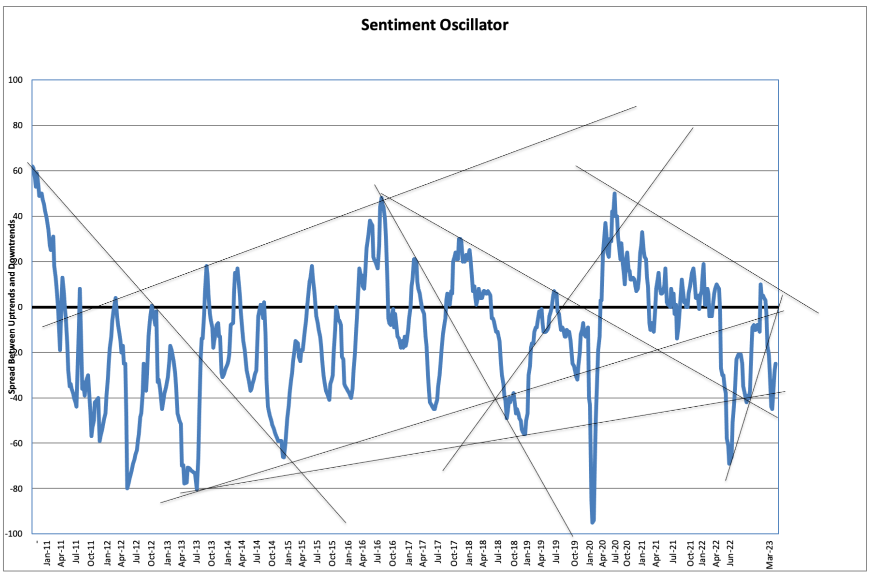
4. Exposing the Dilemma of the Greens

A reader sent me this clip last week. I think it is worth watching as it introduces some facts and figures to the debate. At the very least it, is entertaining.



5. The Gold Card List - reminder of what it is

Just to remind you, we issue the Weekly to those who sign up, free of charge. The Gold Card readers also receive offers of placements and other deals, but we have to be in receipt of a s.708 certificate before we are even allowed to show you these opportunities. If you want to see the deal flow, go to the website and sign up with a s.708 certificate.



Sentiment Oscillator: Sentiment improved slightly last week. There were 20% (20%) of the charts in uptrend, and 45% (48%) 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		steeply higher	
Metals and Mining	XMM		steep[ly higher, then pullback	
Energy	XEJ		breached downtrend	
Information Technology	XIJ		rising	
Stocks	**Code**		**Trend Comment (updated comments in bold)**	**Main Interest**
92 Energy	92E		testing downtrend	uranium
A-Cap Energy	ACB		new low	uranium
ADX Energy	ADX		sideways	oil and gas
Alpha HPA	A4N		new high	HPA
Adriatic Resources	ADT		new high	zinc, polymetallic
Advance Metals (was Pacific American)	AVM		off its lows	coal, gold exploration
Alkane Resources	ALK		new high	gold
Alicanto Minerals	AQI		still down	base metals, silver, gold
Almonty Industries	AII		sideways	tungsten
Altech Chemical	ATC		approaching resistance line	HPA, anodes
Anteotech	ADO		at lows	silicon anodes, biotech
Alto Metals	AME		testing downtrend	gold exploration
American Rare Earths	ARR		breached support line	rare earths
Antilles Gold	AAU		trying to breach downtrend	gold
Anax Metals	ANX		testing downtrend	copper
Arafura Resources	ARU		down	rare earths
Ardea Resources	ARL		new low	nickel
Aurelia Metals	AMI		testing downtrend	gold + base metals
Australian Rare Earths	AR3		spiked through downtrend	rare earths
Auteco Minerals	AUT		breached downtrend	gold exploration
Arizona Lithium	AZL		new low	lithium
Azure Minerals	AZS		rising again	nickel exploration
BHP	BHP		failed at resistance line	diversified, iron ore
Barton Gold	BGD		testing uptrend	gold exploration
Beach Energy	BPT		testing resistance line	oil and gas
Bellevue Gold	BGL		off its highs	gold exploration
Benz Mining	BNZ		slump	gold
Black Cat Syndicate	BC8		recapturing uptrend	gold
BMG Resources	BMG		down	gold exploration
Boab Metals	BML		at resistance line	silver/lead
Breaker Resources	BRB		takeover bid	gold exploration

Buru Energy	BRU	testing resistance line	oil
Calidus Resources	CAI	new low	gold
Caravel Minerals	CVV	rising again	copper
Carnaby Resources	CNB	breached downtrend	copper
Castile Resources	CST	still in downtrend	gold/copper/cobalt
Celsius Resources	CLA	sideways	copper
Chesser Resources	CHZ	breaking downtrend	gold exploration
Cobalt Blue	COB	down	cobalt
Cyprium Metals	CYM	slump on funding failure	copper
Dateline	DTR	back to lows	rare earths
Ecograf	EGR	new low	graphite
Emerald Resources	EMR	rising, new high	gold
Empire Energy	EEG	new low	gas
EQ Resources	EQR	rising	tungsten
Euro Manganese	EMN	down	manganese
Evolution Energy	EV1	softer	graphite
Evolution Mining	EVN	breaching downtrend	gold
First Graphene	FGR	down	graphene
Fortescue Metals	FMG	testing downtrend	iron ore
FYI Resources	FYI	collapse on Alcoa withdrawing fromJV	HPA
Galena Mining	G1A	falling back to trend line	lead
Genesis Minerals	GMD	down	gold
Genmin	GEN	down	iron ore
Gold Road	GOR	back to support line	gold
Great Boulder Resources	GBR	sideways	gold exploration
Group 6 Metals	G6M	down	tungsten
Hastings Technology Metals	HAS	back to lows	rare earths
Hazer Group	HZR	breached downtrend	hydrogen
Heavy Minerals	HVY	slump back to trend line	garnet
Highfield Resources	HFR	down	potash
Hillgrove Resources	HGO	slump	copper
Iluka Resources	ILU	breaching support line	mineral sands
ioneer (was Global Geoscience)	INR	down	lithium
Ionic Rare Earths	IXR	down	rare earths
Jervois Mining	JVR	new low	nickel/cobalt
Kaiser Reef	KAU	sideways through downtrend	gold
Kalina Power	KPO	new low	power station additive
Krakatoa Resources	KTA	new low	rare earths
Kingfisher Mining	KFM	heavy fall	rare earths
Lepidico	LPD	down	lithium
Lindian Resources	LIN	rising again	rare earths + bauxite
Lion One Metals	LLO	breached downtrend	gold
Li-S Energy	LIS	breached downtrend	Lithium sulphur battery technology
Los Cerros	LCL	down	gold exploration

Lotus Resources	LOT		down	uranium
Lucapa Diamond	LOM		down again	diamonds
Lunnon Metals	LM8		resumed uptrend	nickel
Lynas Corp.	LYC		turned down at resistance line	rare earths
Magnetic Resources	MAU		surge on REO news, then retracement	gold exploration
Mako Gold	MKG		sideways	gold exploration
Marmota	MEU		drifting lower	gold exploration
Matador Mining	MZZ		down	gold exploration
Mayur Resources	MRL		rising	renewables, cement
Meeka Gold	MEK		down	gold
Megado Gold	MEG		down	rare earths, gold exploration
MetalsX	MLX		down	tin, nickel
Meteoric Resources	MEI		rising again	rare earths
Metro Mining	MMI		still down	bauxite
Mincor Resources	MCR		surge on takeover bid	gold/nickel
Mithril Resources	MTH		sideways	gold/silver
Musgrave Minerals	MGV		testing downtrend	gold exploration
Nagambie Resources	NAG		down	gold, antimony
Neometals	NMT		new low	lithium
Northern Star Res.	NST		new high	gold
Nova Minerals	NVA		collapse on -.3 gpt grade, 9.9 Moz	gold exploration
Orecorp	ORR		down	gold development
Pacific Gold	PGO		breached downtrend	gold exploration
Pantoro	PNR		new low	gold
Panoramic Res	PAN		down	nickel
Parabellum Resources	PBL		down	rare earths
Patriot Battery Metals	PMT		heavy slump after raising	lithium
Peak Resources	PEK		on trend line	rare earths
Peninsula Energy	PEN		sideways through downtrend	uranium
Perseus Mining	PRU		off its highs	gold
Poseidon Nickel	POS		at lows	nickel
Provaris Energy	PV1		down	hydrogen
PVW Resources	PVW		new low	rare earths
QMines	QML		down	copper
Queensland Pacific Metals	QPM		breached downtrend	nickel/cobalt/HPA
RareX	REE		breaching downtrend	rare earths, phosphate
Regis Resources	RRL		rising again	gold
Renergen	RLT		down	gas, helium
Resource Mining Corp.	RMI		gently down	nickel exploration
Richmond Vanadium	RVT		recovering	vanadium
RIO	RIO		breached uptrend but strong rally	diversified, iron ore
Rumble Resources	RTR		secondary downtrend	gold exploration
S2 Resources	S2R		sideways	gold exploration
Sandfire Resources	SFR		breached uptrend	copper

Santos	STO		softer	oil/gas
Sarama Resources	SRR		sideways through downtrend line	gold exploration
Sarytogan Graphite	SGA		breached support line	graphite
Siren Gold	SNG		down	gold exploration
South Harz Potash	SHP		breaching downtrend	potash
Southern Cross Gold	SXG		breached downtrend	gold exploration
Stanmore Coal	SMR		surge higher	coal
Strandline Resources	STA		down	mineral sands
Sunstone Metals	STM		new uptrend forming	gold/copper exploration
Suvo Strategic Minerals	SUV		risen to meet resistance line	kaolin
Talga Resources	TLG		slump on $40m placement	graphite
Tamboran Resources	TBN		breached downtrend	gas
Technology Metals	TMT		down	vanadium
Theta Gold Mines	TGM		sideways	gold
Thor Mining	THR		down	gold exploration
Tietto Minerals	TIE		breached downtrend	gold
Vanadium Resources	VR8		new low	vanadium
Venture Minerals	VMS		down	tin, tungsten
West African Resources	WAF		breaching downtrend	gold
Westgold Resources	WGX		good rally	gold
West Wits Mining	WWI		downtrend breached	gold
Whitehaven Coal	WHC		testing downtrend	coal
Xantippe Resources	XTC		sideways	lithium
Zenith Minerals	ZNC		down	gold exploration
Totals	20%	29	Uptrend	
	45%	64	Downtrend	
		143	Total	

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 Exploration	25	17.5%	
Gold	23	16.1%	
Rare Earths	15	10.5%	
Oil/Gas	9	6.3%	
Nickel	9	6.3%	
Copper	9	6.3%	
Lithium	7	4.9%	
Iron Ore/Manganese	5	3.5%	
Graphite/graphene	5	3.5%	
Uranium	4	2.8%	
Silver	4	50.0%	
Tungsten	3	2.1%	
Mineral Sands	2	1.4%	
Vanadium	3	37.5%	
Zinc/Lead	2	1.4%	
Coal	2	1.4%	
Potash/Phosphate	2	1.4%	
Bauxite	2	1.4%	
Tin	2	1.4%	
Cobalt	1	0.7%	
Diamonds	1	0.7%	
Other	8		
Total	143		

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