

## **Evolution Energy Minerals (EV1 AU, \$0.50, market cap A\$80.9m)**

### **World class Chilalo graphite project successfully re-lists. Our valuation now \$0.99/share.**

- The high quality Chilalo coarse flake graphite project in Tanzania has been successfully spun out of parent Marvel Gold (ASX: MVL) into a separately listed company, Evolution Energy Minerals. Chilalo is largely shovel-ready and awaits finance. Chilalo's high grade resource is 20.1mt at 9.9% total graphitic carbon and is one of the higher-grade deposits globally.
- Critical to the success of this raising has been the involvement of the ARCH Sustainable Resources Fund which as a 25% cornerstone shareholder in EV1 (with the investment of A\$10m). ARCH have completed a detailed assessment and has satisfied itself that EV1 is able to meet strict ESG covenants. Importantly, ARCH's presence on the register may assist in financing the project and has stated that up to US\$25m may be available for funding (including the A\$10m already committed).
- MVL has diluted to become a 31% shareholder in Evolution. There are no immediate plans to distribute the shares to MVL holders, but this is likely in our view.
- We have largely adopted the assumptions from Chilalo's 2019 DFS. The proposal is for 50ktpa of graphite concentrate production from an open pit and on-site concentrator. Initially graphite will be sold to global markets as a concentrate, but progressively EV1 will look to enter the expandable, micronised and possibly high purity markets. The latter may attract the battery manufacturers for a source of material for anode production.
- Extensive historical test work has shown Chilalo to perhaps be one of the best untapped sources of medium to coarse flake graphite globally. Larger flake products appear to be under increasing supply deficit. We think the market has lost sight of this opportunity.
- From the DFS assumptions we derive a project NPV<sub>8</sub> of A\$329m (comparable to the valuation in the prospectus, net of royalties). A significant proportion of this valuation is related to the manufacture and sale of value-added graphite products. Together these make up ca. 66% of the Chilalo NPV.
- We see that there are opportunities to further optimise the DFS. An exploration budget has been allocated targeting more near-surface graphite deposits close to the proposed Chilalo plant.
- Our valuation of EV1, conceptual at this stage, is now \$0.99c/share. This assumes modest project gearing with the balance of the \$90m capex requirement from equity. It incorporates a 16% free carry to the Tanzanian Government (on sales of concentrate) and a 1.7% royalty purchased by ARCH.
- Graphite prices have been strengthening in recent months with the Benchmark Mineral Intelligence graphite index up around 20-25% YTD.
- The market's attention has refocussed on graphite, especially with the announcement of a possible graphite offtake deal between Syrah (ASX:SYR) and Tesla (NASDAQ:TSLA). This announcement alone has added nearly A\$500m to the market cap of SYR.
- Regarding Tanzania, recent developments (such as the long-awaited grant of SML's and Framework Agreements to other operators in the country, BHP's recent involvement in the Kabanga nickel project and importantly the reinstatement of a cancelled prospecting licence surrounding Chilalo) demonstrates that the country is firmly back in the business of mining.

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## Listing of Evolution Energy Minerals (ASX: EV1)

EV1's predecessor, Marvel Gold (a re-badged Graphex) chose to move into the gold exploration and development business when it proved difficult to finance the Chilalo graphite project in 2020. Private equity funding dried up as the world went into a period of considerable COVID-related uncertainty. The Tanzanian mining industry was going through troubled times with a rewriting of the Mining Act. Equity markets at the time were closed for African graphite plays.

The re-emergence of investor interest in 'critical minerals' has enlivened the graphite space, and many pre-development companies can now boast market capitalisations of well over \$100m. Interest in the sector has also been driven by an end-user focus on a China-dominated supply source. China supplies some 70-80% of the world's consumption of natural graphite. Over recent months, prices of both fine and coarse graphite have increased by 20-25%. As we discuss in Appendix 1, the fundamentals for graphite pricing look quite encouraging, and prices look to be moving higher based on a lack of new production, in China and globally. This is not to say there aren't new sources of supply, but it is clear they are proving a challenge to finance.

EV1 has been reborn out of what seems to be an increasing push for new sources of graphite supply – especially coarse flake graphite where production has contracted globally. The shovel-ready Chilalo project has been sold into this new company, and has been recapitalised with the raising of A\$22m. Key to the success of the raise has been the involvement of a cornerstone shareholder, ARCH Sustainable Resources Fund LP which will wind up with 25% in EV1 (a \$10m investment) and a 1.7% net sales return royalty on Chilalo production purchased by Arch for A\$2m. ARCH's presence will bring a strong ESG commitment by EV1. In this report, we discuss ARCH's involvement and how this may assist with future funding of the project. As shown in the following table, MVL will retain 31% equity in EV1. MVL directors are considering an *in specie* distribution of EV1 shares at some point in the future.

As we discuss in Appendix 2, a new president has re-prioritised mining in Tanzania and we have seen several important events in recent weeks which have demonstrated that country risk has been significantly reduced.

### Capital structure

Marvel	M	50.0
ARCH	M	40.0
Other IPO investors	M	70.0
Stocks Digital	M	1.9
Issued Capital (undiluted)	M	161.9
Options (1) - ARCH	M	20.0
Options (1) - Board and Management	M	14.6
Options (1) - Brokers	M	7.5
Share price	A\$	0.50
Market capitalisation (@\$0.20)	\$M	80.9
Cash	\$M	10.5
Enterprise Value	\$M	70.4
Undiluted shareholding		
Marvel	%	31%
ARCH	%	25%
Other IPO investors	%	43%
Stocks Digital	%	1%
Total	%	100%
(1) Options: 3 years and \$0.25 exercise.		

## Directors and management

Trevor Benson, Executive Chairman

Michael Bourguignon, Executive Director

Phil Hoskins, Non-executive Director

Amanda van Dyke, Non-executive Director (ARCH appointment)

Chris Whiteley, International Sales and Marketing Consultant

## Background

EV1's Chilalo Project is situated in the Ruangwa District in south-eastern Tanzania, approximately 180 km west of the coastal port city of Mtwara on the Indian Ocean and some 400 km south of Dar es Salaam, Tanzania's largest city.



The Chilalo graphite deposit is a series of intercalated graphitic horizons within a package of felsic gneiss, amphibolite, and occasional marble horizons. The package was deformed during several tectonic events, followed by a final faulting event. During the latter deformation, the local geology was intruded by granitic stocks and dykes.

## Tenure

The Chilalo deposit is secured under a ca. 10km<sup>2</sup> mining lease, granted in 2017. The size of the lease is adequate to allow the development of the project and associated infrastructure. The surrounding tenements, in all totalling an additional 120km<sup>2</sup>, are comprised of 3 prospecting licences, all owned 100% by EV1.

## The Chilalo Resource

A series of drilling campaigns over the past 8 years has resulted in a global resource of 67mt at 5.4% total graphitic carbon (TGC).

Domain	JORC Code Classification	Zone	Million Tonnes (Mt)	TGC (%)	Contained Graphite (Kt)
High Grade	Indicated	Main	9.2	10.6	982
		North East	1.0	9.5	100
		All	10.3	10.5	1,082
	Inferred	Main	7.4	9.5	704
		North East	2.3	8.8	205
		All	9.8	9.3	908
Indicated + Inferred		All	20.1	9.9	1,991
Low Grade	Inferred	Main	37.8	3.4	1,282
		North East	9.5	4.1	394
		All	47.3	3.5	1,677
High Grade + Low Grade	Indicated + Inferred	All	67.3	5.4	3,667

Source: EV1 prospectus

- Within the 67mt global resource has been identified a 20mt higher grade core which at a 5% TGC cut-off results in a resource of 20.1mt at 9.9% TGC for around 2mt of contained graphite. This is one of the higher grade deposits known globally.
- Completion of a PFS then DFS over Chilalo allowed the reporting of a reserve, at the same grade:

Deposit	JORC Code classification	Tonnes (Mt)	Grade TGC (%)	Contained Graphite (Kt)
Chilalo	Proved	-	-	-
	Probable	9.2	9.9	878
Total		9.2	9.9	878

Source: EV1 prospectus

- The resources to reserves conversion ratio is relatively low with the majority of ore being derived from the main orebody. Only a moderate proportion of the total resources were included in the mine plan due to geological complexity in the NE zone.

### The Chilalo Definitive Feasibility Study

The Chilalo project has been through a number of design iterations, culminating in a DFS released in January 2020. Key points from the DFS included:

- Production of ca. 50ktpa graphite (at variety of specifications) from a 500ktpa mill feed for an 18 year mine life.
- Importantly the DFS test work confirmed that the Chilalo product:
  - Produces a very high proportion of coarse flake graphite at target purity levels;
  - Is capable of achieving a purity level of >99% Loss on Ignition (LOI) through standard flotation with no chemical intervention (a feature not commonly available in current global graphite market); and
  - Is suitable for a multitude of high-value applications.
- As part of the DFS, the company decided to extend production into the downstream market, to enhance revenues, with the production of expandable graphite (using toll facilities in China) and micronised graphite. This is material to the economics of the project with a progressive ramp up of production of medium to coarse flake expandable graphite product (ca. 12ktpa) and a micronised product (8ktpa).
- Metallurgical recoveries quoted range between 94% and 97%.
- Capital costs are estimated at US\$87m, unchanged from the 2019 DFS.
- Life of mine cash costs were estimate at US\$778/t of product and against an independently derived average sales price of US\$1,534/t Chilalo was expected to deliver a very healthy margin of US\$756/t. There has been no change to the assumed product pricing from the 2019 DFS. As we discuss below, we think

supply/demand dynamics for the commodity is starting to result in price rises, but have used the EV1 estimates for our valuation.

- The resource model was subject to Whittle optimisation analysis, which delivered a pit which bottomed at around 165m with a strip ratio of around 5:1. This has delivered an impressive 18 year reserve life (8.9mt at a grade of 9.9% TGC).
- In the 2019 DFS the company noted that should the mine life contract to around 10 years, and the pit base lifted to around 115m, this would substantially reduce the strip ratio and in turn reduce mining costs. Preliminary work suggested costs could drop by as much as US\$100/t or 38% from the current estimate of around US\$268/t.
- We think this represents a significant opportunity for EV1 and we expect updated resources and reserves together with re-modelled mining costs to contribute towards an improvement in the project economics in due course. We think there is reasonable potential to identify additional near surface tonnes to reduce the strip and may keep the mine life at 15-20 years. Mining makes up over 40% of Chilalo’s total costs and is therefore a very important aspect of the project going forward. These opportunities are discussed in more detail below.
- Our valuation assumes the 5:1 strip ratio pit as proposed in the DFS.
- The earlier PFS proposed production of ca. 50-55ktpa graphite concentrate in Stage 1 (years 1-2) with a virtual doubling of production capacity for Stage 2 (to 100ktpa). The DFS acknowledged that an expansion is possible, but the company has chosen a more conservative scope for the project. The consistent message from management at EV1 is “value over volume”.
- To start at modest scale, and not flood the market with unwanted product makes sense to us. Syrah provides a textbook example of what not to do in this regard. Graphite markets need to be developed with care, and attention to product quality and customers’ requirements.
- The following table summarises the outcome of the DFS.

Physicals	Unit	DFS Outcomes	Royalty Adjusted DFS Outcomes <sup>4</sup>			
Mine life	Years	18	18			
Total plant feed	Mt	8.9	8.9			
Annual plant feed	ktpa	500	500			
Average head grade	TGC %	10.1%	10.1%			
Average graphite concentrate production <sup>2</sup>	ktpa	50	50			
Steady state expandable graphite sales	ktpa	12	12			
Steady state micronised graphite sales	ktpa	8	8			
Project Financials	Unit	DFS Outcomes	Royalty Adjusted DFS Outcomes <sup>4</sup>			
NPV (post-tax)	US\$M	331	323			
IRR (post-tax)	%	36%	34%			
Post-tax payback period	years	3.5	3.6			
Pre-production capital cost (incl. 10% contingency and pre-strip)	US\$M	87.4	87.4			
Average annual EBITDA	US\$M	74	73			
Product Segment Financials	Unit	Concentrate	Expandable Graphite	Micronised Graphite	Consolidated Production <sup>3</sup>	Royalty Adjusted DFS Outcomes <sup>4</sup>
Average sales price (FOB)	US\$/t	1,534	5,690	2,802	2,500	2,500
C1 operating costs per tonne (FOB) <sup>2</sup>	US\$/t	778	512	383	905	905
Operating margin	US\$/t	756	5,178	2,419	1,595	1,595

1. Average graphite concentrate production includes graphite concentrate used as feedstock into both value-added products (ie. expandable graphite and micronised graphite).

2. Operating costs of expandable graphite and micronised graphite excludes the internal transfer price (purchasing feedstock from the Chilalo Project).

3. Consolidated Production shows the average sales price, operating costs and margin for the consolidated operation (ie. Inclusive of concentrate, expandable graphite and micronised graphite).

4. Adjustments made as a result of the Chilalo Project Royalty, executed after the release of the DFS Announcement.

Source: EV1 prospectus

EV1 states that while a number of specific quotes obtained for the costing of the DFS are now out of date, the overall capital and operational cost estimates remain realistic. We have bumped the capex up a little (to US\$90m) to incorporate the down-stream micronisation processing equipment (estimated at US\$2m in the DFS).

It is also important to note that a royalty of 1.7% has been purchased by cornerstone shareholder ARCH for A\$2m. As shown above this reduces EV1's NPV<sub>8</sub> by 2.4%, so is barely material, but has assisted EV1 to recapitalise the asset while minimising equity dilution.

### **Optimising the DFS**

One of the first steps for EV1 will be to refresh the DFS and look for opportunities identified in the last study to further enhance the economic returns of the project. These may include:

- Further optimisation of the open cut. As discussed above, the DFS pit was optimised to an 18 year mine life which delivered a 5:1 strip ratio. The DFS demonstrated the relationship between mine life (ie pit depth) and mining cash costs. To contract the mine life to say 9-10 years with a shallower open cut, mining costs would contract by \$100/t or 30% of total mining costs.
- Improved conversion of known resources into reserves.
- Identification of additional near surface graphite deposits within a short trucking distance of the plant. Exploration opportunity is discussed in more detail below.
- Better recovery of coarse flake graphite. Further test work is proposed to enhance the production of coarse flake.
- A faster ramp-up in sales of value-added products or concentrate into higher value applications than forecast in the DFS.
- Project expansion. The Chilalo PFS provided for an expansion in the production facilities which then forecast the doubling of production in year 3. The DFS took a more conservative approach with a single stage development. The opportunity for expansion needs to be balanced against the market's demand for additional supply and Chilalo's mine life. However expansion still represents a real opportunity.
- Power costs. While not a power hungry project, some cost reductions will emerge should access to the Tanzanian grid become possible. The presence of ARCH on the register will certainly result in a review of the renewable power options for the project. Solar power with back up diesel seems to be the most likely option here. Note that the DFS assumes diesel generated power.
- An examination of further options to upgrade Chilalo graphite concentrate to other value-added products. EV1 also discusses a high-purity (>99% LOI) product once commercial production of the base range of medium and coarse flake products has been achieved. (In the section below, we discuss the likely products from Chilalo in more detail.) This is likely to find uses within the battery raw material industry and could be viewed as an ESG-friendly graphite source given the chemicals or substantial energy requirements for graphite purification.

### **Exploration potential**

The independent geological report in the prospectus focusses on the exploration potential of the Chilalo district and concludes there is good opportunity for additional graphite discoveries. A number of EM surveys have been conducted over the mining lease and surrounding prospective licences, with 2 priority targets and a further 6 lower priority targets identified. Additional fixed loop EM surveys (FLEM) have been completed over the last 6 months, the results of which will be reported shortly. We would expect drilling of these targets to commence in the current half.

As discussed above, we think the best opportunity is to further optimise the existing resource, which may require further drilling, and identify a +10 year life, low strip operation in order to drop unit costs.

## EV1's graphite markets and forecast graphite pricing

- EV1 has decided to move into downstream graphite markets in order to increase the revenue stream for Chilalo. Thankfully this does not mean it will be looking to the anode markets (fine, high purity, spherical) which could become oversupplied with all the projects being spoken about. Instead, EV1 has focussed on products which appear to be (1) suitable to its graphite "signature", (2) in strong demand, (3) appear to be undersupplied and (4) have opportunities to enhance the value of its lowest value concentrate. The most significant of these are **expandable graphite** and to a lesser extent **micronised graphite**.
- Attention is drawn to Appendix 1 which discusses a variety of end uses for graphite, specifically focussed on the products likely to be offered to the market by EV1. In addition to the sale of flake graphite concentrate, EV1 will be looking to provide feedstock to the expandable graphite business and to manufacture micronised graphite, potentially in Tanzania. This was proposed in the 2019 DFS.
- The table below summarised the assumed production profile:

Table 3: Graphite sales profile – increasing volumes to high-value applications

PRODUCT ('000)	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7
Flake graphite concentrate sales	43	56	50	48	45	39	28
Feedstock to Expandable Graphite	-	-	3	6	9	12	12
Feedstock to Micronised Graphite	-	1	2	3	5	6	8
Additions to inventory	3	2	-	-	-	-	-
<b>TOTAL PRODUCTION</b>	<b>46</b>	<b>59</b>	<b>55</b>	<b>57</b>	<b>59</b>	<b>57</b>	<b>48</b>

Source GPX release 29 January 2020

- The early years consist solely of concentrate sales. Ramping up from year 3 is feedstock for the production of expandable and micronised graphite which are forecast to add significantly to the project's EBITDA. The following table illustrates the impact of the downstream on margins when at full production. Note that the cash operating costs exclude the transfer pricing of concentrate.

Product Segment Financials	Unit	Concentrate Graphite	Expandable Graphite	Micronised Graphite	Consolidated production <sup>4</sup>
Average sales price (FOB)	US\$/t	1,534	5,690	2,802	2,500
CI operating costs per tonne (FOB) <sup>3</sup>	US\$/t	778	512	383	905
Operating margin	US\$/t	756	5,178	2,419	1,595

Source GPX release 29 January 2020

- As discussed in Appendix 1, **expandable graphite** is employed in fire retardants, foils and gaskets and appears to be a market limited by the availability of graphite of suitable quality rather than uses for the product. EV1 has demonstrated that Chilalo medium-coarse flake graphite is some of the best in the world for the production of expandable graphite. We think the market has lost sight of this opportunity.
- The DFS went one step further than just supply coarse flake to the expandable producers as was proposed in the PFS. The company had negotiated a deal with a Chinese group (Yichang Xincheng Graphite Co. Ltd., the world's largest manufacturer of expandable graphite) to produce this material on a toll basis. EV1 would then have the ability to sell this product into global markets. As we discuss below, the economics of this deal is as attractive as the mine itself: even more so, in that it delivers significant value with little or no capital

risk. We assume that EV1 will need to refresh this agreement with Yichang.

- EV1 is also proposing to move into the **micronised graphite** market. Here, it's proposed that the lowest value fines fraction is milled using specialised micronisation equipment to deliver 5 industry-standard micronised grades to meet industry specification with prices ranging from US\$1620 to \$5646/t (FOB). Micronised graphite can be used in as additive in welding flux, lubricants, colouring agents and many other applications.
- The total capital cost associated with the micronized graphite product is estimated at a modest US\$2m (which would be additional to the total capex of US\$87.4m).
- As we discuss below, the impact of the sales price of expandable graphite is very material to the valuation of the Chilalo project. This is illustrated in the following table:

PRODUCT SEGMENT FINANCIALS	UNIT	CONC.	EXPANDABLE GRAPHITE	MICRONISED GRAPHITE	CONSOLIDATED PRODUCTION <sup>1</sup>
Average sales price (FOB)	US\$/t	1,534	5,690	2,802	2,500
CI operating costs per tonne (FOB) <sup>2</sup>	US\$/t	778	512	383	905
Operating margin	US\$/t	756	5,178	2,419	1,595

Source GPX release 29 January 2020

- The impact of expandable graphite on average pricing of EV1 product is dramatic, and with micronised material assists to increase the average sales price by some 63%.
- Following publication of the DFS in 2020 we spoke with one of the leading graphite marketing specialists globally. He made the following points:
  - Chilalo material appears to be highly suitable for the production of expandable graphite for use in fire retardants and for graphite foil/gasket manufacture.
  - The optimum flake size for these products is around the 32 mesh (+500 micron) flake sizes.
  - The marketer's view is that in the coarse flake graphite space, very high expansion rates for expandable graphite is not necessarily better for end users. However, coarse flake fractions (i.e. +32, +50, +80 mesh) will always be in demand for a number of critical applications; hence the higher price points over medium and fine flake.
- While there is no capital attached to the production of the expandable product, there are costs associated with its manufacture. We have not been able to conduct due diligence on the quoted cost of US\$512/t (as shown in the table above) but we understand it represents the processing cost plus transportation costs to/from the Chinese toll treater. As we discuss in "Valuation", below, the impact of the sale of expandable product makes up around 50% of the total project NPV.
- The impact of micronised is less (ca.16% of project value), but it is achievable with a relatively low incremental capital cost and an attractive sales price. Discussions with a marketing specialist suggests that this will be a very attractive product.

## The ESG opportunity

The emergence of ARCH as a cornerstone shareholder in the new company has imposed very strict ESG (environmental, social, governance) guidelines on the company.

The terms imposed by ARCH are onerous, and the fund manager makes the point that it will only invest if it can gauge strong buy-in by management. We understand that the EV1 board has given a full undertaking that suitable ESG guidelines will be put in place and will be adhered to.



In order to administer these guidelines, ARCH has appointed a director to the EV1 board (Amanda Van Dyke, the Managing Director of the ARCH Sustainable Resources Fund) and has imposed the following conditions:

- Payment of bonuses to management will not occur in the event of a material or fundamental breach of ESG policy.
- At least one third of director and management bonuses will be dependent on satisfactory ESG outcomes.
- Furthermore, if there has been a material or fundamental breach of ESG policy directors of EV1 may be required to stand down and be subject to a vote by shareholders for re-election to the board.

These are tough conditions, and beyond what we've seen in the past by other companies. We suspect that this is the start of a trend which will see the miners take a much more serious view of ESG issues.

ARCH argue – and we agree – that adherence to appropriate ESG issues may ultimately drive better value for shareholders and stakeholders in general. It reminds us of the attention paid to work place safety 20 or more years ago. It was clearly demonstrated that companies with a strong safety culture would outperform those without.

Increasingly we are seeing reference to “responsible sourcing” of raw materials, especially into the EU. New regulations for battery raw materials are “to be procured according to OECD recognised guidelines for sustainable sourcing. Each battery will have a digital passport tracking all components upstream”.

According to the EV1 prospectus, the ESG programme will consist of the following elements:

- ESG Policy;
- Environmental and Social Action Plan;
- Corporate Governance Code;
- Gender and Diversity Policy;
- Anti-Bribery and Corruption Policy;
- Whistleblower Policy;
- Occupational Health and Safety Policy;
- Human Resources Policy;
- Cultural Heritage Management Plan;
- Stakeholder Engagement Plan;
- Resettlement Action Plan;
- Local Content and Procurement Policy;
- Modern Slavery Policy;
- Biodiversity Action Plan;
- Pollution Prevention and Low Carbon Emissions Policy; and
- Climate change physical and transitional risk assessment.

We think this is a very positive outcome not only for EV1 but for the graphite sector in general. The emergence of investors focussed on so-called critical minerals (which are dominated by the battery raw materials) may be the next step in financing new projects in the sector.

We note with interest that under certain circumstances, ARCH may be prepared to follow it's A\$10m investment in EV1 with up to a total of US\$25m financial support. As well ARCH speak about the possibility of co-investment with other institutional investors in ARCH. Collectively, this might provide the basis for equity and debt funding of Chilalo.

Historically, this has been the biggest hurdle for the graphite sector.

## Project economics

We have taken Chilalo inputs at face value, and have attempted to break up the project into its various components, production/sales of concentrate from Chilalo, production/sales of micronised graphite on site and the production of expandable graphite in China and sales to western markets at the prices assumed in the DFS.

As the production of expandable graphite will likely occur outside Tanzania, it is assumed that no royalties will be paid on the incremental value obtained from expandable graphite, rather just on the value of the concentrate itself.

Regarding the 16% free carry now applicable in Tanzania, we assume this will affect the mine and concentrate, but not the expandable and micronised graphite business. In summary, our estimates for the NPV (on an after-tax basis and excluding corporate overheads) of each of the elements of Chilalo and the downstream processing is as follows:

	NPV(8), US\$m	% contribution
Chilalo concentrate*	119.6	35%
Micronised product	53.6	16%
Expandable graphite	171.6	50%
<b>Total NPV**</b>	<b>344.8</b>	
* Including 1.7% royalty to ARCH		
** excluding corporate overheads		

The downstream expandable graphite strategy is therefore very important to the outcome for the Chilalo project, making up around 65% of the total valuation.

We would qualify these estimates by saying that we think a review of the Chilalo DFS may yield a better outcome, with the potential for lower mining costs and the possibility of additional value with the incorporation of other downstream products.

Our valuation for Chilalo incorporating the above segment values, allowing for royalties (State and royalty to ARCH) and corporate tax and net of a 16% free carry to Tanzania (for the production of graphite concentrate) is in line with EV1's prospectus estimates.

<b>Consolidated NPV(8), EV1</b>		
NPV of projects	US\$m	312.7
NPV of overheads, after tax	US\$m	-33.6
NPV of Tanzanian interests in Chilalo	US\$m	-32.1
<b>EV1, NPV</b>	<b>US\$m</b>	<b>247.0</b>
Exchange rate		0.75
<b>EV1, NPV</b>	<b>A\$m</b>	<b>329.3</b>

## Funding

In its former guise debt finance was sought from private equity (Castlelake). However, this was disrupted by the onset of the COVID pandemic which impacted the funding capacity of the PE group. Together with the major ructions in Tanzania which resulted in the re-drafting of the Mining Act and changes to the fiscal environment Chilalo proved unfundable at that time. See Appendix 2, below.

Funding has become a major challenge for the emerging graphite sector. As there are no forward markets for graphite, it is impossible for debt providers to hedge future sales, which has kept conventional sources of mining debt away from the sector.

The EV1 prospectus outlines several examples of sources of funding for graphite projects:

- Walkabout Resources (ASX: WKT) has sourced a US\$20m debt facility from a local Tanzanian Bank. Construction of the project has now commenced however we question whether this debt facility is sufficient to bring the Lindi project into full production.
- EcoGraf announced early this year that it had obtained Tanzanian Government approval for a US\$60m debt facility from KfW, a large German development bank.
- Black Rock Mining (ASX: BKT) has entered into an agreement with major Korean steel group, POSCO, to invest \$7.5m to acquire 15% of BKT. This will be used to assist with the development of the company's Mahenge graphite project. There is no sign of a debt facility here, as yet. However, the recent completion of a 500 tonne production campaign for samples which may lead to pre-qualification with customers is certainly a positive step toward securing debt or offtake financing.

Debt financing we see as one of the bigger risks associated with developments in the graphite space. As we discuss below, there is a wall of graphite available, but few projects are fully financed.

We have assumed for the sake of our first valuation of EV1 that the company – likely assisted by cornerstone shareholder ARCH – will be able to source a modest debt funding package, with the balance of capital required funded by equity. We have assumed the project will be geared 70% equity, 30% debt.

## **Valuation of Evolution Energy Minerals – NAV approach**

We have incorporated our appraised Chilalo project NPV within what we judge is a realistic corporate framework and a suitably sized balance sheet to fully fund the project. These assumptions include:

- 84% ownership of the Chilalo project, with the Tanzanian Government taking a 16% free carried interest in the upstream (concentrate) project.
- 100% incremental revenues from 'value added' products (expandable and micronised graphite).
- Normal fiscal terms for Tanzania: 4% royalty and corporate tax rate of 30%.
- Pre-production capex of US\$90m (including capex for micronisation) and working capital of A\$30m to be funded 30% debt and 70% equity.
- An A\$ equity raise following FID of A\$98m at a share price of A\$0.40 (roughly a 20% discount to the current price).

This outcome may or may not be achievable. Certainly a ca. A\$100m equity raise might be a challenge. But other options could emerge, such as a sell-down to an end-user and/or offtake financing.

We note that cornerstone shareholder ARCH has broadly agreed to contribute a minimum of US\$25m (ca. A\$33m) inclusive of the A\$10m already committed. ARCH further suggests that a number of their investors may be prepared to co-invest alongside ARCH. This could be a very positive outcome for EV1.

We have used the above parameters to provide investors with some confidence that the project is potentially financeable. Even with a larger requirement for equity, we can still see an NAV of around A\$1/EV1 share.

<b>EV1 NAV(8)</b>			Notes
Cashflow NPV (8%, post-tax, real)	US\$m	312.7	100% basis
NPV of Tanzanian Govt's equity	US\$m	(32.1)	16% of upstream, free carried
Add back capex	US\$m	90.0	Pre-production estimate
<b>Equity NPV</b>	<b>US\$m</b>	370.6	
Exchange rate	AUDUSD	0.75	
<b>Equity NPV</b>	<b>A\$m</b>	494.2	
Project debt	A\$m	(42.0)	Geared 30%
<b>Implied equity</b>	<b>A\$m</b>	452.2	
Debt to Castlflake	A\$m	(9.5)	Repaid following IPO
Cash	A\$m	10.5	At IPO
Cash from option exercise	A\$m	10.5	All options in the money
Exploration potential	A\$m	10.0	Nominal
Corporate office costs	A\$m	(33.6)	PV, after tax
<b>Corporate NAV</b>	<b>A\$m</b>	440.1	
Fully diluted shares outstanding	m shares	161.9	At IPO
Options	m	42.1	
Fully diluted share capital	m	204.0	
Number of shares for equity component to fully fund project	m	242.0	BSCP estimate only
Total number of shares		446.0	
<b>Implied valuation per share</b>	<b>A\$</b>	0.99	

## Evolution Energy Minerals – in a sector context

A 'belt and braces' approach was taken for the Chilalo DFS in 2020 and has moved into downstream upgrading of graphite concentrate to help improve returns for the project. We believe this has been done to deliver a conservative study to potential financiers of the project and to ensure no repetition of production/product disasters seen in the past with other graphite hopefuls.

We are reminded of the grim end for Valance Industries which wound up in administration in 2017, driven by an ill-designed plant and the inability to produce a saleable product. And then to Syrah Resources (SYR ASX) which came close to achieving the same outcome. It was only a dramatic cut in production and costs following an equity raise which allowed SYR's survival. Despite numerous reassuring presentations over several years, SYR's Balama project proved unable to produce to the specification required from the plant. This together with what seems to us to have been a curious (to us) marketing strategy led to a market flooded with already oversupplied fine flake graphite. Prices plummeted and SYR's cashflows were put under extreme stress.

And even the large producers can stumble. Imerys Graphite and Carbon (one of the world's largest graphite producers outside China) reported 'geological and processing issues' at its Okanjande flake graphite project in Namibia which came on line in 2017. It is believed to have had trouble reaching scheduled output of graphite concentrate and meeting sufficient yield levels and closed the mine in late 2018.

The Syrah situation emerged as the Chilalo DFS was being completed, so it's hardly surprising that directors insisted on a conservative approach to the resource itself, subsequent engineering and marketing.

In Appendix 1 we examine the fundamentals of the graphite market and how EV1's Chilalo project fits into a tightening supply outlook for graphite, especially coarse and medium flake material. We have also formed the view that graphite projects are challenging to finance using debt and that an integrated downstream strategy seems to make most sense. It is certainly what the market is prepared to pay for in the current environment.

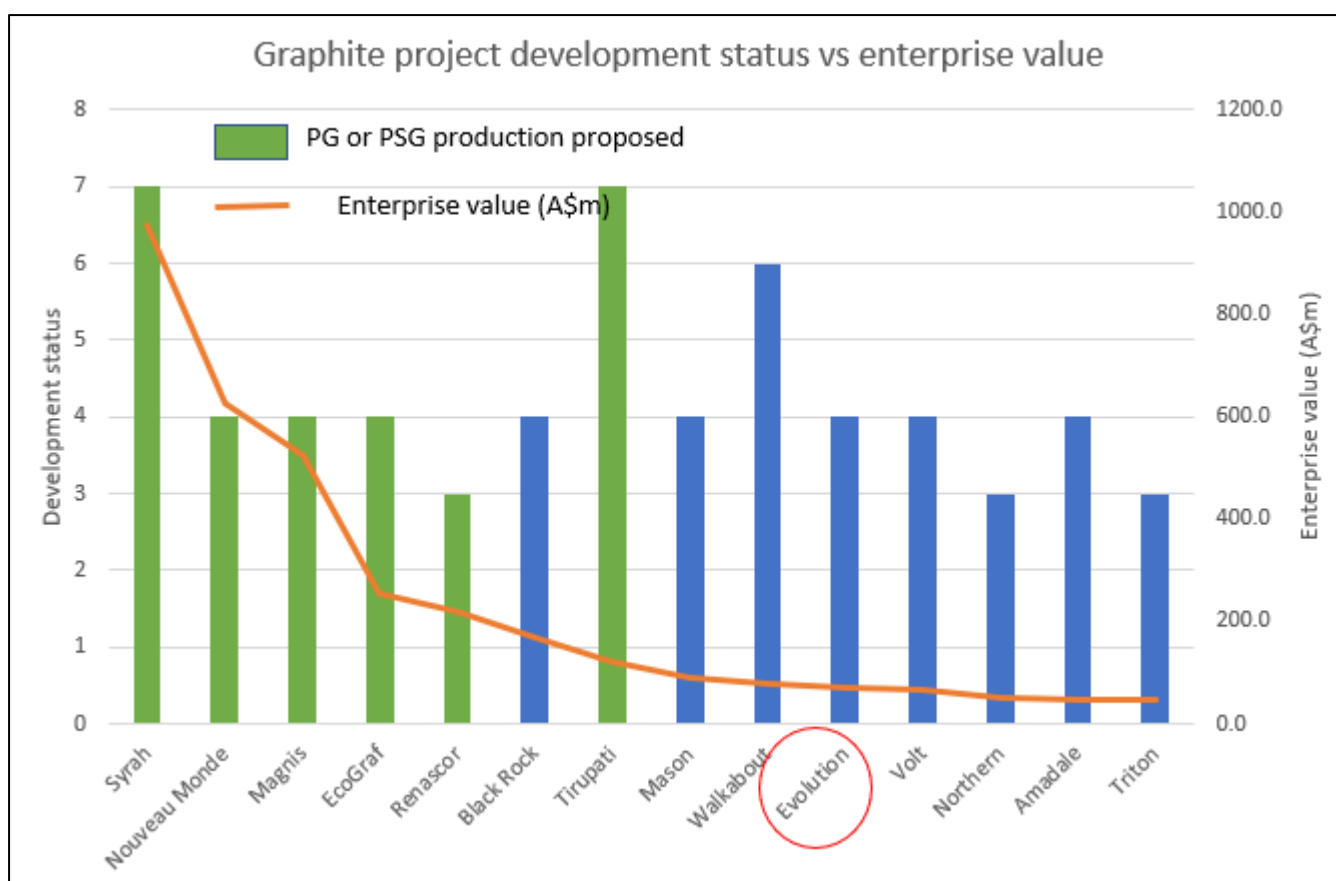
We have undertaken a review of the graphite sector, mainly ASX-listed companies, but several listed on the TSX (with Canadian assets) and one listed on AIM. Some interesting trends emerge.

In the chart below, we have plotted enterprise value (A\$m) against a measure of project development status, in order to investigate as to whether the more advanced and financed projects are priced more highly by the market.

We have simplistically differentiated development status as follows:

- Score 1 for a JORC resource
- Score 2 for a PFS
- Score 3 for a BFS
- Score 4 for largely full permitting
- Score 5 for financing in place
- Score 6 for construction
- Score 7 for production

We have also highlighted company which have adopted a strategy to produce purified graphite (PG) or purified spherical graphite (PSG) for the battery anode industry.



Share prices as at 13 January 2021

**Observation 1:** There are just two new, listed, non-Chinese projects in production: Syrah, now back in production following a 12 month hiatus and now able to boast an enterprise value of around A\$1bn, following disclosure of a potential offtake/sales agreement with EV manufacturer Tesla. (See further comments below). The company remains cashflow negative (into the September quarter) and therefore very leveraged to improved graphite price.

**Observation 2:** The next four largest companies in market capitalisation have reasonably well enunciated anode graphite (or purification) strategies. However, none are in production. Canadian Nouveau Monde looks to be closest to production but is still awaiting financing. First production of ‘anode quality graphite’ is now scheduled for 1H22 (previously 1Q22). However, this looks ambitious to us.

**Observation 3:** Magnis, EcoGraf and Renascor, the next three largest companies by market capitalisation all boast EV’s at over A\$200m. All are proposing to manufacture either purified graphite for battery anodes (Renascor and EcoGraf) or in the case of Magnis travelling the full journey into battery manufacturing. Both EcoGraf and Magnis have graphite deposits comparable to Chilalo in Tanzania. Both have feasibility studies and appear to be shovel-ready. But neither are financed and neither appear close to production. Magnis in a recent presentation talks about conclusion to financing of Nachu in 2022 and commencement of construction in early 2022. This looks unlikely to us, with the company now focussed on its downstream activities.

We don’t pretend to have a detailed understanding of either EcoGraf or Magnis, but to us it looks like the downstream initiatives for both companies are development priorities, rather than the graphite mines themselves. Both projects completed bankable feasibility studies 5 or more years ago. Changes to the Mining Act in 2017 was a major setback to the entire mining industry in Tanzania and we think it was this that prompted both companies to pursue their downstream strategies. Perhaps this has been a blessing in disguise, with the market now allocating valuation premiums to both. It’s hard to criticise the strategy.

The chart above does demonstrate how challenging funding of graphite projects has become with 8 out of the 14 examples above having completed a DFS but are awaiting finance. Graphite is a typical industrial mineral which (1) cannot be hedged and (2) must establish product quality from shipments to end users. This is difficult for conventional lenders.

## **What does this mean for Evolution going forward?**

EV1’s valuation appears to be soundly underpinned by what looks to be a premier graphite project, Chilalo. Based on our estimates and financing assumptions, an NPV<sub>8</sub> around \$1/share does not look unrealistic, but does need to be tested with an update to the DFS economic outcomes.

Evolution’s strategy has been to source equity funding, which it has now done, to then update the 2019 DFS, complete the ESG program to which it has committed, progress towards a construction decision at Chilalo and to lock in downstream opportunities. Now is probably the best opportunity for Chilalo to finally see the light of day.

EV1’s plans to enter the expandable and micronised graphite markets seems to make sense, and if the proposal to contract out the manufacture of expandable can be put in place, this generates significantly improved returns.

But to achieve a premium rating, entry to the anode space may be a prerequisite (in the current market anyway). This premium seems to be enhanced with the belief that the individual companies have specific technologies which may prove to be quite disruptive to entrenched products. In the case of EcoGraf, there is the EcoGraf HF-free purification technology (HF, or hydrofluoric acid is a particularly nasty chemical used to purify graphite) producing high purity graphite for the spherical graphite industries. More recently the company is talking about “superBAM”, “greenRECARB” and “ecoCEM”, all additives to both the battery and steel industries. EcoGraf quote quite remarkable rates of return for the HF-free proposal with initial capital just US\$22.8m (for 5000tpa capacity) and an IRR of 42.4% for the 20,000tpa plant (requiring a further capex spend of US\$49.2m). In this case the pre-tax project NPV is an equally remarkable US\$642m. (We take no view on these estimates.)

As has also been demonstrated by Syrah, the market seems to place a significant premium on companies moving into the production of graphitic raw materials for lithium (and other) battery types. Syrah has established a the “BAM” strategy, located in the US and is proposing to produce some 10,000t of coated spherical graphite (so called active anode material or AAM) at its Vidalia plant. SYR has announced that some 8000 tonnes of this AAM is subject to an offtake agreement with Tesla. This requires both parties agreeing to a final specification by the end of this year then SYR achieving final qualification of by no later than May 2025. The agreement can be terminated if production hasn’t started by May 2024. This transaction was taken very positively by the market, and nearly \$500m in market capitalisation was added to SYR in the space of a few weeks.

We see no reason why EV1 will not seek to further enhance value from Chilalo graphite concentrate and present a linkage to the battery raw material space. This strategy is not yet evident but it will no doubt be under consideration by the new board.

As we mention above, EV1 speaks of a high-purity (>99% LOI) product once commercial production of the base range products has been achieved. This is likely to find uses within the battery raw material industry and could be viewed as an ESG-friendly graphite source given the chemicals or substantial energy requirements for graphite purification.

EV1 has a detailed understanding of the graphite market, and with the assistance of a US-based marketing consultant, Chris Whiteley, have the ability, in our view, to seek out and commercialise downstream opportunities. This had already been achieved as part of the DFS with the following initiatives:

- The production of expandable graphite under contract with a Chinese group (Yichang Xincheng Graphite Co. Ltd., the world’s largest manufacturer of expandable graphite). As we discussed, the economics of this deal is as attractive as the mine itself: even more so, in that it delivers significant value with no capital risk. This agreement has expired so will need to be reactivated.
- The production of micronised graphite using specialised micronisation equipment to deliver additives in welding flux, lubricants, colouring agents and many other applications. We understand the capital requirement for micronisation equipment is quite low (US\$2m was quoted in the DFS) and the upgrading facility might well be located in Tanzania.

## Appendix 1

### Graphite: appears to be moving into a period of strong undersupply

#### Introduction

Graphite is a crystalline form of the element carbon. It occurs naturally in this form and is the most stable form of carbon under standard conditions. It is a good conductor of heat and electricity. Its high conductivity makes it useful in electronic products such as electrodes, batteries and solar panels. It is a soft, light mineral which is flexible but not elastic, and it has a high melting point of 3,650°C. It has high thermal resistance, lubricity, and inertness as well as thermal and electrical conductivity, thermal insulative and expandability properties.

#### Types of graphite

Graphite occurs naturally in metamorphic rocks. There are three types of natural graphite –amorphous, flake and vein (also known as lump). Each form of graphite is found in differing types of ore deposits and each type has different end uses.

- Amorphous graphite is the most abundant graphite, but also the lowest quality with carbon purity lower than flake graphite. It is a low-priced graphite product that cannot be upgraded through flotation or purification.
- Flake graphite, or crystalline graphite in its hexagonal crystal form. It is less common and is typically of higher purity than amorphous graphite.
- Vein graphite is a true vein mineral with high carbon purity in-situ. It is quite uncommon.

In general, the coarser the graphite flake size the higher the price paid. This simply reflects the scarcity of the medium and coarse flake material.

Around half the world's supply of graphite, especially into the battery anode markets is synthetic graphite. Synthetic graphite is man-made, high purity and is the alternative product used in battery anodes to natural spherical graphite.

Not all types of graphite are the same and there can be a scarcity or 'value in use' premium paid by various industries for special grades of graphite (think prime coking coal compared with PCI or thermal coal). Graphite is not a rare beast. It's a bit like iron ore or thermal coal and it's perhaps best regarded as a small volume, bulk commodity. However, pricing is far from transparent, and is usually undertaken on a confidential basis between producer and consumer.

Total global demand for natural graphite is around 0.9 million tonnes, with about as much again supplied by the synthetic graphite producers.

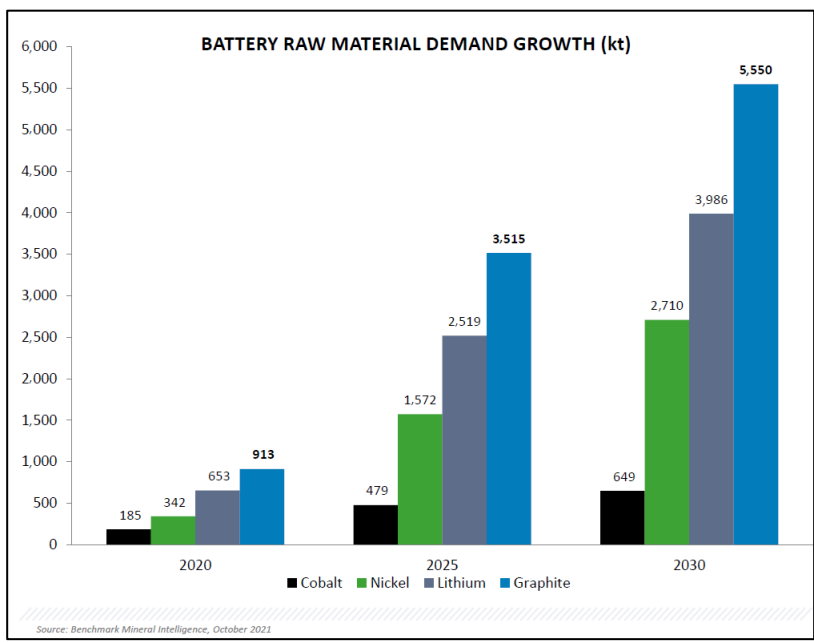
The more carbon is cooked up by geological forces, and the higher the pressure, and the longer the duration of cooking, the larger are likely to be the graphite flake size and the purity. And as a generalisation, the coarser the flake size the more valuable the product. But it's even more complex than this. Some types of graphite have specific properties and/or different purities which might make them more valuable to a particular customer. Therefore, aligning deposits and customers is very important.

Graphite's uses are wide and various. Its high melting point sees widespread use in the refractories industry (steel production) and in other high temperature applications. It also has excellent lubricating properties. Traditionally it has been leveraged to the 'metal bashing' industries. Unquestionably the greatest focus recently has been the use of graphite as the anode for lithium ion batteries, increasingly seen as disruptive technology for the energy space. This has attracted widespread interest from investors.

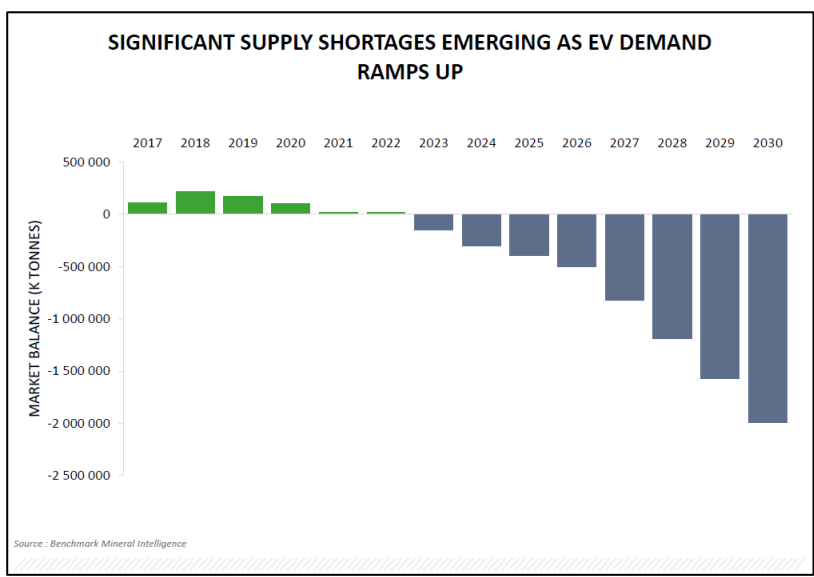
A number of commentators have presented estimates which suggest natural graphite demand should undergo similar asymptotic demand growth as we've seen from other battery raw materials. The following chart from Benchmark Mineral Intelligence (BMI) suggests growth in graphite demand into 2025 could outpace that of lithium,



nickel and cobalt. Graphite is an essential ingredient for rechargeable batteries whether NMC, NCA or LFP chemistries.



This growth in demand is forecast by BMI to result in a significant supply shortage, starting in 2023. This may well be exacerbated by a reluctance of some battery makers to source graphite from China. Our channel checks have highlighted that US Government agencies are unable to source graphite from Chinese producers.



It could be argued that the battery makers will offset an inevitable price rise in natural graphite to synthetic graphite. However much of the world’s synthetic graphite is sourced from China. Does this represent a threat to natural graphite? Production of synthetic graphite is very energy intensive where costs will have accelerated in recent months as China looks to manage its own energy crisis. The current ratio of natural to synthetic graphite is currently around 50:50, but many observers see this increasing to 70:30 as secure sources of suitable product are obtained outside China.

With the progressive maturity of the Chinese graphite industry and the likely closure of the Imerys Lac-des-Isles mine in 2022, larger flake products appear to be under increasing supply shortage. In the case of EV1’s Chilalo project, not only is around 50% of the Chilalo product coarse flake, the graphite itself has a specific set of properties, particularly its expandability.

Expandable graphite is a form of intercalated graphite. Intercalation is a process whereby an intercalant material is inserted (under high temperatures and pressures) between the graphene layers of a graphite crystal or particle. After intercalation the resulting graphite material takes on new properties that are a function of the intercalant and the way it associates with the host (graphite) species. Both physical and chemical properties, including crystallographic structure, surface area, density, electronic properties, expansion behaviour, chemical reactivity, etc., may be affected by the intercalant. It is invaluable for heat sinks and shields when fabricated into graphite foil. The average iPhone, for example, contains a few grams of expandable graphite.

We understand that historical demand for expandable graphite has been relatively small and is used in graphite sheet and foil for use as heat shields in electronics, and in gaskets and seals. However, the size of the prize might be large. EV1 speak of a potential market of several hundred thousand tonnes (or perhaps more) per year in China alone, providing expandable graphite into the manufacturing of flame retardant building materials. We are told that the Chinese government has recommended the use of graphite-bearing construction materials for all new buildings, effectively as a fire retardant. As a result of a major explosion and subsequent fires in Tianjin in 2015, China was used as an example where substandard building products saw huge property damage, and multiple deaths. We have cross checked these views with others in the graphite market and confirm that this emerging demand is real.

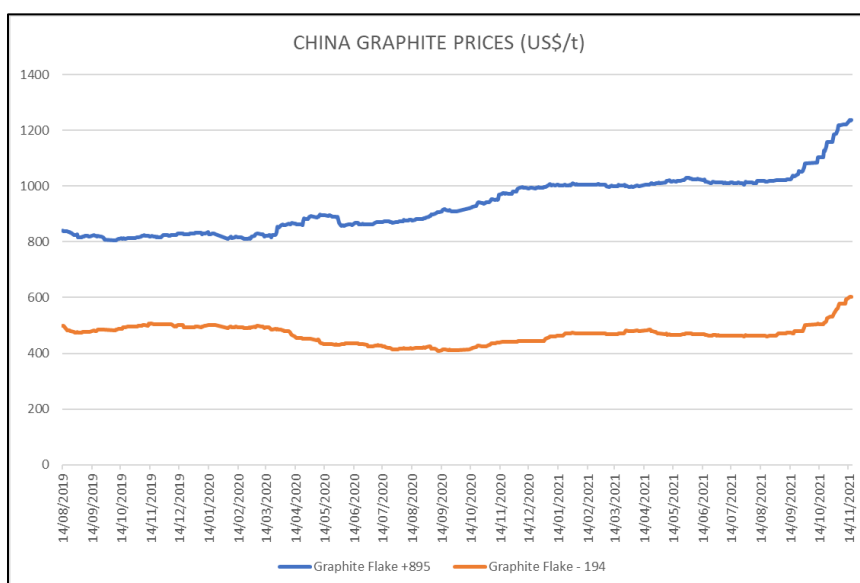
The current demand for natural graphite globally for all applications is circa 0.9-1 million tonnes. China produces approximately 70% of global graphite, however its reserves of coarse flake graphite and graphite capable of expansion appear to be rapidly diminishing. So with a potential market exceeding hundreds of thousands of tonnes, and diminished Chinese reserves capable of meeting that demand, it should come as no surprise that the use of expandable graphite in, for example, graphite-based fire retardant building foam is limited by supply

### Conclusion

If we are to believe BMI, the world will need perhaps 1 million tonnes of additional graphite supply in one form or another over the next 5 years. To us, it's hard to see where that will come from. China's graphite industry is now mature and environmental constraints have forced consolidation of that industry. Moreover, the US (and possibly Europe) will be reluctant buyers from Chinese producers.

There are few new shovel-ready graphite projects globally to meet the forecast demand. This suggests to us that prices should move up to levels to incentivise new production.

Graphite pricing has been weak earlier in the year, largely in response to the slowdown of the Chinese steel industry we understand. (Graphite is an important refractory material). However, prices do look like they are now turning. In the following chart coarse flake is +895 (+80 mesh, 95% TGC); fines are the -194 (-100 mesh, 94% TGC).



Source: Benchmark Mineral Intelligence

## Appendix 2

### The Tanzanian situation

In July 2017, the Tanzanian Government introduced major and disruptive changes to the Tanzanian mining act under the direction of then president John Magufuli. This was largely fuelled by a dispute with local gold miner, Acacia Minerals, a subsidiary of gold giant, Barrick. These changes caused major uncertainties within Tanzania and there were significant delays in finalising details associated with the new mining act, and the granting of new tenements. Furthermore, there were actions covering retention licences which were broadly interpreted as nationalising mining assets.

President Samia Suluhu Hassan was sworn in on March 19, 2021 as the first woman president, following the death of Magufuli. The new administration has maintained continuity of the political agenda while adjusting its policies and programs to reflect an evolving social and economic context according to recent World Bank commentary. The broad policy objectives of the new government remain guided by the Tanzania Development Vision 2025 and its supporting five-year development plans.

EV1's predecessor (and others in country) bent over backwards to accommodate what we judge are tough fiscal imposts on the mining industry. The worst of these unquestionably is the 16% free carried interest to be gifted to the state, in return for approval to mine and export (which is built into our valuation). The company has approvals to export graphite concentrate, has accommodated local content requirements (where it is able) and has put in place what appears to be acceptable local banking arrangements.

It should be noted that EV1 received its Mining Licence in February 2017 and had already received its environmental approvals and so its tenure position has never been in question. All mining and prospecting licences have been transferred to EV1.

There have been several positive events in recent days including the issuing of special mining leases and signing of Framework Agreements for several of the larger projects in Tanzania, including Orecorp's flagship gold project, Nyanzaga, Strandline's Funconi mineral sands project and Peak's Ngualla rare earths project.

In recent days we have seen mining giant BHP invest some \$90m into the world class Kabanga nickel project in western Tanzania. This is to be invested in 2 tranches and would take BHP to 17.8% of Kabanga (which in turn owns 84% of the project with the Tanzania government).

Finally, the country now appears to have re-opened for the miners.

EV1 reported in its recent prospectus that a prospecting licence surrounding Chilalo had been cancelled by the Tanzanian Mines Department. This has since been rectified by the Department and EV1 holds valid title to all mining and exploration tenements covering and surrounding Chilalo.

## Appendix 3

### ARCH Sustainable Resources Fund LP

Evolution has been successful in attracting the ARCH Sustainable Resources Fund LP as a cornerstone investor, investing A\$10m for a 25% stake in the company. We understand that Evolution is one of the early investments for the fund. An extensive period of due diligence was undertaken by ARCH prior to investment.

ARCH Emerging Markets Partners was founded in 2018 to advise on private equity investments. It is a specialist emerging markets investment advisor with deep experience of emerging markets, private equity, asset management and legal and governance matters.

In 2018 Patrice Motsepe's African Rainbow Capital joined ARCH as a 50% shareholder. Motsepe is one of Africa's wealthiest men, having founded diversified miner African Rainbow Minerals (ARM:JSE) as South Africa's first black-owned mining company.

ARCH raises and invests private capital in emerging markets to aid their rapid transition to low carbon, climate resilient and sustainable economies. This is done in support of the COP 21 Paris Agreement, in contribution to the UN Sustainable Development Goals and with respect to human rights in line with the UN Guiding Principles on Business and Human Rights.

In 2019 ARCH launched its Africa Renewable Power Fund and later that year ARCH Cold Chain Solutions (an investment fund focussed on East African supply chains). It has since gone on to establish a resources strategy, the Sustainable Resources Fund. It has offices in London, Nairobi (Kenya) and Abidjan (Cote d'Ivoire), while the first funds have a sub-Saharan Africa remit, the Sustainable Resources Fund is a global investor.

The Resources Fund states that it seeks opportunities where the management and governance are of a high calibre, interests are aligned and where the commodity's medium to long-term fundamentals are sound. Candidates for investment are to be low on the cost curve with potential to be medium to large size operations and with an ESG licence to operate in a fully sustainable fashion. Target commodities are those that are "part of creating a green sustainable future for the planet".

We understand that the ARCH funds attract investment from other world-leading investment managers who are seeking to enhance their returns with a sustainable overlay. It is possible that investments made by ARCH may also be made by ARCH's investors themselves. ARCH funds allow their LP's co invest. It could be that the Renewable Power Fund can provide capital for the project. We understand that ARCH is actively looking at a group of institutional investors in Europe that can co-invest. We believe there has been a good deal of interest in this approach.

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Dr Chris Baker, an authorised representative of BSCP, certifies that the advice in this report reflects his honest view of the company. He has 29 years investment experience in wholesale capital markets. He worked as a mining analyst for brokers BZW and UBS for 11 years and has a further 16 years' experience as a mining analyst and portfolio manager with Colonial First State and Caledonia Investments. He now provides independent financial advice on a part time basis. He may own securities in companies he recommends but will declare this when providing advice. He currently owns shares in EV1. He is remunerated by BSCP but is not paid a specific fee for providing this report. BSCP are Corporate Advisors to parent company Marvel Gold (MVL) and receive fees from MVL for services provided. BSCP, its directors and consultants may own shares and options in EV1 and may, from time to time, buy and sell the securities of EV1.

BSCP earned fees from capital raisings undertaken by EV1.

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