

# Volt Resources

## High-ranking East African graphite project

Initiation of coverage

Metals & mining

15 March 2017

**Price** **A\$0.04**

**Market cap** **A\$39m**

US\$/A\$0.76

Net cash (A\$m) at 31 December 2016 3.0

Shares in issue 976m

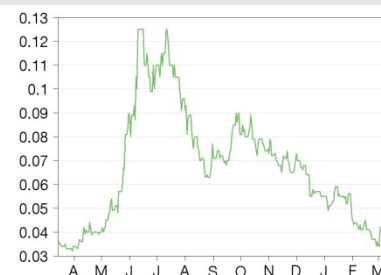
Free float 72%

Code VRC

Primary exchange ASX

Secondary exchange N/A

### Share price performance



% 1m 3m 12m

Abs (20.5) (45.3) (2.8)

Rel (local) (20.3) (46.8) (12.1)

52-week high/low NIS0.13 NIS0.03

### Business description

Volt Resources is a graphite development company. Its main asset is the currently 100%-owned Namangale graphite project located in Tanzania. The company has completed a PFS, is now undertaking an FS and intends to initiate first graphite production by 2019. Volt is currently debt free.

### Next events

Special mining licence Q317

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**Volt Resources is a research client of Edison Investment Research Limited**

Volt's recent pre-feasibility study on Namangale outlines a 170ktpa operation feeding a high-purity graphite concentrate into the lithium-ion battery (LiB) and expandable graphite end-markets. We have compared Namangale to six of the most advanced East African graphite projects and note Volt's high ranking in terms of estimated operating margin and concentrate purity. We note the project's slightly above average capital intensity, but also that it is c 17% lower than Magnis Resources' BFS-stage Nachu project situated close by. We initiate coverage on Volt with a fully diluted (50/50 debt/equity split) valuation of A\$264m or 27 cents per share, using a 10% discount rate and US\$1,684/t concentrate basket price. Volt has also secured a binding off-take agreement with a graphene developer, which we view as technically de-risking Namangale graphite for use in high-value and high-tech applications.

| Year end | Revenue (A\$m) | PBT* (A\$m) | EPS* (c) | DPS (c) | P/E (x) | Yield (%) |
|----------|----------------|-------------|----------|---------|---------|-----------|
| 06/15    | 0.0            | (0.7)       | (0.3)    | 0.0     | N/A     | N/A       |
| 06/16    | 0.0            | (3.3)       | (0.7)    | 0.0     | N/A     | N/A       |
| 06/17e   | 0.0            | (2.4)       | (0.2)    | 0.0     | N/A     | N/A       |
| 06/18e   | 0.0            | (12.9)      | (1.3)    | 0.0     | N/A     | N/A       |

Note: \*PBT and EPS are normalised, excluding amortisation of acquired intangibles, exceptional items and share-based payments.

## Met works positive for Namangale battery product

Metallurgical test work to date confirms Namangale as an attractive, natural source of battery-grade and expandable-grade graphite. With the current size of the natural flake market being c 0.4Mtpa, this market would need to grow considerably to meet expected electric vehicle adoption. Conversely, the synthetic graphite market, dominated by Chinese production, is around 1.2Mtpa. With the adverse environmental issues this graphite type brings to green-tech applications, it would be highly advantageous for Volt to disrupt this market, if possible, with a meaningful supply of cheaper, natural high-purity graphite flake. Namangale is forecast by Volt to produce 170ktpa of graphite concentrate. Volt currently has one binding offtake agreement related to graphene (see page 11 for details) and non-binding MoUs with three Chinese battery makers. Conversion of these MoUs into binding commercial offtake agreements is critical to de-risking our revenue assumptions.

## Valuation: Fully diluted, assumes offtakes agreed

We base our mining, revenue, cost and capex schedules on Volt's 2016 Namangale PFS. We forecast first production to occur in CY19, following US\$173m plus our own US\$30m working capital assumption (A\$268m) capex spend over 2018 and 2019. To maintain maximum corporate financial leverage (net debt/[net debt+equity]) below 50%, we assume that Volt will have to raise no less than A\$93.0m in equity at the prevailing share price (equating to 157% dilution). On this basis, our base case valuation, using a US\$1,684/t basket price and a 10% discount rate, is 27 cents/share. All our valuations assume commercial binding offtake agreements are in place. For further details, see page 7 onwards.

## Investment summary

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### Company description: Tanzanian graphite

Volt Resources' Namangale graphite project is located in southern Tanzania, close to existing good infrastructure and proximal to available capacity at the coastal port of Mtwara. This region is host to a number of early- and advanced-stage graphite projects, and includes the western world's first large-scale graphite mine, Balama, operated by Syrah Resources (ASX:SYR). The December PFS outlined a 170ktpa flake graphite operation producing a suite of products that could be used in a wide range of industrial applications, especially the high-growth LiB battery manufacturing and expandable graphite applications.

### Valuation: Large-scale, long-term graphite for high-growth uses

We assume that Volt develops Namangale as outlined in its PFS. To maintain maximum corporate financial leverage (net debt/[net debt+equity]) below 50%, we assume that Volt will have to raise no less than A\$93.0m in equity at the prevailing share price (equating to 157% dilution). This then requires a maximum debt funding requirement of A\$141.4m as at end FY19. We assume the equity component is raised at Volt's prevailing share price of 3.7c, but expect this to rise as further de-risking events are announced to market (such as binding offtake agreements). On this basis, we value Volt's shares at 27 cents, which rises to 40 cents in 2021 following all development capex spread equally over 2018 and 2019. Based on the PFS, our model shows Namangale generating its highest earnings in the first four years of operation, due in large part to mining out the Namangale 2 deposit. Namangale 2 has a greater portion of jumbo and super jumbo flake sizes compared to Namangale 1, which provides the mainstay of production throughout the mine life.

### Financials: Fully funded to DFS

According to its quarterly cash flow and activities report, Volt ended the half year to Dec 2016 with cash of A\$2.97m. This included cash outflows ytd of A\$4.2m relating to Namangale PFS expenditure. Volt estimates total cash outflows of A\$1.6m for Q317 as it advances the Namangale DFS and continues engaging with potential end-users of its graphite, and we therefore estimate that Volt will finish the year with A\$1.3m in cash.

### Sensitivities: Large output needs to disrupt synthetic market

Volt's Namangale PFS demonstrates project economics based on a  $\pm 25\%$  cost accuracy. Further, it uses graphite product price assumptions from third-party consultants and not as provided by commercial binding offtake agreements. With accuracy to be refined as a matter of course by the definitive feasibility study, to  $\pm 10\%$  currently underway, it is the product offtake agreements that require the company's greatest focus to de-risk our valuation. From the current understanding of Namangale, we believe that the graphite produced could be used for LiB manufacturing (its purity levels after simple flotation and its resource size tackle both the purity and potentially the consistency of supply concerns held by end-users). We also stress that in terms of graphite, a commodity with little large-scale development history in the junior mining space, certain of these development risks are more prevalent than others (see page 9).

## **Namangale well positioned to feed LiB market**

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ASX-listed Volt Resources (formerly Mozambi Resources) holds tenements over ground containing graphitic carbon in Tanzania. Its flagship project is Namangale in Tanzania, located 50km from Magnis Resources' (BFS-stage) Nachu Graphite Project (ASX:MNS, market cap A\$252m at 15 March). Publication of the PFS for Namangale in December 2016 has provided the market with the first real indication of project operating and capital costs, and defined an economic ore reserve. The calculation of an ore reserve has more significance in terms of mining out a commodity that has no open market on which to trade. This is because a reserve calculation has to use product price assumptions to define the amount of the mineral resource that can be mined out economically. Further, it should reflect the pricing data received by the company from its end-user negotiations.

## **Binding offtake agreement secured, a technical de-risking event**

Volt announced on 3 March 2017 that it has secured a binding offtake agreement with a small, private pre-revenue New York-based graphene company called Nano Graphene. This agreement sees Volt providing early stage (pre-main phase mining at Namangale, potentially as early as 2018) extraction of small volumes of graphite, which will then be sold to Nano Graphene. This is significant in that a binding offtake agreement has been secured for Volt, a step ahead of many graphite companies. Although this binding offtake agreement is not related to lithium-ion battery manufacture, it does suggest that Namangale graphite is of a high enough quality and suitable for graphene development and, further, secures some early-stage small cash flows. The agreement sees Volt providing Nano Graphene 5,000 of premium-quality Namangale flake graphite concentrate over a five-year period at a price that is "at a premium to the Volt Resources PFS basket price of US\$1,684/t"; this implies at least gross revenues of US\$1.68m pa. We have not yet included these revenues in our financial model because the costs required to extract graphite to fulfil this agreement have not yet been disclosed. At the current time of writing, we do not expect our base case valuation to change significantly based on this offtake agreement.

As stated above, and probably of the most significance to Volt, Nano Graphene has validated, through its own testing, Namangale concentrate to be suitable for its graphene uses, regardless of particle size. Although still small and early stage, with many of the potential uses still to be proven viable in the laboratory, graphene is a very important industry. However, we caution as to the potential scale and importance it will have for the overall graphite mining sector. With graphene applications only requiring a few per cent replacement of the base material, the volumes required will be analogous to the use of rare earth elements in electronics and magnets. Whereas supply dominance still exists in rare earths with China the main producer, the same situation does not exist in graphite.

Further, one major caveat exists: the method for producing graphene products at industrial scales is still to be confirmed viable – this is the holy grail that graphene companies are chasing. Nano Graphene states on its website that it has a patented production method that is environmentally benign – in simplistic terms it uses water and cavitation techniques to exfoliate graphene from raw graphite.

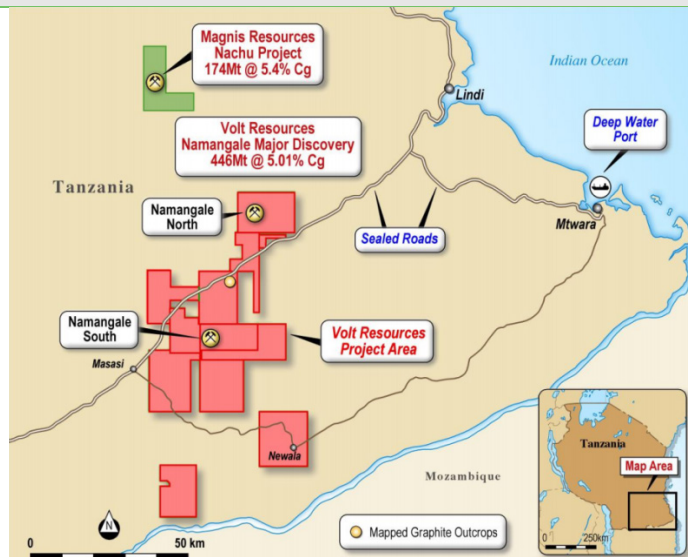
If it proves successful, Nano Graphene will unlock significant commercial value in graphene and open the door to a vast range of applications including, inter alia, large-scale, near-frictionless coatings (for use in any of the transport industries), or any number of nanotechnology applications.

## **Furthering our understanding of LiB graphite market needs**

Namangale is a project that has recently seen a 108% increase in its total resource, which now stands at 461Mt at 4.9% total graphitic carbon (TGC). Importantly, the resource carries a significant portion in the highly valued larger-size categories.

Larger-size fractions have been widely accepted as being the best for use in the manufacture of lithium-ion batteries, a market which is expected to see double-digit growth on the back of the anticipated high growth in the electric vehicle market (see Graphite uses and demand on page 8 of [Graphite for batteries – Value in natural graphite](#)). However, our further research of the graphite sector sees no definitive evidence for as to why smaller flake sizes cannot be used in LiB manufacturing processes, as long as purity and consistency of supply are maintained at appropriate levels (and before any purification to at least 99.95% TGC). However, we do note that the very fine size fraction of graphite resources (including the ‘amorphous’ or cryptocrystalline size fraction) usually provides for a concentrate grade lower than for concentrates using the larger flake sizes. However, even in this regard the point is not definitive and some graphite deposits exhibit concentrate grades above 95% TGC even for the amorphous size fraction (eg certain Triton Resources and Magnis Resources metallurgical test data support this). Of far greater importance to end-users of graphite is the level and internal morphology of impurities. It is also important to note that larger flake sizes can have interstitial contaminants which, if the flake size is reduced through grinding, could be released into the concentrate.

**Exhibit 1: Volt’s Namangale project areas and resource size relative to Magnis Resources**



Source: Volt Resources

## Pushing Namangale towards production

As a means to expedite development of its flagship Namangale project, Volt has formed a team of engineers earlier than usual in the project development process to manage the necessary pre-development assessments and technical studies required to confirm the economic viability of the project. The first meaningful report was the pre-feasibility study (PFS) published in December 2016, which forms the basis of our valuation of Volt. Volt’s recent announcements provide a number of project advancements, including:

- New CEO Trevor Matthews appointed from 1 January 2017.
- Completion of stakeholder workshop in Tanzania.
- Formal request made for port access facilities and land and facilities lease at Mtwara.
- Battery grade (ie >99.9% TGC) achieved from Namangale pre-purification graphite concentrate.
- Numerous marketing and site visit trips made by senior management. Volt’s marketing consultant, Michael Lew, had meetings with more than 20 groups in the electric vehicle supply chain, with many requesting graphite samples. Feedback from a leading US battery manufacturer on a Namangale graphite sample reported conductivity results that were an order

of magnitude higher than the base line it was tested against. Further, Namangale graphite has shown good expandability test results for its potential use in, mainly, fire-retardant applications.

### **Getting MoU agreements in place – Chinese tech companies on board**

Crucially, as graphite sells via bilateral, long- and short-term agreements between producer and end-user, Volt has agreed MoUs with three Chinese end-users of graphite. These were signed with Optimum Nano, Huzhou Chuangya and Shenzhen Sinuo. All of these companies operate in the LiB market and could be seen as an endorsement of Namangale's high resource value, attributed to its higher than average proportion of battery-applicable larger graphite flake sizes. The MoUs are currently non-binding and require conversion into commercial offtake agreements before project financing can be obtained and future Namangale revenues are guaranteed. The combined total graphite offtake contained in these non-binding MoUs amounts to 100kt pa. The total annual output of graphite from Namangale is 170kt pa.

### **Magnis Resources: A proxy for a medium-term re-rating of Volt?**

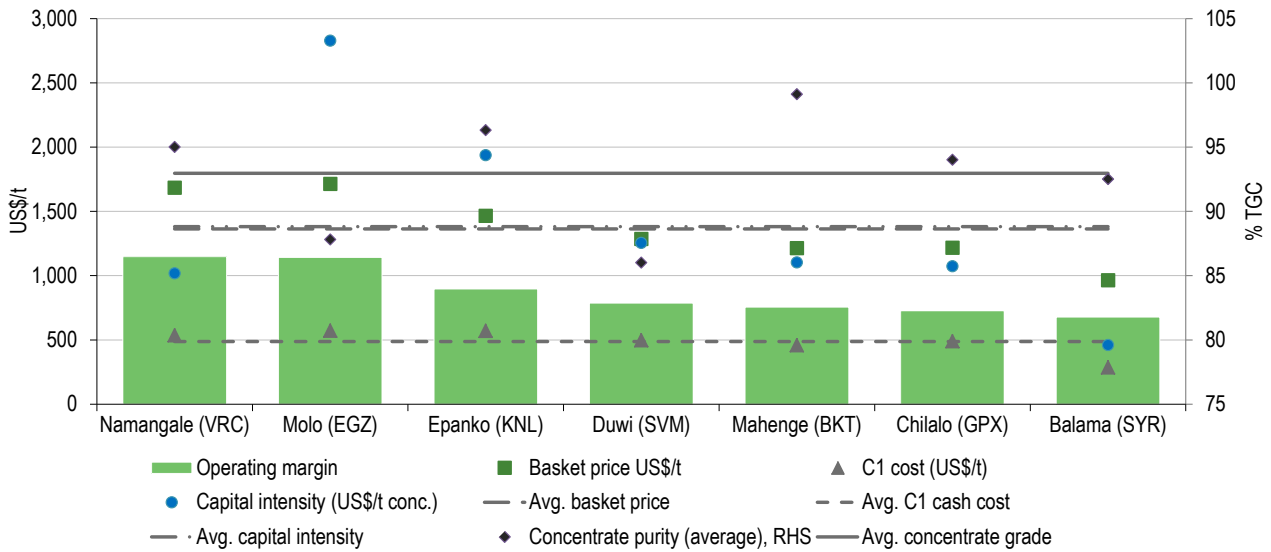
Notable for being located adjacent to the north of Volt's Namangale project areas (see Exhibit 1) is the Nachu project owned by ASX-listed Magnis Resources. Magnis has a market cap of A\$252m (at 15 March 2017) and yet has a resource 39% of the size of Volt's Namangale resource. Nachu has a comparable TGC grade of 5.4% vs Namangale's 4.9%. However, Magnis's Nachu project is much further advanced than Namangale, with a bankable feasibility study completed in March 2016, a demonstrable flow sheet design to produce a battery-grade spherical graphite product and all regulatory and environmental permits finalised. On the basis of this resource size (gross tonnage) differential alone, Volt's shares should see a considerable re-rating when it achieves the same level of development as Nachu – a timeline that Volt has, as stated previously, sought to expedite. Magnis Resource's current market cap of A\$252m compares with Volt's current market capitalisation of A\$39m.

### **Peer comparison – Namangale ranks highly**

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East African graphite deposits are numerous and highly varied in their deposit and economic characteristics. This is due in large part to the secondary metamorphic processes that govern their formation and the way these characteristics relate to the end-markets into which the graphite end-products are sold (deposit flake size distribution, among other things).

**Exhibit 2: East African graphite project peer comparison**



Source: Company data, Edison Investment Research

As a result of the variability of deposits and the lack of an open market on which products are sold, EV/t valuations are far too simplistic as a means of comparing one peer with another. To attempt to compare these highly variable graphite deposits, we have looked at the most advanced of the East African graphite deposits, ie those with at least a first-pass understanding of their deposits and economic viability.

Of the seven most advanced East African graphite projects we highlight above, Namangale compares very favourably in terms of operating margin (first), basket price (second) and concentrate purity (third, although these values are likely to be refined further). On the basis of the estimated C1 equivalent unit cash costs for each of these projects, Namangale ranks fifth. However, any improvement to the mining schedule by defining greater amounts of higher-value graphite (Volt is currently drilling at Namangale 2 to do just this) may improve Volt's C1 cash costs. Further, the spread of C1 costs (omitting Balama's estimated US\$286/t concentrate as an outlier to the data set), is narrow, from US\$458/t (Mahenge) to US\$571/t (Molo), ie US\$113. Namangale's US\$536/t sits only 4% above the median value for C1 cast costs of US\$515/t. Note: all project data are estimated at the current time; Balama is still under construction and yet to operate.

We omit Magnis Resources from this comparison as it has recently cancelled all its Chinese MoUs and replaced them with a combined financing and offtake MoU for its super jumbo and jumbo sized graphite products, with Russian state nuclear company ROSATOM. As there is no detail from this announcement as to the prices Nachu's products would fetch, we have excluded this project from our comparison. However, for reference, in terms of its concentrate purity of 98.3% it would rank second next to Mahenge's 99.1%, and in terms of capital intensity it would rank fourth at US\$1,223/t.

## Resources and reserves – enough for decades

Volt Resources has one of the largest graphite resources in the world. With a total (across all resource categories) of 461Mt at 4.9% TGC, its Namangale project provides one of the largest resources of graphite anywhere, and further, its size distribution provides for a large proportion of the resource to be used for the high-value end-markets.



**Exhibit 3: Namangale’s JORC compliant resources and reserves**

| Namangale Project | Mt  | TGC (%) | Contained graphite (Mt) | Ore reserve         | Ore (Mt) | TGC (%) | Contained graphite (Mt) |
|-------------------|-----|---------|-------------------------|---------------------|----------|---------|-------------------------|
|                   |     |         |                         | Proved              |          |         |                         |
| Inferred          | 264 | 5.0     | 13.2                    | Namangale 1 (North) | 19.3     | 4.32    | 0.8                     |
| North             | 23  | 3.6     | 0.8                     | Namangale 2 (South) | 0        | 0       | 0                       |
| South             | 287 | 4.9     | 14.1                    | Namangale 3 (South) | 0        | 0       | 0                       |
|                   |     |         |                         | Subtotal - proved   | 19.3     | 4.32    | 0.8                     |
|                   |     |         |                         | Indicated           |          |         |                         |
| North             | 122 | 5.2     | 6.3                     |                     |          |         |                         |
| South             | 33  | 4.3     | 1.4                     |                     |          |         |                         |
| Total indicated   | 155 | 5.0     | 7.8                     |                     |          |         |                         |
|                   |     |         |                         | Probable            |          |         |                         |
|                   |     |         |                         | Namangale 1 (North) | 95.8     | 4.40    | 4.2                     |
|                   |     |         |                         | Namangale 2 (South) | 6.4      | 5.11    | 0.3                     |
|                   |     |         |                         | Namangale 3 (South) | 5.8      | 3.05    | 0.2                     |
|                   |     |         |                         | Subtotal - probable | 108.1    | 4.37    | 4.7                     |
| Grand total       | 461 | 4.9     | 22.6                    | Total ore reserve   | 127.4    | 4.36    | 5.6                     |

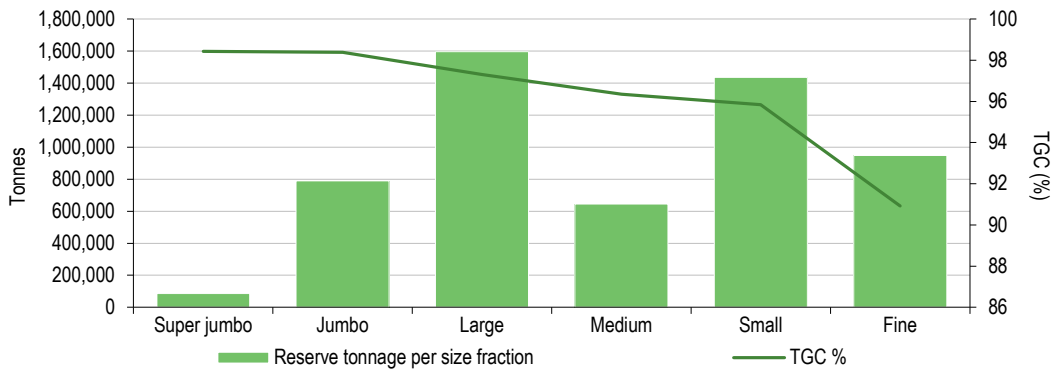
Source: Volt Resources

The following exhibit overlays Volt’s current understanding of particle size distribution as detailed in its metallurgical test data announcements, with its reserve estimate published as part of the December 2016 Namangale PFS.

**Exhibit 4: Namangale PFS flake size distribution across deposits 1-3**

|             | Namangale 1 (%) | Namangale 2 (%) | Namangale 3 (%) |
|-------------|-----------------|-----------------|-----------------|
| Super jumbo | 1               | 9               | 5               |
| Jumbo       | 13              | 29              | 26              |
| Large       | 29              | 29              | 30              |
| Medium      | 12              | 8               | 10              |
| Small       | 27              | 16              | 19              |
| Fine        | 18              | 9               | 11              |

Source: Company announcement

**Exhibit 5: Edison’s interpretation of Volt’s JORC reserve per flake size category**


Source: Company data, Edison Investment Research. Note: Reserve covers Namangale deposits 1-3.

We have also included the total graphitic carbon content for each size fraction (green line in Exhibit 5 above). Whereas before the Namangale PFS announcement, the project was being touted as mainly comprising the very largest flake sizes, it can be seen from Exhibit 5 above that a significant portion of the current mineral resource resides in smaller, and potentially lower-value size fractions. Again, we stress that we have found no definitive argument for why smaller flake sizes cannot be used in LiB manufacturing processes, as long as purity and consistency of supply are maintained at appropriate levels.

## Concentrate purities – expect these to be refined further

We advise caution as to the use of the concentrate purity grades stated in our peer comparison. We have looked to standardise data wherever possible; however, we note the lack of representative concentrate purity data across entire deposits. For example, the 99.1% concentrate purity value for Mahenge is a maximum value stated by the company and it is highly unlikely that this flotation test result will be found to be representative of the entire deposit. Conversely, Duwi's 86% TGC purity value is taken as the midpoint of Sovereign Metals' stated 83-89% range. This company states that the test was conducted using an open circuit. As such, some graphite will have gone to waste, when in reality scavengers would be used to recycle and recover any graphite not caught during the first pass of processing. In short, concentrate purity grades are likely to be refined further as more project data become available. Also, if we consider that certain rare earths projects can modify back-end processing designs right up to construction without compromising development timetables or project viability, we expect graphite process investigations to be conducted in a similar fashion. This will of course require ownership of a pilot plant such that these processing refinements can be managed concurrently with binding commercial offtake partner negotiations.

The industry threshold in terms of flotation concentrate purity for LiB production is stated at 95% total graphitic carbon. This is the threshold for concentrates to then be taken and further purified to 99.95% TGC, the purity level required for LiB manufacture. We have not found clear evidence that flake size is a critical path factor in determining the suitability for graphite to be used for LiB production. This bodes well for Namangale, which has a significant portion of its resource under 150 micron, the flake size threshold usually considered as required for LiB manufacturing, which probably reflects the general weakening of the concentrate purity below this particle size level.

## Valuation

We have used the outcome of the Namangale PFS as the basis for our valuation and set out the key parameters in Exhibit 6 below.

| Exhibit 6: Base case valuation assumptions using Namangale PFS values |                                      |                       |
|---|--------------------------------------|-----------------------|
|   |                                      | VRC PFS December 2016 |
| Key project parameters  | Units                                | Value                 |
| Resources   | mt, % TGC                            | 461mt @ 4.9%          |
| Reserves  | mt, % TGC                            | 127.4mt @ 4.4%        |
| Initial life of mine  | years                                | 22                    |
| Total mined ore   | Mt                                   | 83.4                  |
| Strip ratio   | LOM average                          | 1.4                   |
| Plant throughput  | mtpa                                 | 3.8                   |
| Feed grade  | % TGC, LOM average                   | 4.7                   |
| Recovery  | LOM average                          | 93                    |
| Graphite concentrate production                                       | ktpa, LOM average                    | 170                   |
| Avg. concentrate purity   | % TGC                                | 95                    |
| Cash cost   | US\$/t conc FOB Mtwara, LOM, average | 536                   |
| Pre-production capital  | US\$m                                | 173                   |
| Sustaining capital  | US\$m                                | TBC                   |
| Weighted average basket price   | US\$/t conc FOB                      | 1,684                 |

Source: Volt Resources Namangale PFS

## Basket prices

The company states that once Namangale is in operation, it will produce two products: a larger 'premium quality' product from Namangale South (comprising deposits 1 and 2) and a lower-quality product from Namangale North (comprising graphite from deposit number 3). The following exhibit is based on graphite product prices forecast by Benchmark Mineral Intelligence, Industrial Minerals Research, Macquarie Investments and discussions with industry end-users. Based on these



forecasts, the weighted average basket price across Namangale North and South is US\$1,684/t. As the graphite market is opaque and bilateral offtake agreements are signed between producer and end-user (with agreed prices often omitted for reasons of market confidentiality), we have used this basket price and provided a revenue sensitivity analysis on page 10.

**Exhibit 7: Graphite prices used in the Namangale PFS**

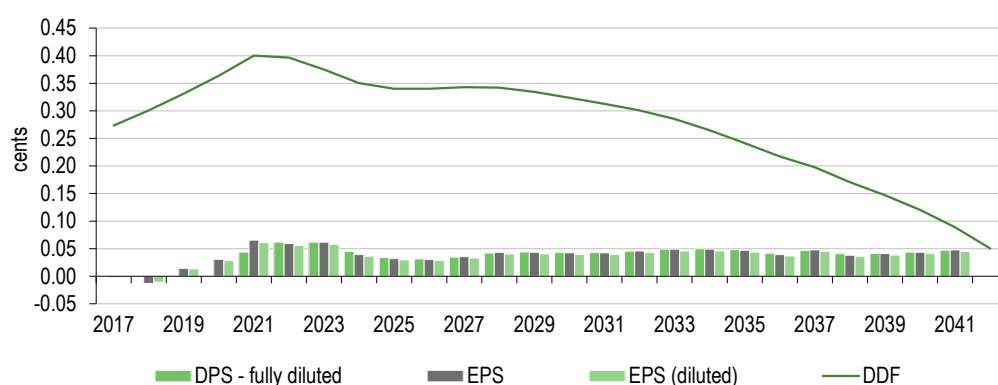
| Size  | Label       | Namangale 1 |        | Namangale 2 |        | Namangale 3 |        |       |
|---|-------------|-------------|--------|-------------|--------|-------------|--------|-------|
|   |             | Weight      | Price  | Weight      | Price  | Weight      | Price  |       |
| µm  |             | %           | US\$/t | %           | US\$/t | %           | US\$/t |       |
| +500  | Super jumbo | 1           | 3,968  | 9           | 3,968  | 5           | 3,968  |       |
| 300   | Jumbo       | 13          | 3,220  | 29          | 3,220  | 26          | 3,220  |       |
| 180   | Large       | 29          | 2,070  | 29          | 2,070  | 30          | 2,070  |       |
| 150   | Medium      | 12          | 1,389  | 8           | 1,389  | 10          | 1,389  |       |
| 75  | Small       | 27          | 1,077  | 16          | 1,077  | 19          | 1,077  |       |
| -75   | Fine        | 18          | 403    | 9           | 403    | 11          | 403    |       |
| Total   |             |             | 1,594  |             | 2,205  |             | 2,032  |       |
| Weighted average 'blended' basket price across all deposits |             |             |        |             |        |             |        | 1,684 |

Source: Volt Resources Namangale PFS

## Funding assumption and DDF valuation

We assume that Volt develops Namangale as outlined in its PFS and forecast US\$173m initial development capex plus our own US\$30m working capital assumption (ie totalling A\$268m at a US\$/A\$ forex rate of 0.76). To maintain maximum corporate financial leverage (net debt/[net debt+equity]) below 50%, we assume that Volt will have to raise no less than A\$93.0m in equity at the prevailing share price (equating to 157% dilution). We assume an interest charge on debt of 9%. On this basis, our estimate of theoretical DPS, EPS and dividend discount flow from 2017 through to the end of planned mining in 2041 is given in Exhibit 8 below.

**Exhibit 8: Edison's estimate of theoretical EPS, DPS and dividend discount flow (line)**



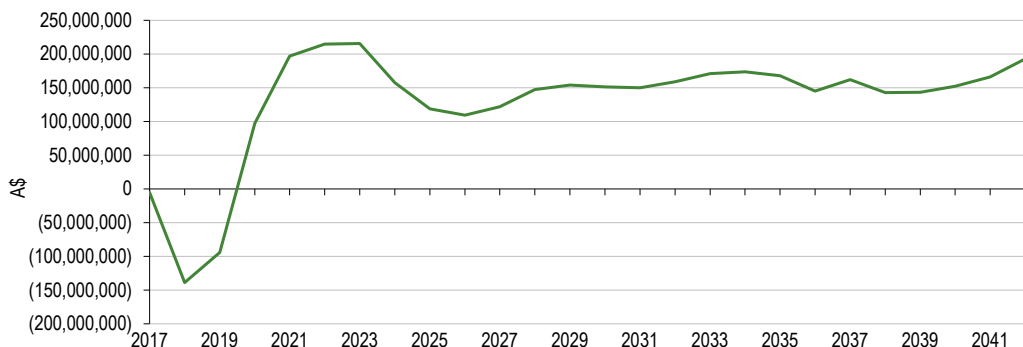
Source: Edison Investment Research

On this basis, we value Volt's shares at 27 cents, which then rises to 40 cents in 2021, following all development capex being fully committed in 2018 and 2019. As can be seen from the exhibit above, Namangale generates its highest earnings in the first four years of operation, due in large part to mining out the Namangale 2 deposit. Namangale 2 has a greater portion of jumbo and super jumbo flake sizes compared to Namangale 1, which provides the mainstay of production throughout the mine life.

Modifying the mining schedule to account for greater tonnages from the large-flake/higher-value Namangale 2 deposit moderately impacts on our valuation adding 5c, or 19%. This assumes no

mining from Namangale 3 takes place in years 7 (2025) to 9 (2027) of the mining schedule as detailed in the PFS, and instead 1.9Mtpa of Namangale 2 ore is mined from 2025 to 2029.

**Exhibit 9: Namangale cash flow profile 2017-43**



Source: Edison Investment Research

## Sensitivities

All mining equities are exposed to financial, engineering, geological, metallurgical, environmental and political and socio-economic risks, with these factors also the foundation of resource and reserve classifications. However, we stress that in terms of graphite, a commodity with little large-scale development history in the junior mining space, certain of the aforementioned development risks are more prevalent than others. The following sections highlight those qualitative and quantitative risks we consider most relevant to Volt:

- **Macro issues:** the current natural graphite market needs to expand significantly and future Namangale products need to be adequately pure and cost-effective to be competitive on the natural flake market, as well as potentially being able to disrupt existing synthetic graphite usage. The focus on environmental protection (especially in the dominant synthetic graphite-producing country, China) and the use of 'dirty' graphite in green technology and green energy applications, should also have broad appeal to companies wishing to prove themselves green to their respective customer bases and stakeholders.
- **Technical issues:** customers require graphite samples to prove suitability for their applications. Expandable graphite test results have been released and are broadly favourable for use in fire-retardant expandable graphite applications. Assessments on the use of Namangale graphite for LiB manufacturing have been underway for some time. Volt will need to maintain access to pilot testing for commercial offtake purposes throughout its development phase. Any delay in providing potential customers with sample products may have a critical impact on project financing. We see some technical de-risking of Namangale graphite as suitable for high-end technology applications through its binding offtake agreement with Nano Graphene (see page 3 for details).
- **Marketing and site visit trips made by senior management:** former CEO Stephen Hunt is continuing to develop negotiations in Asia and the three MoUs in place with Chinese battery developers. Volt's marketing consultant, Michael Lew, had meetings with more than 20 groups in North America relating to the electric vehicle supply chain, with many requesting graphite samples. Feedback from a leading US battery manufacturer on a Namangale graphite sample reported conductivity results that were an order of magnitude higher than the base line it was tested against. Further, Namangale graphite has shown good expandability test results for its potential use in, mainly, fire-retardant applications. Again, we see the Nano Graphene binding offtake agreement as supportive of management's ability to market Namangale material, and

we expect management to follow this agreement with far larger contracts put in place with battery developers.

- **Regulatory issues:** currently, and as per the PFS outcome, there is no free carried interest passed on to the Tanzanian government. We note that Magnis states a 5% free carried interest by the Tanzanian government. We await guidance by Volt's management as to what, if any, free carried interest is agreed when such negotiations take place.
- **Namangale's development needs to marry battery factory construction:** with Volt's PFS released in December 2016, the company is now tasked with completing a definitive feasibility study. Subject to option conversions, the company could be fully funded to complete its DFS. Dependent on a more accurate estimate of costs than is usually required by a PFS (ie  $\pm 25\%$ ), Volt could complete a DFS on Namangale by end 2017. It is not wholly uncommon for mining companies to incorporate DFS accuracy into their PFS to help shorten development timelines. The importance of expediting development for graphite (and lithium) is to be ready to supply feedstocks for the anticipated ramp-up in battery manufacturing production. This ramp-up, based solely on available published timelines for factory development, is likely to occur by the end of the decade, although it is heavily dependent on real demand for electric vehicles.
- **Concentrate purities:** as stated on page 8, concentrate purity values are likely to change as Volt completes further metallurgical test work on Namangale. The most definitive concentrate purity values will be outlined in the company's DFS, currently underway.
- **Tanzanian government free carry:** we note that Magnis uses a 5% free carried interest as required through its negotiations with the Tanzanian government. Every 5% increase in the free carried interest applied to our revenue, costs and capex, and proportionally consolidating these attributable values to Volt, results in a circa 1c change to our base case valuation.

The following quantitative sensitivity analysis of our base case valuation has been performed, with the following results.

| <b>Exhibit 10: Sensitivity to discount rate</b> |      |      |      |      |      |      |      |
|---|------|------|------|------|------|------|------|
| %   | 0    | 5    | 7.5  | 10   | 12.5 | 15   | 36   |
| NPV <sub>10</sub> (A\$)                         | 1.02 | 0.50 | 0.36 | 0.27 | 0.21 | 0.16 | 0.04 |
| Delta   | 278% | 85%  | 33%  | 0%   | -22% | -41% | -85% |

Source: Edison Investment Research

| <b>Exhibit 11: Sensitivity to percentage change in revenues</b> |      |      |      |      |      |      |      |
|---|------|------|------|------|------|------|------|
| % change in revenue   | -30  | -20  | -10  | 0    | +10  | +20  | +30  |
| NPV <sub>10</sub> (A\$)   | 0.13 | 0.17 | 0.22 | 0.27 | 0.32 | 0.37 | 0.42 |
| Delta   | -52% | -37% | -19% | 0%   | 19%  | 37%  | 56%  |

Source: Edison Investment Research

| <b>Exhibit 12: Sensitivity to change in equity raise price</b> |      |      |      |      |      |      |      |      |      |
|--|------|------|------|------|------|------|------|------|------|
| Sensitivity to change in equity raise price (A\$ cents)        | 0.5  | 1.0  | 2.0  | 3.7  | 7.5  | 10.0 | 12.5 | 15.0 | 17.5 |
| NPV <sub>10</sub> (A\$)  | 0.04 | 0.09 | 0.17 | 0.27 | 0.43 | 0.50 | 0.56 | 0.60 | 0.64 |
|  | -85% | -67% | -37% | 0%   | 59%  | 85%  | 107% | 122% | 137% |

Source: Edison Investment Research

| <b>Exhibit 13: Sensitivity to percentage change in operating costs</b> |      |      |      |      |      |      |      |
|--|------|------|------|------|------|------|------|
| % change in operating costs  | -30  | -20  | -10  | 0    | +10  | +20  | +30  |
| NPV <sub>10</sub> (A\$)  | 0.33 | 0.31 | 0.29 | 0.27 | 0.25 | 0.24 | 0.22 |
|  | 22%  | 15%  | 7%   | 0%   | -7%  | -11% | -19% |

Source: Edison Investment Research

## Financials

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According to Volt's quarterly cash flow and activities report, it ended the half year to December 2016 with cash of A\$2.97m. This included cash outflows ytd of A\$4.2m relating to Namangale PFS expenditures. Volt estimates total cash outflows of A\$1.6m for Q317 as it advances its Namangale DFS and continues engaging with potential end-users of its graphite. We therefore assume that Volt finishes FY17 with cash of A\$1.3m.

To maintain maximum corporate financial leverage (net debt/[net debt+equity]) below 50%, we assume that Volt will have to raise no less than A\$93.0m in equity at the prevailing share price. This then requires a maximum debt funding requirement of A\$141.4m as at end FY19. We assume the equity component is raised at Volt's prevailing share price of 3.7c, but expect this to rise as further de-risking events are announcement to market (such as binding offtake agreements). This would result in 2.5bn new shares, or 157% dilution.

**Exhibit 14: Financial summary**

| Accounts: IFRS, Year-end: 30 June, A\$000s       | 2015   | 2016         | 2017e   | 2018e    | 2019e    | 2020e    |
|--|--------|--------------|---------|----------|----------|----------|
| <b>Profit &amp; loss account</b>                 |        |              |         |          |          |          |
| Total revenues                                   | 0      | 0            | 0       | 0        | 116,641  | 230,972  |
| Cost of sales                                    | 0      | 0            | 0       | 0        | (32,709) | (64,770) |
| Gross profit                                     | 0      | 0            | 0       | 0        | 83,932   | 166,201  |
| SG&A (expenses)                                  | (668)  | (3,351)      | (2,275) | (2,229)  | (2,216)  | (2,222)  |
| Other income/(expense)                           | 0      | 0            | 0       | 0        | 0        | 0        |
| Exceptionals and adjustments                     |        | Exceptionals | 0       | 0        | 0        | 0        |
| Depreciation and amortisation                    | (3)    | 0            | (245)   | (10,733) | (10,733) | (10,733) |
| Reported EBIT                                    | (670)  | (3,351)      | (2,520) | (12,963) | 70,983   | 153,245  |
| Finance income/(expense)                         | 5      | 24           | 152     | 26       | 26       | 26       |
| Other income/(expense)                           | 0      | 0            | 0       | 0        | 0        | 0        |
| Exceptionals and adjustments                     |        | Exceptionals | 0       | 0        | 0        | 0        |
| Reported PBT                                     | (666)  | (3,327)      | (2,368) | (12,936) | 71,009   | 153,272  |
| Income tax expense (includes exceptionals)       | 0      | 0            | 0       | 0        | (21,303) | (45,982) |
| Profit from discontinued operations (net of tax) | 0      | (480)        | 0       | 0        | 0        | 0        |
| Reported net income                              | (666)  | (3,807)      | (2,368) | (12,936) | 49,706   | 107,290  |
| Basic average number of shares, m                | 244    | 583          | 968     | 976      | 3,490    | 3,490    |
| Basic EPS (cents)                                | (0.27) | (0.65)       | (0.24)  | (1.32)   | 1.42     | 3.07     |

**Balance sheet**

|                                  |       |        |        |         |         |         |
|----------------------------------|-------|--------|--------|---------|---------|---------|
| Property, plant and equipment    | 0     | 0      | 5,769  | 126,203 | 249,636 | 243,437 |
| Goodwill                         | 0     | 0      | 0      | 0       | 0       | 0       |
| Intangible assets                | 0     | 0      | 0      | 0       | 0       | 0       |
| Other non-current assets         | 703   | 10,773 | 10,773 | 10,773  | 10,773  | 10,773  |
| Total non-current assets         | 703   | 10,773 | 16,542 | 136,975 | 260,409 | 254,209 |
| Cash and equivalents             | 554   | 7,618  | 1,323  | 1,323   | 1,323   | 1,323   |
| Inventories                      | 0     | 0      | 0      | 0       | 9,720   | 19,248  |
| Trade and other receivables      | 17    | 104    | 208    | 416     | 9,587   | 18,984  |
| Other current assets             | 0     | 104    | 104    | 104     | 104     | 104     |
| Total current assets             | 571   | 7,826  | 1,635  | 1,843   | 20,734  | 39,658  |
| Non-current loans and borrowings | 0     | 0      | 0      | 131,262 | 137,186 | 39,886  |
| Other non-current liabilities    | 0     | 0      | 0      | 0       | 0       | 0       |
| Total non-current liabilities    | 0     | 0      | 0      | 131,262 | 137,186 | 39,886  |
| Trade and other payables         | 160   | 1,108  | 2,216  | 4,432   | 2,688   | 5,324   |
| Current loans and borrowings     | 0     | 0      | 0      | 0       | 0       | 0       |
| Other current liabilities        | 0     | 0      | 0      | 0       | 0       | 0       |
| Total current liabilities        | 160   | 1,108  | 2,216  | 4,432   | 2,688   | 5,324   |
| Equity attributable to company   | 1,336 | 17,707 | 16,177 | 3,340   | 141,484 | 248,875 |
| Non-controlling interest         | (222) | (216)  | (216)  | (216)   | (216)   | (216)   |

**Cash flow statement**

|   |       |         |         |           |           |          |
|---|-------|---------|---------|-----------|-----------|----------|
| Profit for the year                         | (666) | (3,807) | (2,368) | (12,936)  | 49,706    | 107,290  |
| Depreciation and amortisation               | 3     | 0       | 245     | 10,733    | 10,733    | 10,733   |
| Share based payments                        | 216   | 1,774   | 100     | 100       | 100       | 100      |
| Other adjustments                           | 3     | 554     | 0       | 0         | 0         | 0        |
| Movements in working capital                | 91    | 117     | 1,004   | 2,008     | (20,634)  | (16,289) |
| Cash from operations (CFO)                  | (353) | (1,362) | (1,019) | (95)      | 39,905    | 101,834  |
| Capex                                       | (24)  | (3,039) | (5,882) | (131,167) | (134,167) | (4,534)  |
| Acquisitions & disposals net                | (178) | (364)   | 0       | 0         | 0         | 0        |
| Other investing activities                  | 0     | 0       | (132)   | 0         | 0         | 0        |
| Cash used in investing activities (CFIA)    | (202) | (3,403) | (6,014) | (131,167) | (134,167) | (4,534)  |
| Net proceeds from issue of shares           | 590   | 11,829  | 546     | 0         | 88,338    | 0        |
| Movements in debt                           | 0     | 0       | 0       | 131,262   | 5,924     | (97,300) |
| Other financing activities                  | 0     | 0       | 192     | 0         | 0         | 0        |
| Cash from financing activities (CFF)        | 590   | 11,829  | 738     | 131,262   | 94,261    | (97,300) |
| Currency translation differences and other  | 0     | 0       | 0       | 0         | 0         | 0        |
| Increase/(decrease) in cash and equivalents | 36    | 7,064   | (6,295) | 0         | 0         | 0        |
| Cash and equivalents at end of period       | 554   | 7,618   | 1,323   | 1,323     | 1,323     | 1,323    |
| Net (debt) cash                             | 554   | 7,618   | 1,323   | (129,939) | (135,863) | (38,563) |
| Movement in net (debt) cash over period     | 554   | 7,064   | (6,295) | (131,262) | (5,924)   | 97,300   |

Source: Company accounts, Edison Investment Research

|   |  |   |            |
|---|--|---|------------|
| <b>Contact details</b>  |  | <b>Revenue by geography</b>   |            |
| Level 5, London House<br>216 St. Georges Terrace<br>Perth WA 6000<br>Australia<br>+61 (08) 9486 7788<br>www.voltresources.com   |  | N/A   |            |
| <b>Management team</b>  |  |   |            |
| <b>CEO: Trevor Matthews</b>   |  | <b>Chairman: Stephen Hunt</b>   |            |
| Mr Matthews has an accounting and finance background with over 25 years' experience in the resources industry including roles with North and WMC Resources in executive-level positions. More recently, his last two roles were as MD for MZI Resources (2012-16) and Murchison Metals (2005-11). |  | Mr Hunt has more than 25 years' experience in the marketing of steel and mineral products worldwide. His career includes 15 years at BHP Billiton, where he spent five years in the London office marketing minerals to European and Middle Eastern customers.              |            |
| <b>Non-executive director: Mathew Bull</b>  |  | <b>Non-executive director: Alwyn Vorster</b>  |            |
| Mr Bull has a BSc in Geology and Geophysics with over 10 years' experience in the mining and exploration industry. He has worked in a wide range of commodities including graphite, gold and iron ore.  |  | Mr Vorster is a mining professional with more than 25 years' experience working with numerous large and smaller mining companies in technical and commercial roles covering the total supply chain from geology, mining, rail and port and shipping to marketing and sales. |            |
| <b>Principal shareholders</b>   |  |   | <b>(%)</b> |
| Kabunga Holdings  |  |   | 14.8       |
| Gasmere Pty Ltd   |  |   | 2.0        |
| Soo Hsein, Michael  |  |   | 1.3        |
| Chata Holdings Pty Ltd  |  |   | 1.2        |
| Gerard C Toscan MGM   |  |   | 1.1        |
| Polo Resources  |  |   | 1.0        |
| Dejul Trading Pty. Ltd  |  |   | 0.9        |
| <b>Companies named in this report</b>   |  |   |            |
| Syrah Resources, Magnis Resources, Energizer Resources, Sovereign Metals, Kibaran Resources, Talga Resources, Black Rock Mining   |  |   |            |

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