Lepidico

Resource update, by-product output and site visit

Valuation update pending feasibility study

Metals & mining

In the last two months, Lepidico has announced an updated mineral resource at Karibib and first optimised production schedules for by-products. At nameplate capacity of 5,600tpa of lithium hydroxide monohydrate, Lepidico estimates sulphate of potash (SOP) production in excess of 11,000tpa, amorphous silica production in excess of 30,000tpa, caesium formate brine production of 210tpa and rubidium sulphate production of 1,400tpa. Although in some cases variable, these by-product tonnages are significantly in excess of those estimated in the 2017 pre-feasibility study and, for the first time, include estimates for caesium and rubidium chemicals, which has allowed us to further refine our valuation of Lepidico ahead of the finalisation of its full feasibility study on the integrated Karibib/L-Max Phase 1 plant project due in May.

Year end	Total revenues (A$m)	PBT (A$m)	Cash from operations (A$m)	Net cash/(debt)* (A$m)	Capex (A$m)
06/18	0.2	(7.2)	(3.0)	4.9	(3.1)
06/19	0.0	(5.1)	(3.5)	10.4	(6.3)
06/20e	0.0	(8.4)	(15.1)	56.5	(7.4)
06/21e	0.0	(3.0)	(2.7)	(66.1)	(119.9)

Note: *Includes Desert Lion Energy convertible.

Karibib updated mineral resource estimate

The object of the 2019 drilling programme at Karibib was specifically to promote resources from the inferred category into the measured and indicated categories for subsequent inclusion into the proven and probable reserve categories, which was achieved. Although Lepidico's lithium grade at Karibib is lower overall than at Alvarrões (one of the alternative sources of ore for its Phase 1 L-Max plant), the orebody still comprises a massive zone as well as lower grade zones. In addition, part of the reason for the lower lithium grades is the correspondingly higher by-product grades – as a result of which Lepidico expects to produce more, higher specification SOP as well as caesium and rubidium products. Key to Lepidico's success will be its ability to match production and processing rates. Greatly in its favour in this respect is the fact that historical mining operations have effectively pre-stripped the orebody ready for exploitation by Lepidico.

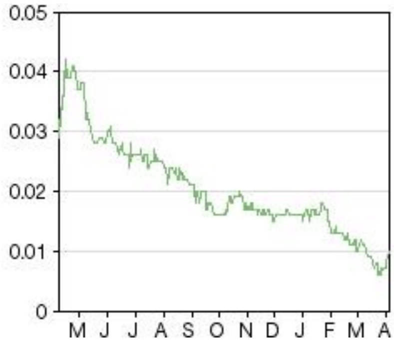
Valuation: 7.34 Australian cents per share

Relative to our last report on Lepidico, we have left the majority of our assumptions unchanged, with the exception of by-product production rates, Lepidico's assumed maximum debt:equity ratio of 60:40, an updated US$/A$ forex rate and refined capex estimates. In the aftermath of these changes and assuming that Lepidico can raise equity finance at 2.9c per share (see pages 7 and 10–11 for more discussion and scenario analysis) – implying a 20.3% cost of equity – our estimate of the present value of the future dividend income stream to investors has increased to 7.34 Australian cents per share (cf 6.04c/share previously). Note that this valuation does not attribute any value to Lepidico from a Phase 2 Plant or any other development options. Finally, unless it proves protracted, we do not believe that COVID-19 should have a major, long-term effect on Lepidico.

6 April 2020

Price	**A$0.01**
Market cap	**A$44m**
	A$1.6456/US$
Net debt (A$m) at end December 2019*	1.8
*Includes Desert Lion Energy convertible	
Shares in issue	4,403.7m
Free float	68%
Code	LPD
Primary exchange	ASX
Secondary exchange	N/A

Share price performance



%	1m	3m	12m
Abs	(9.1)	(41.2)	(63.8)
Rel (local)	15.9	(21.0)	(54.9)
52-week high/low		A$0.04	A$0.01

Business description

Via its Karibib project in Namibia and unique IP, Lepidico is a vertically integrated lithium development business that has produced both lithium carbonate and lithium hydroxide from non-traditional hard rock lithium-bearing minerals using its registered L-Max® and LOH-Max™ processes.

Next events

Feasibility study	May 2020

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Edison profile page

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Recent developments and initiatives

Since Edison's last report (see Lepidico: Caesing the opportunity, published on 19 November 2019), Lepidico has announced a number of developments with respect to its Karibib Lithium Project in Namibia, which it acquired with its takeover of Desert Lion Energy in July 2019. The more significant of these recent developments are detailed below:

- 20 December: announced that a letter of intent with German chemical company BASF for the purchase of lithium hydroxide from Karibib has been formally novated to Lepidico for its integrated Phase 1 Lithium Chemical Project and extended to 31 December 2020. The novation and extension agreement followed a visit by BASF to Lepidico's pilot plant in Perth and provides both parties sufficient time to work towards the completion of a definitive qualification and offtake agreement.
- 30 January: announced updated mineral resource estimate for Helikon 1 and Rubicon at Karibib (see below).
- 8–9 February: hosted a visit to Karibib attended by the author of this report. During this visit – and not least on account of the proximity of the Navachab Gold Mine and Osino's nearby exploration success in region in the past two years – it became evident that the north-east portion of Lepidico's tenement is prospective not only for lithium but also for gold.
- 25 February: announced first optimised production schedule guides for by-products. At nameplate capacity of 5,600tpa of lithium hydroxide monohydrate, Lepidico estimates sulphate of potash (SOP) production in excess of 11,000tpa, amorphous silica production in excess of 30,000tpa, caesium formate brine output of 210tpa and rubidium sulphate production of 1,400tpa. Although in some cases variable (eg caesium formate brine annual production ranging from 110–460tpa on account of natural caesium grade variability), indicated by-product tonnages nevertheless significantly exceed those estimated in the 2017 pre-feasibility study (PFS) and, for the first time, include estimates for caesium and rubidium chemicals.
- 9 March: announced that its process technologies can be leveraged by electric vehicle and lithium-ion battery manufacturers to assist in the decarbonisation of their supply chains and that the Karibib project has the potential to support best in class carbon intensity lithium hydroxide production, with additional opportunities identified to reduce carbon dioxide intensity further (eg a CO_2 intensity of 6.5–7.0t CO_2 per tonne of lithium hydroxide monohydrate produced, cf an estimated 14.8t/t for Western Australian spodumene production with subsequent conversion in China).

An analysis of the principal consequences and effects of these announcements is provided in the sections below.

Mineral resource upgrade

Lepidico's updated mineral resource estimate at Karibib, announced on 30 January, was based on 5,164m of additional diamond drilling at the two largest, lepidolite rich pegmatite deposits within the project area, namely Helikon 1 (where 35 holes were drilled) and Rubicon (where a further 51 holes were completed). The object of the drilling programme was specifically to promote resources from the inferred category into the measured and indicated categories for subsequent inclusion into the proven and probable reserve categories, rather than to increase the tonnage of the resource. Within that context, pit optimisations were undertaken for Helikon 1 and Rubicon that demonstrated that resources could be economically extracted at a cut-off grade of 0.15% lithium oxide (Li_2O) with the result that the cut-off grade for the deposits was lowered to this level from 0.20% in the previous mineral resource estimate with the inevitable result that there was nevertheless some collateral increase in tonnage as well. A comparison of the mineral resource estimate at Karibib in January 2020 relative to that in July 2019 is as follows:

Exhibit 1: Karibib Project mineral resource estimate

		Cut-off (% Li_2O)	Tonnage (kt)	Grade (% Li_2O)	Contained Li_2O (t)	Contained LCE* (t)	Rb (%)	Cs (ppm)	Rb (t)	Cs (t)
Rubicon Main	Measured	0.15	1,560.0	0.53	8,268	20,445	0.28	335	4,368	523
	Indicated	0.15	5,720.0	0.36	20,592	50,920	0.20	232	11,440	1,327
	Inferred	0.15	0.0	0.00	0	0	0.00	0	0	0
	Total	0.15	7,290.0	0.40	28,860	71,365	0.22	254	16,038	1,852
Helikon 1	Measured	0.15	640.0	0.65	4,160	10,287	0.25	520	1,600	333
	Indicated	0.15	940.0	0.50	4,700	11,622	0.22	531	2,068	499
	Inferred	0.15	170.0	0.70	1,190	2,943	0.29	1100	493	187
	Total	0.15	1,750.0	0.58	10,050	24,852	0.24	584	4,200	1,022
Rubicon plus Helikon 1	Measured	0.15	2,200.0	0.57	12,428	30,732	0.27	389	5,940	856
	Indicated	0.15	6,660.0	0.38	25,292	62,542	0.22	274	14,652	1,825
	Inferred	0.15	170.0	0.70	1,190	2,943	0.29	1100	493	187
	Total	0.15	9,040.0	0.43	38,910	96,217	0.23	318	20,792	2,875
Total hard rock	**Measured**		**2,200.0**	**0.57**	**12,428**	**30,732**				
	Indicated		**6,660.0**	**0.38**	**25,292**	**62,542**				
	Inferred		**2,370.0**	**0.43**	**10,109**	**24,996**				
	Total		**11,240.0**	**0.43**	**47,829**	**118,270**				
Lepidico interest	**(80%)**		**8,992.0**	**0.43**	**38,263**	**94,616**				
Grand total	**Measured**		**2,200.0**	**0.56**	**12,428**	**30,732**				
	Indicated		**6,722.2**	**0.39**	**25,895**	**64,034**				
	Inferred		**2,377.2**	**0.43**	**10,166**	**25,139**				
	Total		**11,299.4**	**0.43**	**48,489**	**119,905**				
Lepidico interest	**(80%)**		**9,039.5**	**0.43**	**38,792**	**95,924**				
Change vs previous										
Rubicon Main	Measured	-0.05	1,560	0.53	8,268	20,445	0.28	335	4,368	523
	Indicated	-0.05	2,713	-0.27	1,649	4,076	0.20	232	11,440	1,327
	Inferred	-0.05	-1,601	-0.58	-9,285	-22,960	0.00	0	0	0
	Total	-0.05	2,682	-0.22	631	1,561	0.22	254	16,038	1,852
Helikon 1	Measured	N/A	640	0.65	4,160	10,287	0.25	520	1,600	333
	Indicated	N/A	940	0.50	4,700	11,622	0.22	531	2,068	499
	Inferred	-0.05	-1,860	0.08	-11,396	-28,180	0.29	1100	493	187
	Total	-0.05	-280	-0.04	-2,536	-6,271	0.24	584	4,200	1,022
Rubicon plus Helikon 1	Measured	-0.05	2,200	0.57	12,428	30,732	0.27	389	5,940	856
	Indicated	-0.05	3,653	-0.25	6,349	15,699	0.22	274	14,652	1,825
	Inferred	-0.05	-3,461	0.10	-20,681	-51,141	0.29	1100	493	187
	Total	-0.05	2,402	-0.18	-1,905	-4,710	0.23	318	20,792	2,875

Source: Lepidico, Snowden Mining Industry Consultants Pty Ltd, Edison Investment Research. Note: *LCE = Lithium carbonate equivalent.

A number of features of the mineral resources upgrade in the table above are noteworthy:

- The resource has been depleted for underground voids.
- Lepidico's beneficial interest in the Karibib project is 80% (as shown).

- Caesium and rubidium grades were only estimated for the first time in the January 2020 mineral resource update, as befitting their status as 'critical' materials according to the US government.
- The difference between the resources denoted 'Rubicon plus Helikon 1' and 'Total hard rock' are accounted for by the deposits entitled Helikon 2, Helikon 3, Helikon 4 and Helikon 5, which were not the object of the recent drilling campaign and the resources of which are therefore unchanged from the July 2019 estimate conducted at a cut-off of 0.20% lithium oxide. A brief comparison of 'Total hard rock' with 'Rubicon plus Helikon 1' reveals that these deposits comprise 2,200kt at an average grade of 0.41% lithium oxide all in the inferred category of resources.
- The difference between the resources denoted 'Total hard rock' and those denoted 'Grand total' are accounted for by 'Rubicon slimes', which are historical petalite processing flotation tails and the resource estimate for them is similarly unchanged since July 2019. A comparison of the two reveals that these comprise a very small percentage of the total (<1%) in both the indicated and inferred categories.
- Resource upside still exists in the form of unclassified mineralisation existing within the bounds of the known pegmatites, both along strike and down dip.

Interpretation and development planning

Although Lepidico's Karibib lithium grades are noticeably lower than those at Alvarrões (eg 0.43% lithium oxide cf 1.16%), one of its alternative sources of ore, it still comprises a massive lepidolite zone as well as lower grade mixed lepidolite-muscovite and muscovite zones. In addition, part of the reason for the lower lithium grades is the correspondingly higher by-product grades, as a result of which Lepidico expects to produce more, higher specification SOP as well as caesium and rubidium products.

Geology

The pegmatites at Karibib are characterised by a barren, coarse grained quartz core. Historically, this was surrounded by a petalite zone (sometimes on one side only) adjacent to the quartz core, although this has generally been mined out by historical mining operations that largely focused on the petalite itself for the ceramics industry. Around the petalite zone is a high-grade lepidolite zone (denoted the LEPZ zone), which also represents the main source of caesium in the orebody, and around that a low grade, disseminated lepidolite zone, which is layered and banded with albite and denoted the LEPZ-B zone. Surrounding the whole is the mica zone, which also contains varying concentrations of lithium. The ratio of the mica zone to the two lepidolite zones is approximately 2.5 to one. Management interprets the structures to be consistent with a tectonic gash filled with granite fluids that have then cooled slowly from the edges, concentrating the non-compatible elements (eg caesium) towards the centre of the structure.

Structure

The Rubicon and Helikon deposits are 7km apart. Rubicon has a 700m strike, while Helikon is 400m long, but bounded by a north-south fault at depth where there is a sharp boundary with a sandstone/shale unit. Discrete lenses are identifiable as the pegmatites pinch and swell. Historical underground workings confirm that the different zones may be distinguished visually, which will aid the distinction between the LEPZ zone and the LEPZ-B zones when mining, in addition to close grade control drilling.

Mining

Key to Lepidico's success will be its ability to match production from the mine with processing rates at its plant. Greatly in its favour however is the fact that historical mining operations have effectively already pre-stripped the orebody for exploitation by Lepidico and much of the essential infrastructure is already in place including water bores and pipeline and haul roads.

The pit optimisations used for the mineral resource estimate at Rubicon and Helikon indicate that mining should start at Rubicon, which should be the source of the first 1Mt of LEPZ and LEPZ-B material at a grade of approximately 0.7% lithium oxide and a stripping ratio of 0.3 to one. In production year 3, mining is expected to move to similar grade material at Helikon 1, but with a stripping ratio of about two to one. Three years after that, Helikon 1 will move to the second of its two stages of development, during which both grade and recoveries are expected to decline, while the stripping ratio rises. Nevertheless, over the first 10 years of operation, c 4.0Mt of mineralisation will be prioritised from both Rubicon and Helikon 1 with an average grade of c 0.55% Li_2O and a stripping ratio of only c 1.4 to one to supply concentrate feed to the planned Phase 1 L-Max chemical plant. Overall however, mining tonnages are extremely low, necessitating only a small fleet, comprising two excavators and two trucks. Haulage from Helikon 1, in particular, is expected to employ conventional road trucks.

Processing

Stage 1 feed will be dominated by ostensibly massive, augmented by some disseminated, lepidolite, initially at a rate of 40tph, or 330ktpa and with an expected recovery into concentrate of 85–90%. It is then envisaged that the Karibib concentrator capacity will need to increase by c 65% in production year 5 (when Helikon 1 moves into a lower grade zone – see above). Known as Stage 2, this will involve increasing throughput to 65tph (or 540ktpa) at a 79% recovery in order to maintain 60,000tpa of concentrate output from predominantly the mica zone feed, grading c 0.45% Li_2O on average (but, in places, up to 3% over 5–6m). Stages 1 and 2 together are anticipated to account for the first 10 years of operations. As they stand, measured and indicated resources are estimated to be sufficient to support concentrate production for approximately 14 years, with a further two stages planned after the completion of stages 1 and 2. In addition, considerable surface stockpiles of massive lepidolite exist – a 'waste' product from historical mining. These are not currently included in the mine plan but could add significant value if resource estimates are undertaken.

Waste management

Owing to Namibia's arid nature, Lepidico will filter and dry stack its tailings and recycle c 80% of its water requirements (similar to the nearby Navachab Gold Mine). Moreover, on account of its unique technology and unique suite of products, Karibib's tailings will be designated a waste management area, rather than a dedicated tailing storage facility. Finally, since the surface of its footprint is underlain by calcrete, there will also be no requirement for a liner, while Lepidico's process's production of silicates, rather than sulphates, means that neither its waste nor its tailings will be potentially acid forming. As a result, there will be no need to neutralise any waste products beyond the immediate products of its acid circuit.

Ongoing exploration

In addition to that already delineated and upgraded, Lepidico has observed high-grade lithium mineralisation in old mine workings at Helikon 2, 3 and 4. These three deposits represent excellent targets for also promoting quality inferred mineral resources into the measured and indicated categories, as well as expanding the mineral inventory. A regional exploration programme to evaluate the lithium pegmatite potential within the >1,000km^2 exclusive prospecting licence areas started in January.

In addition to lithium exploration, several gold occurrences have been identified within Lepidico's block and it therefore makes eminent sense for the company to evaluate the potential of and explore for gold at Karibib, in parallel with lithium.

Background

Permitting

Lepidico's operations at Karibib are fully permitted in the form of three exploration prospecting licences (EPLs) and one mining licence (no. 0204) on which both Helikon and Rubicon are situated.

Surface rights

The surface rights coincident with Lepidico's mining and exploration comprise the Okangava farm, which was in private ownership before being sold to the Namibian government. As a result, the surface rights exist with the government, which has sub-divided the farm to a number of individuals (typically employed in professional services) on leasehold terms. The land itself is then occupied by tenant farmers and their cattle. Lepidico reports that it has good relations with these tenant farmers, to whom it provides water under its extraction permit for their livestock. Fences along the existing Helikon haul road and around the former Rubicon mine and processing infrastructure mean that easements for Lepidico's planned operations are already in place.

Logistics

All of the required infrastructure for the development of Karibib (eg water, roads, rail etc) is, to all intents and purposes, already in place. The local town, Karibib, has a population of c 10,000 and hosts rail infrastructure, an airstrip and road infrastructure that would not be out of place in Europe in terms of its quality, other than for the fact that, from the perspective of a European visitor, it is, by comparison, empty of traffic.

Road infrastructure

Lepidico intends to outsource its door to door logistics needs to a specialist freight forwarder. Initial haulage capacity of 250tpd (7,500tpm) will be met with 32t road haul trucks.

Once produced, the combined concentrate will then be transported to Walvis Bay on flatbed trucks. Walvis Bay's principal function is as a bulk terminal. Since its output is relatively modest, concentrate will be shipped in 1.2t service sacks before being packed into 27t containers at the port for the six-week journey to Abu Dhabi. In the meantime, it intends to investigate any potential for cross-contamination at the recently expanded Walvis Bay container terminal in order to evaluate possible logistics cost savings.

Water

Within the context of an arid environment overall (ie 150–200mm rainfall per annum vs London with 584mm pa), Karibib experiences short periods of intense rainfall, in relation to which Lepidico will be required to stabilise a small existing water course near the Rubicon pit.

Otherwise, process plant water will be sourced from existing water bores, which is reported to be 'near potable' and from which Lepidico has the right to abstract 207,000m^3 of water per annum for seven years (see 'Sensitivities' section, below). In addition, Lepidico has the option to purchase water from the Namibian parastatal water utility, NamWater, which has a water line that crosses the Karibib property.

Power

Background

Namibia has three electricity generating power stations, but otherwise imports up to 70% of its power from neighbouring countries including South Africa (Eskom) and Zimbabwe (in particular, Kariba). The two most important power generating facilities in Namibia are the Ruacana hydroelectric power station on the Kunene River on the border with Angola with a capacity of 249MW and the coal-fired van Eck power station just to the north of Windhoek with a capacity of 120MW. However, while the profile of Namibian power production is currently relatively traditional, NamPower has a target of generating 80% of its power from renewables by 2023, including 330MW from hydro-electric sources and, to this end, is actively encouraging independent power producers (and particularly solar producers) into the grid.

Local

Lepidico's power requirement at Karibib will be 4.5MVA, which will be supplied via a 25km long 66kV line that will run down public roads from the nearest switching station at Marble Hill and enter the mine site at the same point as the NamWater line (see above). A power purchase agreement between Namibia's electricity state utility, NamPower, and Lepidico has already been signed off on all technical matters and it only remains for the latter to now make an offer to the former regarding the commercial terms and, in particular, an appropriate power tariff in line with other commercial agreements in place. Nevertheless, a number of options pertaining to both the physical and commercial structure of the power purchase agreement exist. For example, Lepidico could own the 25km long transmission line to site, with a meter located at the Marble Hill switching station. Alternatively, NamPower could own the line, with the meter located at the mine site (which is Lepidico's preference).

Assumption variations

In the light of the above developments and our increasing knowledge and understanding of the Karibib project and its relationship with a Phase 1 L-Max plant – planned to be built in Abu Dhabi – we have made the following changes to the assumptions that supported our valuation in our last note (see Lepidico: Caesing the opportunity, published on 19 November 2019):

- We have updated our by-product production expectations as follows:
  - SOP production to 11,000tpa vs 3,854tpa previously.
  - Caesium formate brine production (now formally included in our valuation) to 210tpa vs 116tpa previously, although with the proviso that this may exhibit significant variability.
- We have adjusted the assumed caesium formate price to US$37,000/t from US$50,000/t to reflect recent efforts by the world's majority supplier to stimulate demand by reducing prices.
- We have updated the US$/A$ foreign exchange rate from A$1.4472/US$ in November 2019 to the prevailing rate of A$1.6456/US$.
- We have updated Lepidico's share price (which affects future assumed dilution – see below) from 1.7 Australian cents to 2.9c per share (NB: variations from the scenario are considered in the 'Sensitivities' section, below). While this is some way above the current share price, Lepidico's shares have been sold down heavily since late January not only because of weak sentiment surrounding lithium developers, but also on account of the delay in finalising the project feasibility study and the effect of the coronavirus on world markets generally. Consequently, management believes that it would be impossible to proceed with a financing package and a final investment decision in the current environment. Once the feasibility study has been completed however and COVID-19 passed and sentiment towards lithium developers

has improved, it is not unreasonable to assume that Lepidico's share price could recover to give the company an enterprise value equivalent to c 30.9% of project NPV (the average for companies at bankable stage of development – see our sector report, Gold stars and black holes, published in January 2019 and page 11) – or close to 3c per share. In this case, 2.9c is also the average price of Lepidico's shares between early November 2017 and late February 2020. It is also the price at which Lepidico announced its last equity fund-raising in the form of a one for nine entitlement offer, announced in early May 2019, to raise A$10.8m. Outside this scenario, management has indicated that it would be unlikely to commit to the equity dilution involved in developing the project at prices much below this and, realistically, not below a price of 2c per share.

- A three-month delay to the project. Phase 1 chemical plant engineering is now reported to be on track for completion in May 2020, whereas we had previously assumed that it would be completed in Q120.

In addition, we have also refined our capital expenditure expectations, as follows:

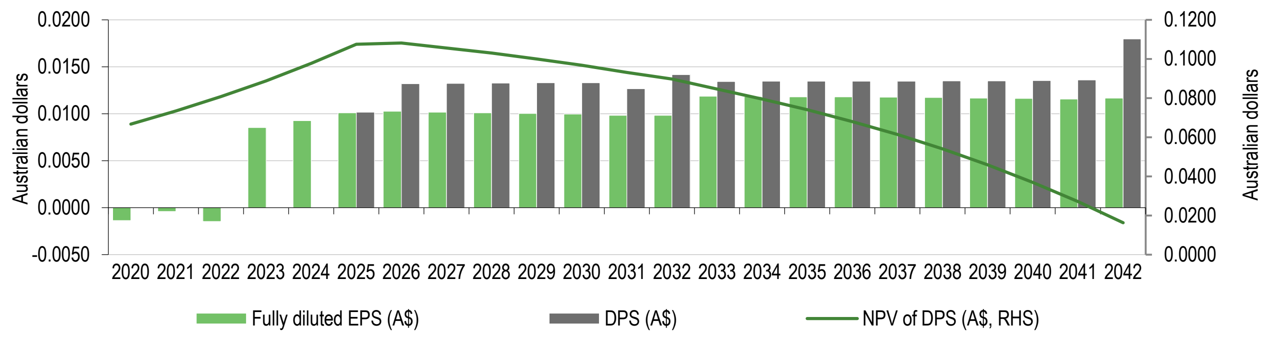
- We have assumed a US$15m cost of incorporating a caesium and rubidium circuit into the Phase 1 Plant project.
- We have increased initial capital expenditure at Karibib from US$18.8m to US$25.1m – in part to reflect a contingency for the expansion of the concentrator in the fifth year of operations.
- We have removed an assumed US$10m saving relating to the production of lithium hydroxide (ie LOH-Max) rather than lithium carbonate (L-Max). This is a) in order to be conservative and b) because the likelihood and magnitude of such a saving has yet to be determined.

We are also now assuming a peak debt:equity ratio of 60:40 rather than a nominal US$30m equity raise in order to finance the equity portion of the Phase 1 Project's funding. Lepidico's management reports that the company and project have had 'good engagement' from funding institutions and we expect that commercial banks could support a debt:equity ratio of 60:40. Offtake, prepayments or streaming agreements have the potential to increase this further to an 80:20 ratio. In due course it may also be possible to attract development agency type funding to the mining project on account of its location in Namibia, which could have the effect of lowering the interest rate on debt to as low as 8%. For the moment however, Edison is only considering an expansion of the debt:equity ratio to 60:40 with all of the other potential developments regarded as possible future value enhancers. All other assumptions remain unchanged.

Updated valuation

In the light of the considerations discussed above, our valuation of Lepidico – based on maximum potential future dividends discounted back to present value at a rate of 10% per annum – has increased from 6.04 Australian cents to 7.34c per share and could be expected to rise further, to a peak of 10.81c, in FY26. A graph of our updated EPS and (maximum potential) DPS forecasts for the first 20 years of the Phase 1 Plant project life is as follows:

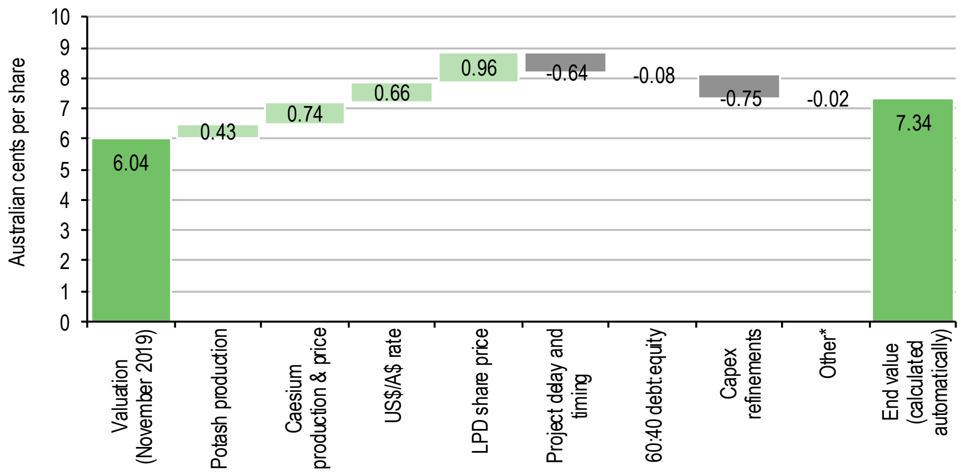
Exhibit 2: Edison estimate of future Lepidico EPS and (maximum potential) DPS



Source: Edison Investment Research

The individual components of the valuation change are shown in the waterfall chart below:

Exhibit 3: Lepidico per share valuation evolution, November 2019 – April 2020



Source: Edison Investment Research. Note: *Principally H120 results.

Note that this valuation is fully diluted in that it accounts for an additional assumed A$68.4m in equity issuance (at a share price of 2.9c/share) in order to achieve a maximum debt:equity ratio of 60:40 in FY22. Stated alternatively, an investment in Lepidico at a share price of 2.9c would yield an internal rate of return to investors in Australian dollar terms of 20.3% per annum for 22 years to 2042. By contrast, an investment in Lepidico shares now at the prevailing share price of 1.0c would yield an internal rate of return to investors in Australian dollar terms of 35.5% per annum over the same 22 years to 2042.

Financials

Lepidico had net debt of A$1.7m as at end-December 2019 (and reported, on 23 March, that it had A$3.4m in cash as at end-February 2020, after having raised A$10.8m in late FY19 via the issue of 372.9m new shares (plus warrants) at a price of 2.9 Australian cents in the form of one-for-nine renounceable rights issue). Gross debt of A$5.4m as at 31 December 2019 related to the liability component of a convertible note that Lepidico acquired when it acquired Desert Lion. The original note was convertible into Desert Lion equity at a price of C$0.20/share and is now convertible into 108m Lepidico shares at a price of approximately 4 Australian cents at any time prior to maturity on 10 December 2020.

In its 23 March announcement, Lepidico stated that its Phase 1 Project feasibility study is 'very close to completion now'. Assuming that its Phase 1 feasibility study is completed on schedule in May 2020 and that the company makes a positive final investment decision shortly thereafter, we estimate that Lepidico will spend c A$193.4m (currently US$117.5m) in capital expenditure over the course of FY21 and FY22 before moving into production in FY23. That being the case, we estimate that it will have to raise an additional A$68.4m (approximately a two for one entitlement offer) in order to achieve a net debt:equity ratio of 60:40. This compares with our prior assumption that Lepidico would raise US$30m (A$49.4m at the prevailing forex rate) as the equity portion of its project financing.

Sensitivities

Within the context of the above discussion, Edison's valuation of Lepidico, above, is sensitive to at least seven specific factors – three of which are empirical and the balance of which are conceptual. These are considered in turn, below.

COVID-19

The most evident risk to Lepidico from the uncertainty surrounding the coronavirus pandemic are volatile capital markets in the short term and delays in the finalisation of agreements with third parties in the medium term. Otherwise, we do not believe that the coronavirus will have a material impact on long-term demand for lithium or the uptake of electric vehicles in preference to traditional petrol engine vehicles. In the meantime, the company reports that constructive discussions continue with prospective off-take partners for the planned products from the Phase 1 chemical plant and samples continue to be prepared and dispatched for analysis. Essential feasibility study and corporate functions are continuing, non-essential functions have been curtailed and cash resources are estimated to be sufficient to sustain the business into late calendar 2020.

Convertible note

As a part of its acquisition of Desert Lion, Lepidico acquired a convertible note that was originally convertible into Desert Lion equity at a price of C$0.20/share and is now convertible into 108m Lepidico shares at a price of approximately 4 Australian cents at any time prior to 10 December 2020. Our valuation, above, implicitly treats this convertible note as if it were conventional debt. However, in the event that it were to be converted in full, then our valuation of Lepidico falls very fractionally to 7.28 Australian cents per share (cf our 'base case' valuation of 7.34c/share).

Lithium hydroxide price

Edison's long-term lithium prices are based on an assumed benchmark lithium carbonate price of US$12,000/t, which equates to a lithium hydroxide monohydrate price of US$14,021/t. Variations in our valuation of Lepidico with respect to the lithium hydroxide monohydrate price are as follows:

Exhibit 4: Lepidico valuation sensitivity to lithium hydroxide price

Implied equivalent lithium carbonate price (US$/t)	**5,565**	**6,207**	**6,849**	**7,500**	**8,562**	**10,274**	**12,000**	**13,700**	**15,411**
Lithium hydroxide price (US$/t)	**6,500**	**7,250**	**8,000**	**8,760**	**10,000**	**12,000**	**14,021**	**16,000**	**18,000**
Change vs base case (%)	**-53.6**	**-48.3**	**-42.9**	**-37.5**	**-28.7**	**-14.4**	**u/c**	**+14.1**	**+28.4**
Valuation (Australian cents/share)	2.11	2.63	3.15	3.67	4.54	5.93	7.34	8.73	10.13
Change vs base case (%)	-71.3	-64.2	-57.1	-50.0	-38.1	-19.2	u/c	+18.9	+38.0

Source: Edison Investment Research

Future equity funding price

Edison's financial model assumes that Lepidico will raise A$68.4m in the relatively near future in order to achieve a future, maximum net debt:equity ratio of 60:40 and that it will raise this equity at a share price of 2.9c. Exhibit 5, below, demonstrates the sensitivity of our valuation to the price at which future equity funding is conducted:

Exhibit 5: Lepidico valuation sensitivity to future equity funding price

Equity funding price (cents/share)	0.5	0.6	0.7	0.8	0.9	1.0	2.0	2.9	4.0
LPD valuation (cents/share)	2.67	3.06	3.42	3.75	4.05	4.33	6.31	7.34	8.16
Change vs base case (%)	-63.6	-58.3	-53.4	-48.9	-44.8	-41.0	-14.0	u/c	+11.2

Source: Edison Investment Research.

As a matter of interest, readers should note that the non-diluting price of future equity funding (ie the price at which Edison's post-funding value is the same as the funding price) is 9.99 cents per share.

In our mining sector report, entitled Gold stars and black holes, published in January 2019, we calculated that the average company enterprise value (EV) for companies at the pre-feasibility stage of development was 9.9% of attributable project NPV. This rose to 30.9% for companies at a bankable stage of development. Taking the non-diluting price of future equity funding of 9.99c to represent project NPV on a per share basis, Lepidico's share price of 1.0c is in line with the average for companies at PFS stage (albeit Edison has had to vary its financial model to reflect changed circumstances since the original PFS). On completion of a bankable study (scheduled in May) on substantially the same terms as the PFS however, we would expect Lepidico's shares to re-rate to something close to 30.9% of 9.99c, or approximately 3.1c per share – ie close to our assumed price of future equity funding of 2.9c (see pages 7–9).

Surface material

Stockpiles

In addition to its in-situ resource, our site visit to Karibib also revealed clear evidence of a surface stockpile of broken massive lepidolite ore, being a legacy of former petalite mining at Rubicon, where it was considered waste. To date, this has been excluded from Karibib's formal mineral resource estimate (Exhibit 1). However, management estimates the size of the stockpile to be in the order of 700kt at a grade of c 0.9% lithium oxide with c 20kt in excess of 1.1% (cf an average grade of 0.40% Li_2O at Rubicon – see Exhibit 1). This being the case, we estimate that the stockpile could represent a material circa two years of feed to Lepidico's Phase 1 L-Max plant, from which c 100–150kt of lepidolite concentrate could be produced.

Slimes

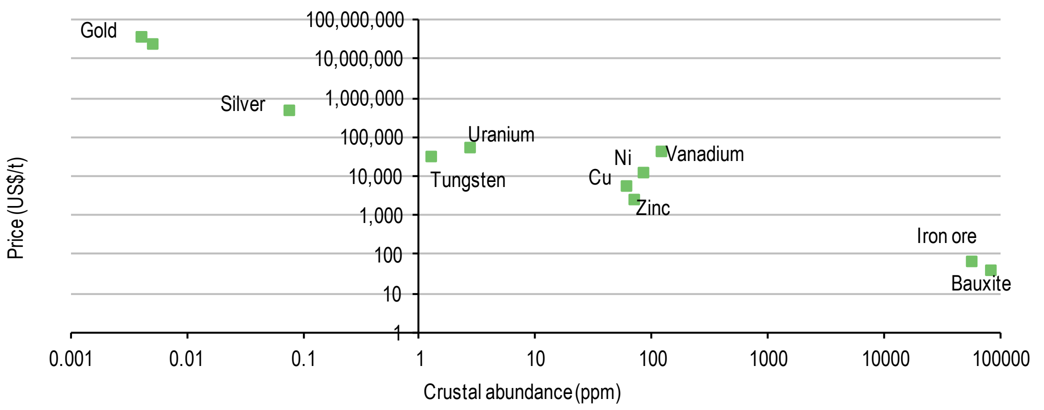
Lepidico also has access to 69.4kt of slimes at Rubicon, at an elevated grade of 0.95% Li_2O, being the flotation tailings related to former petalite mining at Rubicon. While these require mineralogical test-work to be performed before their compatibility with the L-Max process can be determined, they nevertheless represent an additional potential source of material for Lepidico. Utilisation of the slimes would also qualify as tailings disposal/remediation for environmental, social and governance (ESG) purposes.

Rubidium

According to Lepidico's first optimised production schedule of by-product volumes, the Karibib resource has the ability to support production of c 1,400tpa of rubidium sulphate, equivalent to 1,368tpa of rubidium formate. While the use of rubidium formate as a completion fluid for high pressure, high temperature oil wells is not as developed as that of caesium formate (see our note, Lepidico: Caesing the opportunity, published on 19 November 2019), with chemical and physical properties typically lying in a range between those of caesium and potassium, there seems little reason why it should not develop a function in this role.

While caesium's crustal abundance of 3ppm is instrumental in conferring upon its formate salt a price in the order of US$37,000–50,000/t (see Exhibit 6, below), we estimate that rubidium's higher crustal abundance of 90ppm would confer upon its formate salt a price in the region of US$7,158/t. Nevertheless, on this basis, 1,368tpa of rubidium formate at a price of US$7,158/t could potentially generate a very similar (or even greater) revenue to 210tpa of caesium formate at a price of US$37,000/t (see Exhibit 3).

Exhibit 6: Price (US$/t) vs crustal abundance (ppm), selected metals and minerals



Source: Edison Investment Research

Miscellaneous

Desert Lion's business plan was based around a concentrator throughput rate of 2.35Mtpa and its water abstraction rates (which Lepidico has inherited) are consequently similarly based upon this rate, which is materially in excess of Lepidico's initial throughput design rate of 330ktpa, rising to 540ktpa. As such, Lepidico's right to abstract 207,000m^3 of water per annum is sufficient to at least support a doubling of production capacity to 11ktpa of lithium hydroxide monohydrate and potentially more if it applies for additional water rights, either from further water bores close to the mine or by application to NamWater. As such, Lepidico's business plan at Karibib has expansion potential in addition to duplication potential and the potential for a large-scale Phase 2 plant.

Three other initiatives that have the potential to augment the economics of Lepidico's mining plan at Karibib include 1) the possibility of steepening the walls of the proposed open pits; 2) mining the footwall mining zone at Helikon, in particular, which has returned grades as high as 3% lithium oxide over 5–6m in exploration drilling; and 3) the potential for gold exploration success.

Finally, Lepidico's environmental and social impact assessments point to the following benefits at both its mining operation at Karibib and its lepidolite chemical conversion plant in Abu Dhabi:

Karibib lithium mining project

- Brownfields – redevelopment of the mining operation has been designed within the footprints of former mining activities
- Sustainable and industry best practice closure plans will rectify mining and processing legacy issues
- The creation of 85 jobs to benefit local communities, with no relocation requirement
- The potential to use renewable energy via Power Purchase Agreements with renewable energy providers
- No tailings storage facility as a result of the co-disposal of benign dry stacked flotation plant tails with mine waste
- Small scale (and potentially electrically powered) mining fleet

- Water sourced locally from well bores with >85% of process water recycled

Lepidolite chemical conversion plant

- Relatively modest power consumption – gas fired electrical power to be supplemented by nuclear (2020 start-up)
- Heat recovery equipment included in design to reduce gas consumption
- Low emissions with net carbon intensity of 5–7t CO_2 per tonne of lithium hydroxide monohydrate produced for the integrated project after amorphous silica credit
- SOP and Cs/Rb by-products to provide further carbon credits (to be quantified)
- Residue product could generate additional carbon credits and result in a zero-waste facility
- Social benefits – creation of 119 new jobs and low impact as built on existing industrial park
- Small footprint minimises steel and concrete in construction

Exhibit 7: Financial summary

Accounts: IFRS; year end June; A$000s	2015	2016	2017	2018	2019	2020e	2021e
Income statement							
Total revenues	9	116	127	171	2	0	0
Cost of sales	0	0	0	0	0	0	0
Gross profit	9	116	127	171	2	0	0
SG&A (expenses)	(455)	(617)	(912)	(5,284)	(4,006)	(7,001)	(3,146)
Other income/(expense)	0	0	0	0	0	0	0
Exceptionals and adjustments	(16)	(415)	(878)	(2,171)	(1,150)	(1,331)	0
Depreciation and amortisation	(5)	(6)	(6)	(6)	(8)	(163)	(163)
Reported EBIT	(467)	(923)	(1,670)	(7,290)	(5,162)	(8,496)	(3,309)
Finance income/(expense)	(18)	(5)	128	70	57	52	283
Other income/(expense)	(559)	(448)	(3,815)	0	0	0	0
Exceptionals and adjustments	0	(888)	0	0	0	0	0
Reported PBT	(1,044)	(2,263)	(5,357)	(7,220)	(5,105)	(8,444)	(3,027)
Income tax expense (includes exceptionals)	0	0	0	0	0	0	0
Reported net income	(1,044)	(2,263)	(5,357)	(7,220)	(5,105)	(8,444)	(3,027)
Basic average number of shares, m	178	465	1,802	2,624	3,272	5,630	6,888
Basic EPS (c)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Balance sheet							
Property, plant and equipment	9	4	8	27	18,487	24,907	144,597
Goodwill	0	0	0	0	0	0	0
Intangible assets	0	16,204	16,698	19,027	22,925	22,925	22,925
Other non-current assets	1,485	715	1,620	730	9,001	8,181	8,181
Total non-current assets	1,494	16,922	18,326	19,783	50,414	56,013	175,704
Cash and equivalents	53	650	3,307	4,860	13,660	59,802	59,802
Inventories	0	0	0	0	0	0	0
Trade and other receivables	4	3,886	706	712	1,869	0	0
Other current assets	0	0	0	0	0	0	0
Total current assets	57	4,537	4,013	5,572	15,529	59,802	59,802
Non-current loans and borrowings	0	0	0	0	3,276	3,276	125,876
Other non-current liabilities	0	0	0	0	0	0	0
Total non-current liabilities	0	0	0	0	3,276	3,276	125,876
Trade and other payables	105	614	1,663	804	10,940	142	259
Current loans and borrowings	115	0	0	0	0	0	0
Other current liabilities	40	33	46	51	86	86	86
Total current liabilities	260	647	1,709	856	11,026	227	344
Equity attributable to company	1,292	20,812	20,630	24,500	53,252	113,922	110,895
Non-controlling interest	0	0	0	0	(1,610)	(1,610)	(1,610)
Cash flow statement							
Profit for the year	(1,044)	(2,263)	(5,357)	(7,220)	(5,105)	(8,444)	(3,027)
Taxation expenses	0	0	0	0	0	0	0
Depreciation and amortisation	5	6	6	6	8	163	163
Share based payments	450	40	1,736	2,138	520	511	0
Other adjustments	(451)	1,036	(162)	2,066	664	1,641	0
Movements in working capital	(10)	132	133	(28)	410	(8,930)	117
Interest paid / received	0	0	0	0	0	0	0
Income taxes paid	0	0	0	0	0	0	0
Cash from operations (CFO)	(1,050)	(1,049)	(3,644)	(3,038)	(3,504)	(15,059)	(2,747)
Capex	(9)	(63)	(861)	(3,057)	(6,251)	(7,403)	(119,854)
Acquisitions & disposals net	0	32	122	110	0	0	0
Other investing activities	(563)	(80)	0	0	0	0	0
Cash used in investing activities (CFIA)	(572)	(111)	(739)	(2,947)	(6,251)	(7,403)	(119,854)
Net proceeds from issue of shares	1,505	1,872	7,040	7,555	18,462	68,603	0
Movements in debt	100	(115)	0	0	0	0	122,600
Other financing activities	0	0	0	0	0	0	0
Cash from financing activities (CFF)	1,605	1,757	7,040	7,555	18,462	68,603	122,600
Increase/(decrease) in cash and equivalents	(18)	597	2,657	1,570	8,707	46,142	0
Currency translation differences and other	0	0	0	(17)	93	0	0
Cash and equivalents at end of period	53	650	3,307	4,860	13,660	59,802	59,802
Net (debt)/cash	(61)	650	3,307	4,860	10,385	56,526	(66,074)
Movement in net (debt)/cash over period	(61)	711	2,657	1,553	5,525	46,142	(122,600)

Source: Company sources, Edison Investment Research. Note: FY19 balance sheet is Lepidico's stated balance sheet consolidated with Edison's estimate of Desert Lion's balance sheet as at 30 June 2019, converted into Australian dollars.

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