



**Breakaway  
Research**

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### Company Information

ASX Code	LPD
Share Price (10 March 2017)	A\$0.013
Ord Shares	1,750m
Options	151.75m
<b>Market Cap undiluted</b>	<b>A\$22.8m</b>
Est. Cash (31 Dec 2016)	A\$2.1m
Total Debt	A\$0.0m
<b>Enterprise Value</b>	<b>A\$19.1m</b>

### Directors

Chairman (Non-Executive)	Gary Johnson
Managing Director (Executive)	Julian "Joe" Walsh
Director Exploration (Executive)	Tom Dukovcic
Director (Non-Executive)	Mark Rodda

### Substantial Shareholders

Strategic Metallurgy Pty Ltd	14.48%
Parkway Minerals NL	5.54%
Venture Frontier Ltd	3.6%
JP Morgan Nominees Aust.	3.02%
Strategic Metallurgy Pty Ltd	2.86%

Source: Lepidico Ltd

### Company Details

Address	Level 1, 254 Railway Parade, West Leederville WA 6007
Phone	+618 9363 7800
Web	<a href="http://www.lepidico.com">www.lepidico.com</a>

### Price Chart



Source: Commsec

# Lepidico Ltd (LPD)

*Significant Potential Uplift with new Li Technology*

*Recommendation: Speculative BUY*

### Key Points

- **Lepidico is developing the L-Max® technology which has the potential to extract Lithium (Li) from Li-rich mica minerals such as lepidolite while the industry has typically focused on hardrock spodumene deposits or brine deposits.**
- **The Pre-feasibility study findings on constructing a Phase 1 commercial plant capable of producing 3,000 tpa battery grade lithium (LCE) indicate C1 costs at nil after by-product credits.**
- **Total project value at commissioning is estimated to be around US\$190m using a 10% discount rate and a US\$10,000 per tonne lithium (LCE) price.**
- **Assuming the project is fully funded by equity at the prevailing share price, the NPV<sub>(10%)</sub> equates to 4.3 cents per LPD share**
- **The Phase 2 expansion involves production increasing from 3,000 t pa LCE to 20,000 t pa LCE.**
- **The Company has been securing projects around the world which have applicable mineralogy for the L-Max® technology. If successful, it can replicate plants to create multiple production sources.**
- **The value in the Business Model and confidence in the L-Max® technology is evident in an emerging takeover offer by rival, Lithium Australia NL (ASX Code: LIT).**

*Lepidico ("LPD") owns the L-Max® technology – a technology which enables the extraction of lithium from lithium micas like lepidolite. In the past, these micas have been difficult to process and hard rock lithium miners have tended to mine only spodumene-rich deposits.*

*The L-Max® technology leaches the lithium in a relatively straightforward process using commonly available reagents. The process produces a number of valuable by-products and this value offsets the cost of producing lithium on a C1 cash cost basis (estimated by the Company's pre-feasibility study). The Company has released project parameters for its DFS and seeks to fast track development for first production in 2019.*

*Our recommendation is a SPECULATIVE BUY for LPD. The Company has access to valuable technology which could create a leading position in the lithium market in years to come. Successful implementation of its Phase 1 project could provide a 3.4 times share price uplift as it approaches first production and its current value is underpinned by the LIT takeover offer.*

### Company Overview

Lepidico is an ASX listed company owns the L-Max® technology. The Company has undergone several name and personnel changes in recent years to eventually become the vehicle to develop this exciting technology and to become a world class lithium producer.



The technology enables its management team to fast track lithium production from mineral deposits that have traditionally been uneconomic lithium sources.

This research report is designed to provide investors will an overview of the L-Max® technology process, and with the recent release of its pre-feasibility results, Breakaway Research has estimated a project value from the pre-feasibility data.

*Understanding L-Max® technology requires understanding current lithium supply ...*

The first step is to understand the demand/supply fundamentals of the lithium market, and in particular, the characteristics of supply and how it may change with L-Max® technology.

## Lithium Demand & Supply

Most investors have witnessed the boom in lithium shares driven by lithium price increases as EV manufacturers and analysts have been forecasting supply deficits due to increasing battery demand.

The hype is highlighted with the former head of European clean-tech research at Jefferies, Gerard Reid, as declaring that lithium was a "revolution not evolution" in the energy world at the Mines and Money December 2016 conference in London. He noted that at five times the energy density of lead batteries, lithium-ion batteries are already the battery of choice in mobile phones, laptops and every new electric vehicle and, will also be the cheapest by 2020.

*Initial lithium demand was driven by consumer items...*

The recent growth from consumer goods demand is now being replaced by demand from electric vehicle growth which had increased by 55% to around 700,000 vehicles in 2016 y-o-y. However, this only accounts for less than 1% of the 80 million vehicles sold globally each year. The world's largest vehicle manufacturer, Volkswagen, estimates it will be producing 2 million-3 million electric vehicles by 2025. Extrapolated across the industry this could result in a 30-40% market share for EVs. Evidence is supporting this contention with Tesla having outsold Mercedes in the luxury car market in 2016 for the first time in 40 years.

*Now it is increasingly in battery demand for EVs ...*

In terms of demand, this would require an extra 800,000 t of lithium by 2025, with also increasing demand for cobalt, nickel, graphite, and silicon. In addition, storage for renewable power generation is expected to drive further lithium demand with forecasts of an extra 8,000-10,000 t pa of lithium demand by 2020.

*Government mandated EVs will require additional 507kt LCE by 2020 ...*

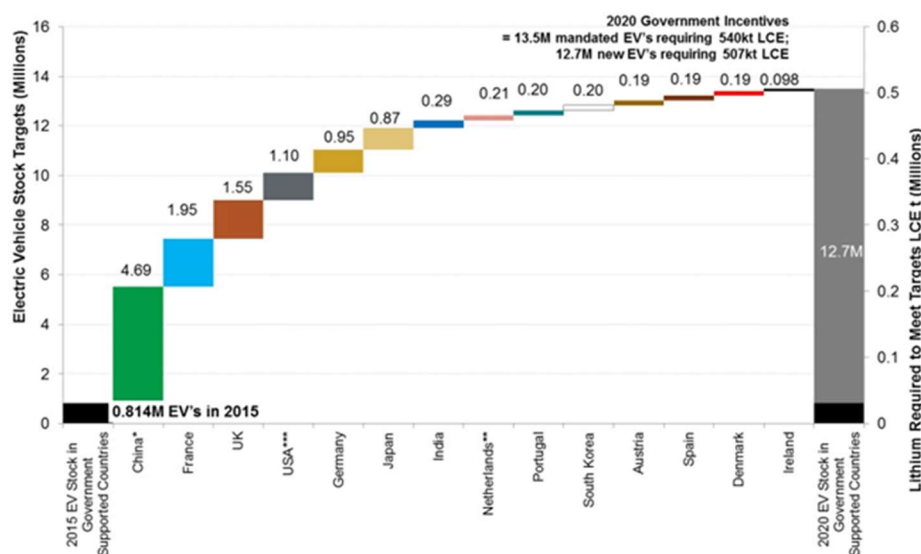


Figure 1. Mandate Electric Vehicles and potential lithium demand (Source: Orocobre)

Announced government EV targets across a number of countries will require 507kt lithium (LCE) to build 12.7 m EV vehicles alone (See Figure 1).

Orocobre has also projected demand and supply in the same time period to 2020 (see Figure 2). While supply is forecast to increase, it only meets demand levels which correspond to a 10% compound annual growth rate over this time period.

Forecast supply can only meet demand projections at 10% CAGR...

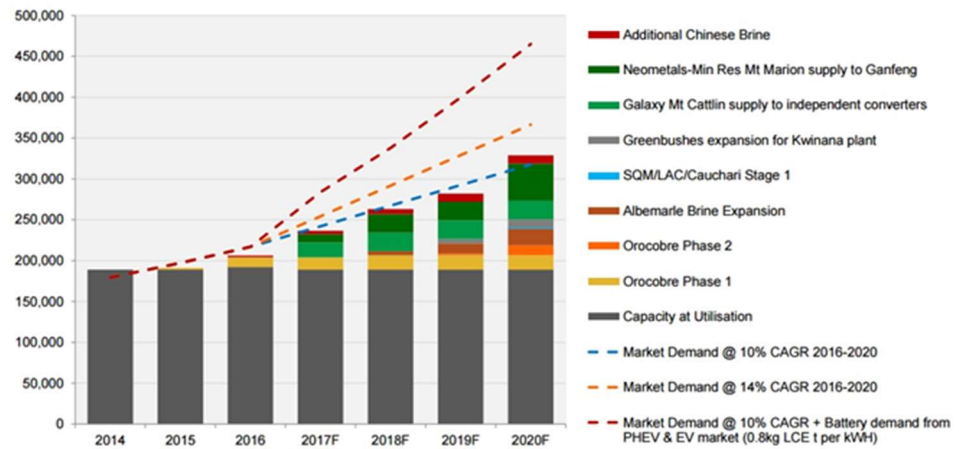


Figure 2. Forecast supply and demand growth rates (Source: Orocobre)

Roskill analyst David Merriman, believes that the lithium market has been in deficit since 2013. He notes that while stockpiles of minerals and concentrates have kept most end-processors well-supplied in 2016, an increased control of feedstock, and later refined product, has led to a virtual tightness in lithium supply. At the same time, lithium demand has already significantly outpaced supply.

As consequence, the lithium price has increased significantly as presented in Figure 3. The prices are based on yearly averages and do not depict recent volatility which led to significantly higher short term prices.

Recent short term prices have been significantly higher than yearly averages ...

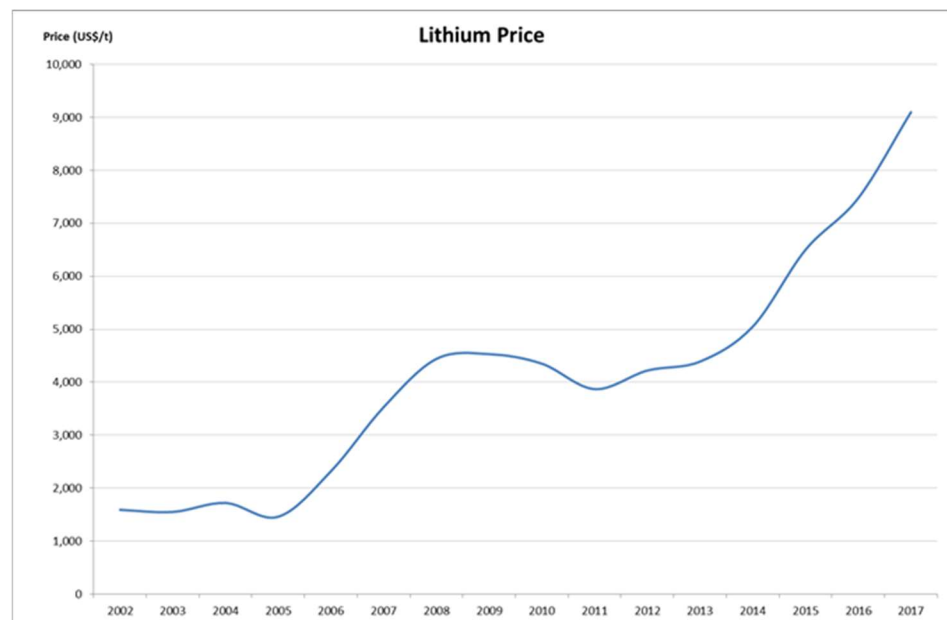


Figure 3. Average lithium prices (LCE) (Source: Metalary.com)

Spot prices in China have reached US\$25,000 t in 2016, compared with long-term contract prices of US\$4,000-US\$7,000 t. reflecting its scarcity.

Given the positive supply/demand fundamentals and increasing yearly average lithium prices, Breakaway Research has used a flat US\$10,000/t lithium carbonate equivalent (LCE) price in its forecasts.

## Lithium Supply Characteristics

There are two main sources of lithium – brine deposits and hard rock spodumene deposits. Lepidico's L-Max® technology is applicable to hard rock deposits but can process minerals other than spodumene.

*Breakaway Research has assumed a US\$10,000/t LCE price...*

### Production for Brine Deposits

Production from brine deposits (for e.g. SQM's Salar de Atacama operation in Chile) involves the pumping of lithium rich brines from salt lakes, followed by concentration in evaporation ponds. From this, the concentrated solutions are processed to end products, including lithium carbonate. Common by- or co-products include potassium and boron salts.

*Lithium is derived from two sources: brine deposits and hard rock deposits ...*

Key points that affect potential brine operations include lithium content, magnesium content (this is relatively expensive to remove, with a rule of thumb stating that the ratio of Mg to Li in brines must be below 10:1 for a brine deposit to be economic. Also high evaporation rates result in lower costs as smaller ponds and shorter residence times are required.

### Production from Hard Rock Deposits

Spodumene (which is a lithium pyroxene –  $\text{LiAl}(\text{SiO}_3)_2$ ) deposits are commonly hosted in pegmatites, and are mined by conventional open cut mining. The ore is processed by crushing and grinding, and extraction using a mixture of gravity, heavy media separation, magnetic separation and flotation to produce a spodumene rich concentrate.

Two concentrate qualities are often produced from the same deposit – a premium technical grade ("TG") concentrate and a chemical grade ("CG") concentrate, dependent upon customers' requirements. A common by-product is tantalite and other tantalum minerals. The concentrate is then further treated to produce  $\beta$ -spodumene for ceramics, and LCE for other uses.

### Current Major Suppliers

Chile's SQM and U.S. companies FMC Corp and Albemarle Corp dominate the production landscape, extracting lithium from salt lakes in Chile and Argentina. Albemarle also operates a brine operation in Nevada. The fourth producer is Australia's Talison, which produces lithium at the Greenbushes hard rock mine in Western Australia. Talison is 49%-owned by Albemarle and 51% by China's Tianqi Lithium, which takes most of the mine's output for processing in China.

*Lithium from hard rock deposits is normally derived from spodumene ...*

### L-Max® Technology Overview

The L-Max® technology is a proprietary process that is the subject of International Patent Application which is pending in 148 countries. The process allows the extraction and recovery of lithium from lithium bearing micas such as lepidolite and zinnwaldite in comparison to spodumene (pyroxene) which is present in the traditional hard rock deposits.

*The L-Max® Technology is applicable to other lithium minerals...*

These Li-rich micas minerals have largely been overlooked as a source of lithium until the advent of L-Max® which now presents a commercially viable process.

*In particular, it is applicable to lithium bearing micas such as lepidolite...*

Lithium bearing micas have been overlooked in many deposits ...



Figure 4. Lepidolite (purple) and Zinnwaldite minerals. (Source: Company)

They may also be present in historical tailings ...

There are two significant opportunities to source lithium bearing micas:

1. Li-rich mica pegmatites have typically been overlooked as an exploration target with many opportunities available to now secure
2. At mining operations Li-rich micas have typically reported to tailings. These tailings could provide an easily exploitable resource.

The Company has been actively investigating opportunities which fall into the above categories and building a portfolio of resources and exploration targets to source ore for the application of the L-Max® technology.

### Process Description

Pilot plant trials have demonstrated a 94% recovery...

L-Max® is a hydrometallurgical process that involves the direct atmospheric leach of lithium micas, followed by impurity removal stages and the subsequent precipitation of lithium carbonate.

And producing lithium carbonate with a purity > 99.5% ...

The Company has completed a 140 hours mini-plant trial utilising the L-Max® technology. The plant was successful in processing a lepidolite concentrate to achieve a 94% recovery, producing a lithium carbonate with a purity >99.5%.

The mini-plant trial also produced various by-products from the leach liquor generated including potassium sulphate, sodium silicate and caesium/rubidium formate.

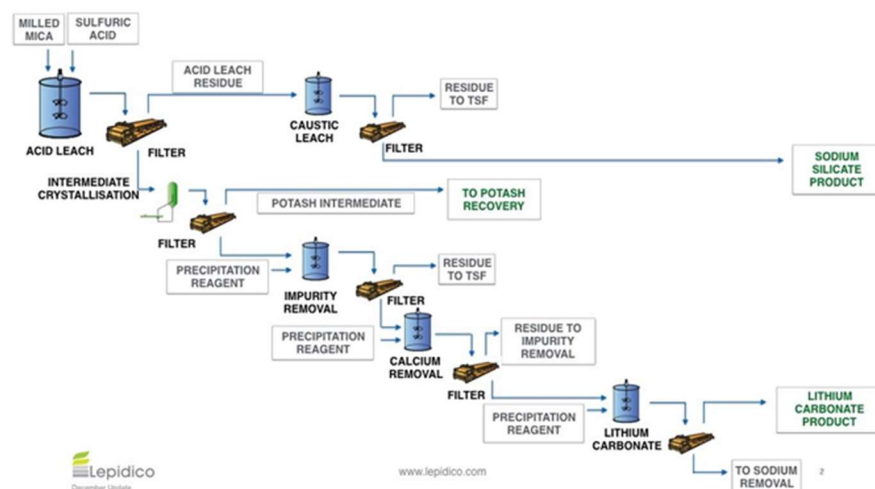


Figure 5: The L-Max® Flowsheet (Source: Company)

The mini-plant trial set up is depicted in Figure 6.



Figure 6. Mini-plant trial (Source: Company)

### **Plant Pre-Feasibility Study – Phase 1**

*The positive mini-trial led to commissioning a PFS late last year...*

The successful mini-pilot plant trials encouraged the Company to commence the Pre-Feasibility Study (“PFS”) for a Phase 1 plant development utilising the services from its lead consultant, MinMet Services Pty Ltd.

The Study investigated technical aspects and the viability of a small scale commercial L-Max<sup>®</sup> plant which would process a lithium-mica concentrate feed at a rate of 3.6 tonnes per hour (tph) to produce approximately 3,000 tonnes per annum of battery grade lithium carbonate and a suite of valuable by-products.

*The PFS is now completed and again reaffirms positive findings ...*

Key findings were:

- The flowsheet can cater for variations in feed mineralogy
- A single plant could be fed with multiple feed sources
- The process uses readily available lower cost chemicals in an atmospheric pressure, low temperature (c. 100° C) leaching environment
- Battery grade LCE can be produced directly from the process and several valuable by-products
- By-product credits will completely offset the cash cost of LCE production
- The process residue is stable and benign
- First production of the Phase I Plant is planned for the second half of 2019

*Kenora, Ontario is the proposed site of the first production facility ...*

As expected, it was also found that the project economics are enhanced by having the plant in proximity to feed sources, reagents and final product markets. As a consequence, the Company is planning to locate the first plant in Kenora, Ontario. Kenora has a population of 15,000 and is on the Canadian Pacific Railway, located 200 km east of Winnipeg, Manitoba.

It is also 80 km south of the Separation Rapids Lithium Deposit which will provide the feed material for the plant.



Figure 7. Kenora location map (Source: Google Maps)

*It is also near the Separation Rapids Lithium Deposit which can provide feedstock ...*

### Separation Rapids Lithium Deposit

The deposit is reported as one of the largest “complex-type” lithium pegmatite deposits in the world and is owned by Avalon Advanced Materials Inc (TSX: AVL). Avalon has reported a petalite resource totalling:

- 9.63 Mt @ 1.31% Li<sub>2</sub>O, 39% feldspar, 0.006% Ta<sub>2</sub>O<sub>5</sub>, 0.02% Cs<sub>2</sub>O, 0.36% Rb<sub>2</sub>O

*Avalon can focus on developing its petalite resource...*

While Avalon is focusing on the development of this petalite resource, there is also a separate outcropping lepidolite zone which is amenable to L-Max<sup>®</sup> processing. This zone is the target of resource drilling which is scheduled to commence this month and be completed in the June Quarter.

*However, there is also a lepidolite zone which may provide the feedstock for Lepidico ...*

Avalon reports that it has entered into a non-binding letter of intent under which it is contemplated that Avalon would sell a minimum of 15,000 tpa of lepidolite concentrate produced from Separation Rapids Lithium Project to Lepidico for processing at Lepidico’s planned Phase 1 commercial lithium carbonate production facility.

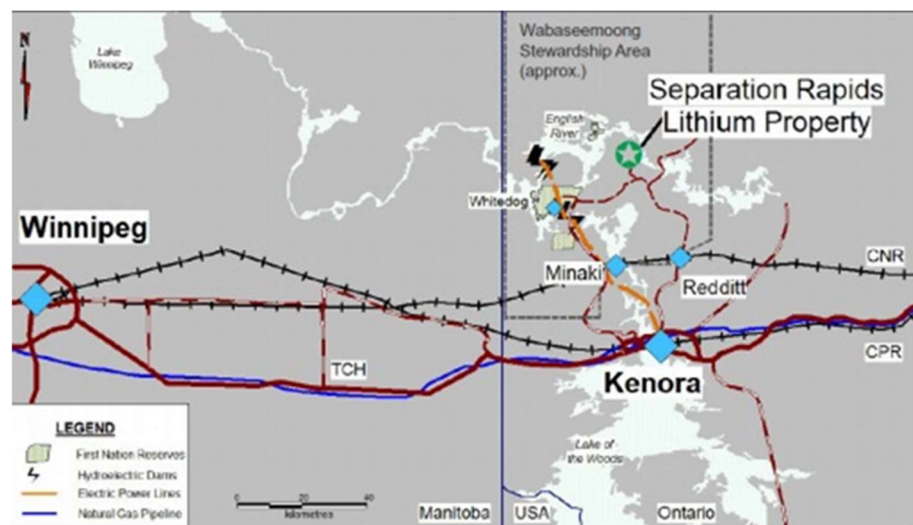


Figure 8. Kenora and Separation Rapids location map (Source: Company)

## Definitive Feasibility Study

*The Company has commenced a DFS given the robust economics established in the PFS ...*

The encouraging findings from the pre-feasibility study have led the Company to move forward in planning a Definitive Feasibility Study.

The Phase 1 project DFS will involve:

- Plant throughput 29,000 tpa of lithium-mica concentrate
- Production of 3,000 tpa lithium carbonate equivalent (LCE, battery grade)
- Average targeted C1 Costs of nil or negative after by-product credits
- Average targeted C3 Costs in the US\$1,000 to US\$2,000 /t range after by-product credits and amortisation of expected development and sustaining capital
- Estimated study costs of US\$5 m and Development Capital Expenditure of US\$35-40 m including 20% contingency
- By-products include sulphate of potash (SOP), caesium, tantalum concentrate and sodium silicate

*The Company has provided a high level of project disclosure ...*

While the DFS parameters are estimates, they are supported by the pre-feasibility findings. The Company has been exemplary in its disclosure of the expected operating parameters and with costs generally sourced from third party suppliers. Breakaway Research has used this data to ballpark the potential value of the project.

However, it is first important to appreciate the relationships between the concentrate supplier and Lepidico and therefore the basis for Lepidico to estimate its production rates and costs.

*The relationship between the Company and Avalon means that Avalon will supply a lepidolite rich concentrate ...*

The following table outlines the processing of ore by Avalon Advanced Materials Inc. at its Separation Rapids Lithium Deposit and sale of a lepidolite concentrate to Lepidico for processing using the L-Max® technology.

Responsibility	Parameter	Value/Quantity
Avalon/third party suppliers produce a Li rich concentrate	Ore processed (tpa)	61,790
	Grade (Li <sub>2</sub> O)	2.2%
	Recovery	96%
Purchased from Avalon/third party suppliers by Lepidico	<b>Lepidolite concentrate purchased (t)</b>	<b>29,000</b>
	Grade (Li <sub>2</sub> O)	4.50%
	Recovery	94%
	Conversion factor to Li metal	0.464
	Contained lithium metal (t)	569
	Conversion factor to lithium carbonate	0.188
Produced by Lepidico	<b>Lithium Carbonate production (t LCE)</b>	<b>3,028</b>

Figure 9. Relationship with feedstock source to Lepidico's proposed processing facility at Kenora location map (Source: BR, Company)

*There are significant by-product credits ...*

The Company has also provided details on the quantities of by-products it expects to produce in conjunction with 3,000 tpa of Lithium Carbonate. These are outlined in Figure 10.

Sodium silicate is not well known but is a widely used product and is used in adhesive, drilling fluids, concrete and general masonry treatment products, detergent auxiliaries, used in water treatment, used in refractories and in dyes.



Product	Annual Production (tpa)
Lithium Carbonate (>99.5%)	3,000
Sulphate of Potash (SOP) (>95% K <sub>2</sub> SO <sub>4</sub> )	3,000-4,000
Sodium Silicate (40wt% solution at SiO <sub>2</sub> :Na <sub>2</sub> O ratio of 2)	40,000-50,000
Caesium (as metal contained in formate)	10-100
Tantalite Con (30% Ta <sub>2</sub> O <sub>5</sub> )	20-25

Figure 10. Forecast lithium carbonate production and by-products from the Phase 1 project. (Source: Company)

Unit costs are estimated at US\$1,129/t of conc. processed...

In terms of costs, the Company has completed investigations to a relatively high level of confidence. It forecasts a total unit cost of US\$1,129 per tonne of lepidolite concentrate processed as outlined in Figure 11. This includes the cost the lepidolite concentrate provided by a third party source and its transport to the Lepidoco's proposed L-Max<sup>®</sup> processing plant.

Item	US\$/t of concentrate processed
Concentrate purchase	350
Concentrate transport	4
Inbound consumables logistics	144
Consumables FOB	286
Processing costs other	186
Sales, marketing, and outbound logistics	55
General and administration	104
<b>Total Unit Cost</b>	<b>1129</b>

Figure 11. The composition of the estimated US\$1,129/t processing costs. (Source: Company)

Reagents are easy to source ...

The details of the quantities and costs of consumables itemised in Figure 11 at US\$286/t of concentrate processed are split out below in Figure 12. All components/reagents are relatively easy to source.

Consumable	Consumption rates kg/t	Estimated Cost of consumable (FOB) US\$/t
Sulphuric Acid (93%)	1,054	60
Limestone and Hydrated Lime	706	38/120
Sodium carbonate	143	239
Caustic Soda (50% solution)	614	207
Formic acid	13	600
Natural Gas	7.6 GJ/t	\$3.38/GJ

Figure 11. Consumable usage and estimated costs. (Source: Company)

Operating costs are a key component of the project economics. These are summarised in

Figure 12. Not surprisingly with the level and the value of the by-products, the C1 cash costs are forecast to be below zero on a per tonne of Lithium Carbonate production basis. In our analysis below, we have used the upper level of the projected C3 costs after by-product credits.

*C1 operating costs are forecast to be zero after deducting revenue from by-product credits ...*

Parameter	Unit	Value
Plant throughput (concentrate)	tpa	29,000
Lithium Carbonate Production	tpa	3,000
LiC C1 cost (co-product basis)	US \$/t	4,000-5,000
LiC C3 cost (co-product basis)	US \$/t	5,000-6,000
LiC C1 cost (net of by-product credits)	US \$/t	less than zero
LiC C3 cost (net of by-product credits)	US \$/t	1,000-2,000

Figure 12. Estimated production costs for the Phase 1 DFS. (Source: Company)

Details on the estimated Capex has also been reported by the Company and we have reproduced these estimates in Figure 13. These have also incurred a relatively high level of rigour with a comparison of supplier quotes on key items.

*Capex estimates include a 20% contingency ...*

Item	US\$m
Feasibility Study and 2017 Owners Costs	5.0
L-Max <sup>®</sup> plant direct costs	16.2
L-Max <sup>®</sup> plant services	4.6
Infrastructure	2.6
Indirect costs	6.7
Contingency at 20%	6.0
<b>Total</b>	<b>41.1</b>

Figure 13. Capital costs estimates for the Phase 1 project. (Source: Company)

The cost curve below indicates that the Phase 1 project is extremely competitive on a C1 and C3 basis net of by-product credits.

*The forecast C1 and C3 positions are very competitive on the LCE cost curve ...*

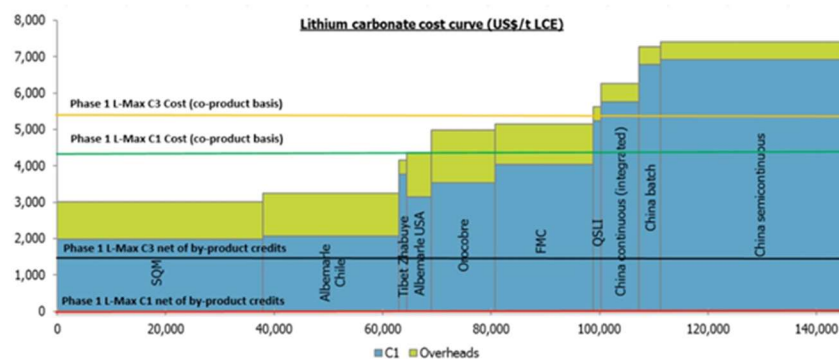


Figure 14. The Phase 1 positioning on a lithium production cost curve. (Source: Company)

## Indicative Valuation of the proposed L-Max® plant (Phase 1)

The detailed cost and operating parameters reported by the Company on Phase 1 DFS provides analysts with data to conduct a preliminary valuation.

We have estimated a valuation based on discounting expected cash flows in perpetuity and using a 10% discount rate. This is summarised in Figure 14 and indicates our assessed valuation for the Phase 1 DFS project involving the construction of a plant in Kenora, Ontario and sourcing the lepidolite concentrate from the Separation Rapids Lithium project nearby. Using a LCE price of US\$10,000/t, we estimate that the project has a value around US\$190 m although we caution that it is based on PFS parameters.

Valuation based on discounted perpetual cash flows	
Annual Lithium Carbonate (LCE) production (t)	3,000
Lithium price (US\$/t)	10,000
Gross revenue (US\$m pa)	30.00
<i>Less</i>	
Li concentrate processed	15,000
C3 operating costs (after by-product credits) US\$ per LCE t	2,000
Total operating costs (US\$m pa)	6.00
Annual sustaining capex (US\$m pa)	1.1
Annual cash flow (US\$m pa)	28.9
Effective tax rate*	20%
Post-tax cash flow (US\$m pa)	23.12
NPV at 10% discount rate (US\$m)	231
<i>Less</i>	
Capex for Phase 1 project (US\$m)	41.1
NPV at 10% discount rate (US\$m)	190.1

Figure 14. Phase 1 Project Valuation (Source: BR)

\* We have used a 20% tax rate to reflect a realistic tax rate that would be applicable after D&A deductions and reinvestment.

We assess a project valuation of US\$247m based on the PFS estimates and a US\$10,000 LCE price ...

This provide a 3 to 4 time uplift to the Lepidico share price if it is assumed that Lepidico will raise the US\$41m required to finance the project at its current share price (unlikely). This is outlined in Figure 15.

This uplift would be expect to occur as the project meets critical milestones such as a positive DFS, securing financing, and project development.

Based on our conservative financing assumptions, we estimate the project value could deliver a 3.4x increase in the share price as it moves towards production in 2019 ...

NPV at 10% discount rate (US\$m)(from above)	190.1
AUD/USD	0.76
NPV at 10% discount rate (A\$m)	250.1
Lepidico enterprise value (EV)	19.1
Dilution in raising capex (assume 100% equity financed)	54.1
Lepidico - fully diluted to finance Phase 1 Project	73.2
Multiple uplift on EV	3.4

Figure 15. Project value in comparison to the enterprise value of Lepidico. (Source: BR)

The encouraging feature of this valuation is that it is only represents the Phase 1 project and doesn't assess the value of Phase II expansion or the ability to replicate this business

model with other projects as outlined in the next section.

In Figure 16, we have adjusted the number of Lepidico (LPD) shares on issue to reflect a situation where the entire Phase 1 capital is funded by a share issue at the current share price. This has also been diluted for LPD issued options. The value per share is 4.3 cents, a substantial premium to the current share price.

*The fully financed Phase 1 project on a NPV<sub>(10%)</sub> basis is valued at 4.3 cents per LPD share ...*

Shares & options now on issue (m)	1902.3
Additional shares need to finance Phase 1 (A\$m, net of cash raised from option exercise)(m)	3888.9
Total shares on issue post financing (m)	5791.2
Project NPV at 10% discount rate (A\$m)	250.1
Value per share (A\$)	0.043

Figure 16. Project value on a per LPD share basis after financing by a share issue at \$0.013 share price (Source: BR)

*Lepidico is looking for other sources of applicable mineralisation...*

### Other Project Opportunities

Lepidico has been actively seeking projects (exploration through to projects with resources) that may provide mineralisation that will be amenable to L-Max<sup>®</sup> processing. The most recent has been the announcement of an ore access agreement with Grupo Moto over the Alvarrões lepidolite mine in Portugal

#### Alvarrões lepidolite mine

The Company has signed a binding term sheet with Grupo Mota, owner and operator of the Alvarrões lepidolite mine, located near the city of Guarda in northeast Portugal. Lepidico will undertake near mine drilling at Alvarrões with past open pit mining having extended 1 km in strike length. Under the agreement Lepidico will spend a minimum of €250,000 on exploration and drilling over an 18-month exclusive period. Exploration will also include evaluation of material from waste dumps, tailings and mine spill.

*It has recently announced an agreement with Grupo Mota in regard to this company's project in Portugal ...*

Other important projects include a farm in with Pioneer Resources in Western Australia and exploration of the Lemare lithium project in Quebec. We briefly mention these projects below, but it is important to emphasise that access to hard rock lithium 'non-spodumene' projects is not proving difficult and the cost commitments to enter joint venture arrangements are also not particularly high.

#### Pioneer Resources Joint Venture, WA

The Company recently announced it had signed a farm-in agreement with Pioneer Resources to earn a 75% interest in Pioneer's 'PEG009' lepidolite prospect located within the Pioneer Dome project near Norseman. The farm-in is by funding a drilling program to evaluate its lithium-mica resource potential, with the objective of delineating of at least 500,000 tonnes grading 1.2% Li<sub>2</sub>O. or more to earn a 75% interest. If this was successful, it would provide five years of feed for another Phase 1 L-Max<sup>®</sup> Plant

#### Lemare Lithium Project, Quebec

Under the terms of the Lemare Option Agreement, the Company is earning up to a 75% from the vendor, CRE. Lepidico has already spent C\$450,000 and is required to spend a further C\$350,000 on exploration by 31 March 2017 A first phase (1,000 m) will be drilled of a total 2,200 m programme. The target is the 600 m strike length of spodumene mineralised pegmatite discovered in late 2016 and where surface samples returned an average grade of 2.19% Li<sub>2</sub>O

## Other Lepidico Projects

Figure 17 is a map showing Lepidico's activities and projects across the world.



Figure 17. Project map (Source: Company)

## Market Capitalisation & Enterprise Value

*It has too many shares on issue and needs to consolidate...*

The enterprise value of Lepidico is estimated at A\$19.1m. The calculation is outlined in Figure 18. The number of shares on issue is very high and LPD will have to consider a consolidation in the future.

*Lepidico has a modest enterprise value of A\$19.1m ...*

Parameter		Value
Share price	A\$m	0.013
Shares issued	m	1750.5
Options issued	m	151.8
Market capitalisation	A\$m	24.7
<b>Less</b>		
Cash at 31 Dec 2016	A\$m	2.1
Cash raised from option exercise	A\$m	3.5
<b>Add</b>		
Debt	A\$m	0
<b>Enterprise value</b>	<b>A\$m</b>	<b>19.1</b>

Figure 18. Enterprise value calculation

Options issued are summarised in Figure 19.

Expiry	Number issued	Exercise Price	Amount Raised
30-Sep-17	27,750,000	0.030	832,500
3-Aug-18	40,000,000	0.018	726,000
31-Dec-18	9,000,000	0.010	90,000
31-Dec-19	50,000,000	0.025	1,250,000
31-Dec-19	25,000,000	0.025	625,000
<b>Total</b>	<b>151,750,000</b>	<b>0.023</b>	<b>3,523,500</b>

Figure 19. Issued options.

## Takeover Offer by Lithium Australia (LIT)

*The current takeover offer by LIT is priced below the current share price ...*

On 6 February 2017 LPD advised the market that it became aware that Lithium Australia NL (ASX: LIT) (“Lithium Australia”) intended to make an unsolicited, conditional offer to purchase all of the fully paid ordinary shares in Lepidico.

On 2 March 2017, Lithium Australia released its Bidder’s Statement and outlined an offer of 1 Lithium Australia share for every 13.25 LPD Shares.

Using the current LIT share price, the value of the offer per LPD share is less than the current share price of LPD (see Figure 19).

Lithium Australia share price	0.15
LPD offer: 1 LIT =	13.25 LPD shares
Value per LPD share =	0.011
Current LPD share price	0.013

Figure 20. Current value of the LIT takeover offer terms.

## Lepidico Director Backgrounds

*Non- Executive Chairman*  
**Mr Gary Johnson**

The Board comprises members which have experience of growing large companies including recently appointed MD Joe Walsh. The Chairman, **Mr Gary Johnson**, was instrumental in developing the L-Max® technology and also brings the experience of how to implement it.

*The Chairman has been instrumental in developing the process and is the major shareholder...*

**Mr Johnson** has over 30 years’ experience in the mining industry as a metallurgist, manager, owner, director and managing director possessing broad technical and practical experience in the strategies required to create successful mining companies. He is the managing director of the consulting business, Strategic Metallurgy Pty Ltd, and a director of Antipa Minerals Ltd and St Georges Platinum and Base Metals Ltd. He is also Lepidico’s major shareholder.

*Executive Managing Director*  
**Mr Julian “Joe” Walsh**

**Mr Walsh** is a resources industry executive and mining engineer with over 25 years’ experience working for mining companies and investment banks. Joe was the General Manager Corporate Development with Pan Aust and was instrumental in the evolution of PanAust from an explorer in 2004 to a US\$2-billion, ASX 100 multi-mine copper and gold company. Joe also has extensive equity market experience and has been involved with the technical and economic evaluation of many mining assets and companies around the world.

*Executive Director Exploration*  
**Mr Tom Dukovcic**

**Mr Dukovcic** is a geologist with over 25 years’ experience in exploration and development. He has worked in diverse regions throughout Australia and internationally in southeast Asia and Brazil. During this time he has been directly involved with the management of gold and copper discoveries in Australia and gold in Brazil.

*Non-Executive Director*  
**Mr Mark Rodda**

**Mr Rodda** is a lawyer with twenty (20) years private practice, in-house legal, company secretary and corporate consultancy experience. Mark currently manages Napier Capital, a business established in 2008 to provide clients with specialist corporate services and assistance with transactional or strategic projects. Prior to its 2007 takeover by Norilsk Nickel, Mark held the position of General Counsel and Corporate Secretary for LionOre International, a company with operations in Australia and Africa and listings on the Toronto Stock Exchange (TSX), London Stock Exchange and ASX. Mark is currently a director of Antipa Minerals Ltd.

## **Breakaway's View**

*The L-Max® technology represents a game changer in Li supply ...*

Lepidico (LPD) has developed the patented L-Max® technology with its Chairman and inventor, Gary Johnson, and has the team to demonstrate its commercial viability. The Company is now clearly focused on:

- The commercial implementation of the L-Max® technology by establishing a plant at Kenora and processing lepidolite concentrate from the Separation Rapids mine, both in Ontario.
- Securing resources in a number of other projects and locating plants in other strategic markets around the world.

*Robust economic provides an outlook of multiple share price increases towards production...*

The recent pre-feasibility study on the Phase 1, 3,000 tpa lithium production project has been completed at a high level of detail. Even at this Phase 1 stage, the project generates robust returns and has the capacity to provide a multiple share price uplift as the project's parameters are firmed up in the forthcoming Definitive Feasibility Study and the project is financed, constructed and moves towards commissioning in 2019.

*A new process, with proven components*

However the exciting aspect of the L-Max® technology and the Company's business model is its ability to be ramped up to higher production levels at Kenora (Phase 2 involves a production increase to 20,000 tpa LCE) as well as being replicated across a number of world-wide projects. The recently announced deal on the Alvarrões lepidolite mine in Portugal provides a potential second site in a European jurisdiction.

Meanwhile the takeover offer by Lithium Australia, albeit currently non-commercial terms relative to the share price, endorses the value of the L-Max® technology and provides underlying share price support. It has also generated momentum in Lepidico to ensure that the market understands the potential value of the L-Max® technology.

Hence Breakaway's recommendation is a *Speculative Buy* based the following factors:

- The robust economics of the Phase 1 project at Kenora which is likely to lead to a steadily increasing share price as this project moves to development
- The Company's inherent growth potential through moving to Phase 2 expansion at Kenora and also building new plants at other projects it has already identified
- The underlying endorsement of the technology and underpinning share price support created by the Lithium Australia takeover offer.

Share price drivers going forward will be largely related to the DFS findings on the Phase 1 Kenora project and the Company's ability to secure project finance. It will be influenced to a lesser degree by exploration developments on its existing joint ventures and the identification of new projects.

## Appendix 1. Lithium Notes

It has generally been accepted in the industry that production from brines is less costly than from hard rock mines mainly due to the elimination of mining costs. However recent studies have shown that brines generally have lower operating costs but higher capital expenditure than hard rock mines and typically take longer to bring into production, which make brine and hard rock projects broadly similar in comparative NPV terms. Hard rock deposits can also have some advantages in having less impurity variation than brine deposits.

The most common process to convert lithium mineral concentrates to lithium carbonate or hydroxide is the acid-roast method.

There are a wide variety of lithium compounds, so it is commonplace to refer to the lithium content in terms of lithium carbonate equivalent (“LCE”). Lithium carbonate for technical use generally requires a grade of 99.0 %  $\text{Li}_2\text{CO}_3$  and battery grade is at least 99.5%  $\text{Li}_2\text{CO}_3$  and commands a price premium.

Lithium grades are normally presented in percentages or parts per million (ppm). Grades of deposits are also expressed as lithium compounds in percentages, for example as a per cent lithium oxide ( $\text{Li}_2\text{O}$ ) content or a per cent lithium carbonate ( $\text{Li}_2\text{CO}_3$ ) content.

Lithium carbonate equivalent (“LCE”) is the industry standard terminology for, and is equivalent to,  $\text{Li}_2\text{CO}_3$ . Use of LCE is to provide data comparable with industry reports and is the total equivalent amount of lithium carbonate, assuming the lithium content in the deposit is converted to lithium carbonate. These conversion rates outlined in the following table provide a guide below to get an equivalent  $\text{Li}_2\text{CO}_3$  value in per cent.

Class	Tonnes	$\text{Li}_2\text{O}$	Total Feldspar	$\text{Ta}_2\text{O}_5$	$\text{Cs}_2\text{O}$	$\text{Rb}_2\text{O}$
	(Mt)	(%)	(%)	(%)	(%)	(%)
Measured	4.03	1.32	39	0.006	0.017	0.343
Indicated	3.97	1.26	39	0.007	0.025	0.362
Measured plus Indicated	8.00	1.29	39	0.006	0.021	0.352
Inferred	1.63	1.42	39	0.008	0.016	0.36





### **Analyst Verification**

I, Stephen Bartrop, as the Research Analysts, hereby certify that the views expressed in this research accurately reflect our personal views about the subject securities or issuers and no part of analyst compensation is directly or indirectly related to the inclusion of specific recommendations or views in this research.

### **Disclosure**

Breakaway Research Pty Ltd and the Breakaway Investment Group (AFSL 290093) may receive corporate advisory fees, consultancy fees and commissions on sale and purchase of the shares of Lepidico Ltd and may hold direct and indirect shares in the company. It has also received a commission on the preparation of this research note.

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