8 December 2016 | Gavin Van Der Wath

# European Lithium Limited

Stock Rating Buy  Price Target $0.18

ASX: EUR

European Lithium Limited (EUR) is a lithium development company, currently undertaking a PFS of its 100% owned Wolfsberg Lithium Project (WLP) in Austria. Value accretion is expected to occur regularly as development programme milestones are met. We value EUR at AUD64M or AUD0.18 per share based on peer comparison.

| EUR.AX | Buy |
|---|---|
| Price (as at 4pm AEDT, 7 Dec. 2016) | A$0.044 |
| Target Price | A$0.18 |
| Up/Downside | +409% |
| 52 Week Range | A$0.14-$0.044 |
| Shares Outstanding | 362M |
| Shares Escrowed | 206M |
| Market Cap | A$16M |
| EV (estimated) | A$12M |

**Top 5 Shareholders**

| No. | % | Name |
|---|---|---|
| 1 | 14 | Dempsey Resources Pty Ltd |
| 2 | 9 | Exchange Minerals Ltd |
| 3 | 4 | Anglo Menda Pty Ltd |
| 4 | 4 | HR Moser & Associates |
| 5 | 3 | Delecta Ltd |

**Price Chart**


## Electric Vehicles Lead Demand Explosion

Although the consumption of lithium has experienced exceptional growth since 2000, we believe that demand is expected to burgeon over the next decade as the increasing political and consumer focus on environmental consciousness is expected to drive vehicle demand for lithium-ion hybrids (HEV), plug-in hybrids (PHEV) and fully electric vehicles (EV). These require large format batteries that require kilos of lithium, rather than the grams used today in portable electronic applications. This is reinforced by huge investment in electric vehicles by all the major car manufacturers and announcements of investment in battery manufacturing facilities.

## Unmatched Strategic Position

Europe has declared lithium to be of strategic value as it is import dependent. It is the second largest market after China and currently consumes 28% of lithium production. With the current oligopolistic situation in the lithium market, continuity of supply is of paramount importance to incumbent consumers as well as the new battery manufacturing facilities that have been (and are expected to be) announced in Europe. EUR's WLP is one of the few advanced European based projects able to fill this niche as well as providing supply diversification. The proximity to markets will also permit by-products (quartz, feldspar and mica) to be monetised.

## Management Deliver First Milestone

Managements first objective was to validate the previously declared Inferred Resource of 3.7mt @1.5% $Li_2O$ and they have delivered spectacularly with a Measured & Indicated Resource of 6.3Mt @ 1.2% $Li_2O$. Tonnage is up 75% and contained $Li_2O$ is up by 33%. The project's consolidated land holding of exploration and mining licences is expected to yield a significant lithium resource. A single drill hole reached a depth of 450m in Zone 1, the Northern limb of an anticline structure, and further drilling to this depth along strike is expected to demonstrate vein continuity and to significantly increase the resource, which remains open at depth and along strike. Exploration upside also exists in Zone 2, the Southern limb of the anticline, which could have a similar resource to that expected in Zone 1.

## Options For Early Production

The operation lends itself to an early production strategy and timeline. Bulk trial mining has been undertaken and completed and mining permits remain current. The University of North Carolina has completed metallurgical studies where the primary process and grade recovery was confirmed. Besides investigating a battery grade lithium carbonate and/or hydroxide plant as part of the PFS, management are also evaluating the fast track production of a spodumene concentrate for the European glass-ceramic market for early cash flow.

# Valuation

## Summary

*We value EUR at AUD0.18 per share*

We have used Enterprise Value (EV) per $Li_2O$ resource tonne of peer companies as the primary measure of our valuation methodology. Our valuation and share price target has been based on an expected resource previously reported of 16.9Mt @ 1.27% $Li_2O$. This results in an EV of AUD59M at an average peer comparison value of AUD275/t, which translates into a market capitalisation of AUD64M after cash of AUD5M added. This is equivalent to AUD0.18 per share.

## Peer Comparison

*We expect rapid validation of an Inferred Resource of around 17Mt @ 1.3% $Li_2O$*

The WLP previously had a JORC (2004) Measured, Indicated and Inferred Resource of 16.9Mt @ 1,27% $Li_2O$ for Zone 1, but due to the drill core being lost and supporting primary documentation not being available the competent person revised the resource to an Inferred Resource of 3.7Mt at 1.5% $Li_2O$ under the 2012 JORC Code.

EUR has found most of the primary supporting documentation and has completed verification of the initial results. The current reported Measured and Indicated Resource of 6.3Mt @ 1.2% has exceeded our expectations of the validation of the initial resource. In addition the company has extended its exploration focus to include the other limb of the anticline (Zone 2). We believe that within the space of 12 months the original JORC (2004) Measured, Indicated and Inferred Resource will be validated, forming the basis for our valuation.

FIGURE 1: COMPANY COMPARISON

*The average EV/resource tonne is AUD275/t*

| Company | Inferred Resource | $Li_2O$ (Mt) | EV (AUDM) | EV/Res AUD/t$Li_2O$ |
|---|---|---|---|---|
| Pilbara Minerals Ltd ASX: PLS | 128.6Mt @ 1.22% $Li_2O$ | 1.57 | 433 | 275 |
| Altura Mining Ltd ASX: AJM | 39.2Mt @ 1.02 $Li_2O$ | 0.40 | 138 | 347 |
| European Metals Holdings Ltd ASX: EMH | 37Mt @ 0.8% $Li_2O$ | 0.30 | 60 | 202 |
| Neometals Ltd ASX: NMT | 8.3Mt @1.36% $Li_2O$ | 0.11 | 118 | 1 037 |
| Galaxy Resources Ltd ASX: GXY | 39Mt @1.15% $Li_2O$ and 0.44Mt $Li_2O$ | 0.89 | 602 | 677 |
| **Average** | | | | **508** |
| **Average (PLS, AJM, EMH)** | | | | **275** |
| European Lithium Ltd ASX: EUR | 6.3Mt @ 1.2% $Li_2O$ | 0.08 | 21 | 275 |
| European Lithium Ltd ASX: EUR | 16.9Mt @ 1.27% $Li_2O$ | 0.21 | 59 | 275 |

*Source: Company Reports, EverBlu Estimates*

*Current share price only reflects current resource value*

We have used Pilbara Minerals, Altura Mining and European Metals as our principal peers. Galaxy Resources and Neometals' projects have commenced production and construction and that value is reflected in their share price. This does give an idea of the significant upside value should the project be developed. Furthermore the share price only reflects the value inherent in the current resource but has no value attributed for any increase.

## SWOT Analysis

### Strengths

Significant land holding of granted exploration and mining licences

Known geology

Bulk sampling has been carried out

Historical adit and underground workings show competent mining conditions

Comprehensive metallurgical studies completed by University of North Carolina

Operating in known and developed region

Strategic Central European location close to markets

Experienced management & operational team

PFS underway

### Opportunities

Huge upside in resource estimation

Early cash flow generation through concentrate production

Favourable policies towards electric vehicles

Increasingly stringent pollution regulations

Electricity grid energy storage

Lower battery costs driven by research and further efficiencies

Carinthia can access up to 20% of capex for the project as grants from EU programmes

### Threats

Substitution of lithium compounds

Alternate battery technology

### Weaknesses

Low oil price favours incumbent internal combustion engines

Current low resource estimate

## The Wolfsberg Lithium Project

### Background

The WLP is located 20 km from Wolfsberg, in the community of Frantschach St Gertraud, Austria and is close to supporting infrastructure, roads, rail and cities. Other mining activities are already established in the area. This project has a strategic location for mining and supply of lithium to European markets.

*Located 20 km from Wolfsberg, in the community of St Gertraud, Austria*

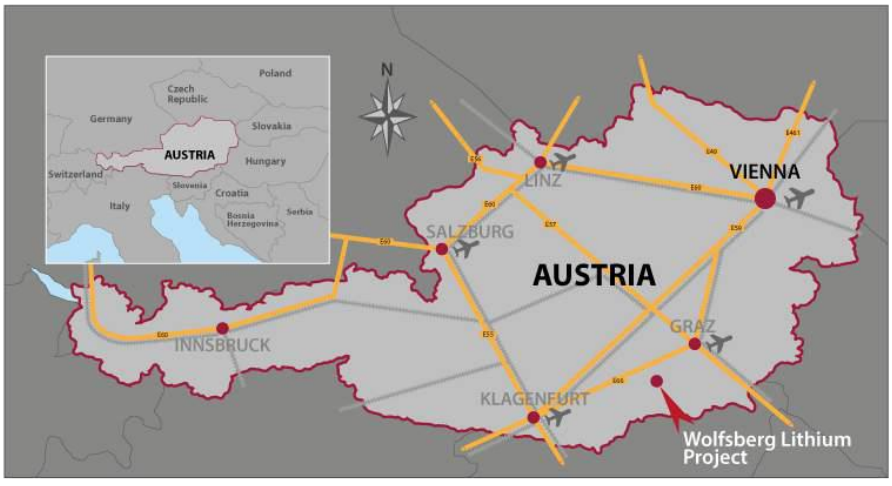
Minerex, an Austrian government company, discovered the Wolfsberg lithium deposit in 1981. Following extensive technical and commercial studies it was decided in 1988 not to develop the project.

The project was then taken over by Bleiberger Berwerksunion (BBU) a lead-zinc miner also operated by the Austrian Government. BBU abandoned their development plans three years later and all of the mineral tenements as well as the underground infrastructure were sold to Karntner Montanindustrie GmbH (KMI). KMI continued to carry out all the necessary works and other requirements specified by the authorities to maintain the mine and the exploration licences in good order.

In 2011, ECM Lithium AT GmbH acquired the WLP from KMI for €9.7M plus 20% VAT. ECM Lithium AT GmbH was beneficially owned by Global Strategic Metals (GSM) (80%) and Exchange Minerals, a private company (20%), through the BVI company ECM Lithium AT (Holdings) Ltd. This company was renamed European Lithium Ltd, following a demerger of GSM's interest in the company through an in specie share distribution to shareholders. GSM spent a further €1.83M on exploration and development including drilling, a scoping study and the extraction of two 500 tonne bulk samples in October 2013. EUR is obliged to pay Exchange Minerals a royalty of €1.50 per dry tonne of 'all mineral product' sold as part of the deal. EUR re-listed on the ASX in September 2016 following a RTO of Paynes Find Gold by sale of the BVI company holding the Austrian assets, European Lithium AT (Investments) Ltd, to it. Paynes Find Gold was renamed European Lithium Limited.

FIGURE 2: AUSTRIA AND THE WOLFSBERG LITHIUM PROJECT

*Close to supporting infrastructure*




*Source: Company Reports*

### Development Programme

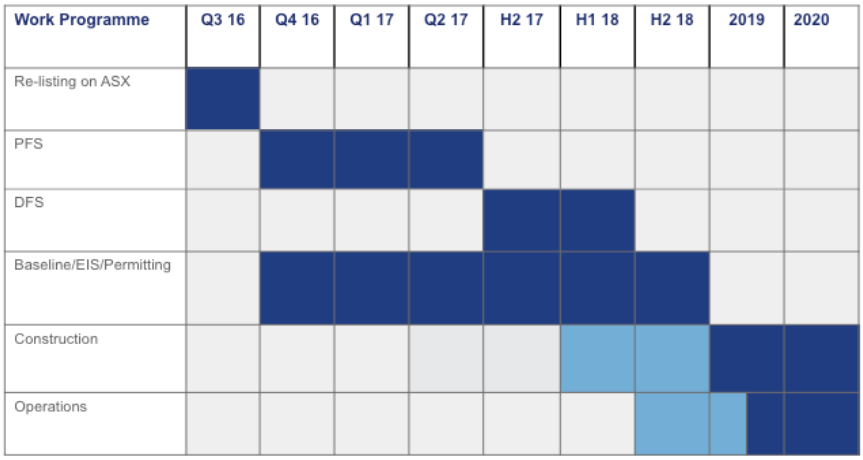
After the recent Minerex data verification and declaration of the upgrade of the resource compliant to JORC Code (2012), the project has entered the Pre-

feasibility stage. This will involve the following major steps.

- Increase resource by drilling down dip in Zone 1
- Establish a resource in Zone 2
- Establish the most suitable mining method and maximum production rate and establish the optimum process for recovery of lithium concentrate, marketable by-products and battery grade lithium products
- PFS to evaluate the Project economics and configuration for the optimal route of development.
- Introduce products to potential offtakers
- Determine permitting requirements and conduct environmental base line studies
- Determine scope, budget and schedule for a DFS and EIA
- Consider opportunities for fast track concentrate production in particular the early production of DMS concentrate for glass-ceramic producers in Europe

*Production is expected to commence in 2019*

FIGURE 3: DEVELOPMENT PROGRAMME




*Source: Company Reports*
** light blue indicates fast track DMS*

*Fast tracking DMS could advance production and generate early cash flow*

The company has engaged specialists for almost all these major steps.

- Geology Adviser - Dr Richard Göd (ex Chief Geologist Minerex) (Austria)
- Exploration Management – Technisches Büro für Geologie (Austria)
- Drilling contractor (underground) – Swietelsky (Austria)
- Drilling contractor (surface) – VA Erzberg (Austria)
- Competent person for JORC reporting – Don Hains (HainsTech) (Canada)
- Metallurgical test work – Dorfner Anzaplan (Germany)
- Mine design studies – tba
- Permitting regime – Haslinger Nagele (Austria)
- Environmental studies – Umwelt Büro (Austria)
- Marketing - MiDevCon (Germany)
- PFS Engineering and study integration - tba
- Liaison with Austrian Authorities – KMI (Austria)

*Consultants have been engaged*

## Exploration And Resources

The project consists of 54 Exploration Licences (ELs) covering a total non-overlapped area of 1,133 hectares with part of this same area covered by 11 Mining Licences for a total area of 52.8 hectares within the ELs.

The original 22 exploration licences were extended for another five years by

decree of the Mining Authority on 22nd September 2014 with new licence expiry dates of 31 December 2019. Exploration licences can be renewed for 5 year periods following exploration work on at least one licence. There is no expiry date on a mining licence provided the terms of the mining licence are fulfilled. The bulk mine samples taken in 2013 fulfilled the mining requirements to start mining within 2 years of obtaining the mining licence. The company applied for an exemption from undertaking additional mining whilst technical studies are in progress and an exemption was extended for years 2016 and 2017 in a decree from the Mining Authority dated 3rd November 2015.

Minerex completed exploration work and estimated a Resource to German reporting standards of 18Mt @ 1.3% $Li_2O$, work included:

- 35 surface trench excavations with 200 samples,
- 78 surface diamond drill holes for 12,012 metres,
- 34 underground diamond drill holes for 4,715 metres,
- 1,389m of decline and underground mine development with channel sampling of the pegmatite dykes
- 1,607 assays

*Original Inferred Resource upgraded to a Measured and Indicated Resource of 6.3Mt @ 1.2% $Li_2O$ with significant upside*

Following acquisition of the project, the former owners (GSM), declared the project as 16.9Mt @1.27% $Li_2O$ compliant to JORC Code (2004) guidelines. For current reporting the independent geological consultants engaged for the re-listing prospectus did not consider them valid under JORC Code (2012) guidelines due to the lack of drill core, original source documentation on the drilling methods, core recoveries, sampling, QA/QC, chemical analysis and other procedures. AM&A consequently revised the JORC Code (2004) Measured Resource to JORC Code (2012) Inferred Resource of 3.7Mt @ 1.5% $Li_2O$.

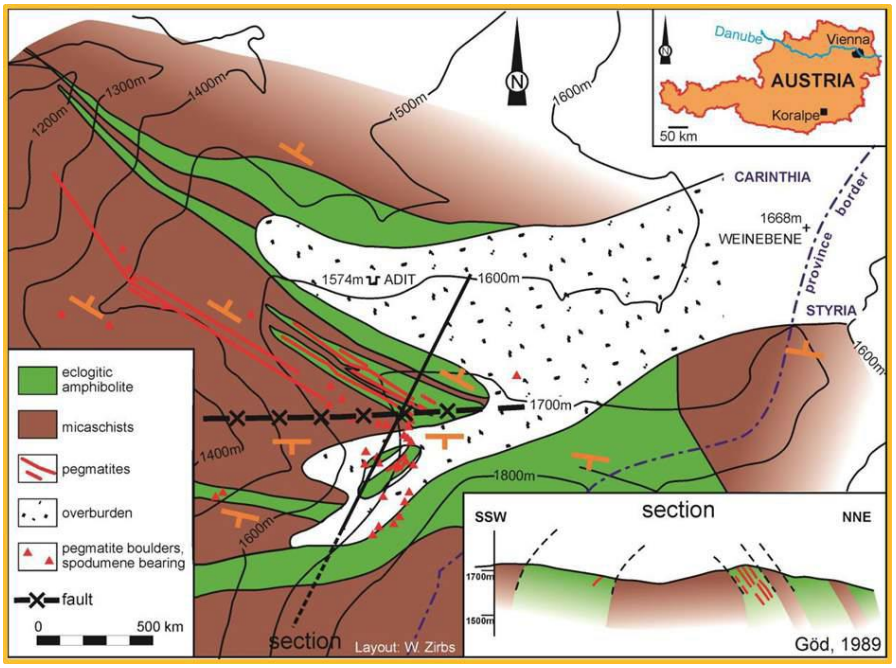
Considerable primary data has now been located and recovered from the archives of the Mining Authority in Vienna. Drilling to verify the original Minerex data was completed in September 2016. Seven twin holes were drilled totalling 828m intersecting numerous pegmatite veins and down hole surveys were taken. Channel samples were taken along two tunnels following AHP (Amphibolite Hosted Pegmatites) veins and one following MHP (Micaschist Hosted Pegmatites).

Following a verification programme of the Minerex data, under a comprehensive QA/QC protocol, the primary data was used to prepare an upgraded Measured and Indicated Resource of 6.3Mt @1.17% $Li_2O$ compliant to JORC Code (2012) with tonnage up 75% and contained $Li_2O$ up by 33% to 74kt. No cut-off was been quoted due to the following reasons:

- the added value of the by-products (feldspar, quartz, and mica) which are able to be monetised by the company as a result of its proximity to the markets in Central Europe; and
- mining practicalities dictate that the full vein from hanging wall contact to footwall contact will be mined with contacts distinguishable visually.

Internal dilution, however, has been included in the resource, which has resulted in a slightly lower grade than the initial Inferred Resource.

FIGURE 4: WOLFSBERG DEPOSIT - PLAN




*Source: Company Reports*

*Spodumene bearing pegmatites contained in schists and amphibolites*

*Zone 1 remains open down dip and along strike*

The deposit known as Zone 1 has been drilled down dip to a maximum depth of 450 metres. Lithium bearing pegmatite veins up to 5.5 m wide were intersected and the ore body remains open along strike to the northwest and down dip. In addition, there is an exploration target known as Zone 2, which has been demonstrated to be the southern limb of an anticline of which the northern limb, Zone 1, has been the focus of all the exploration to date.

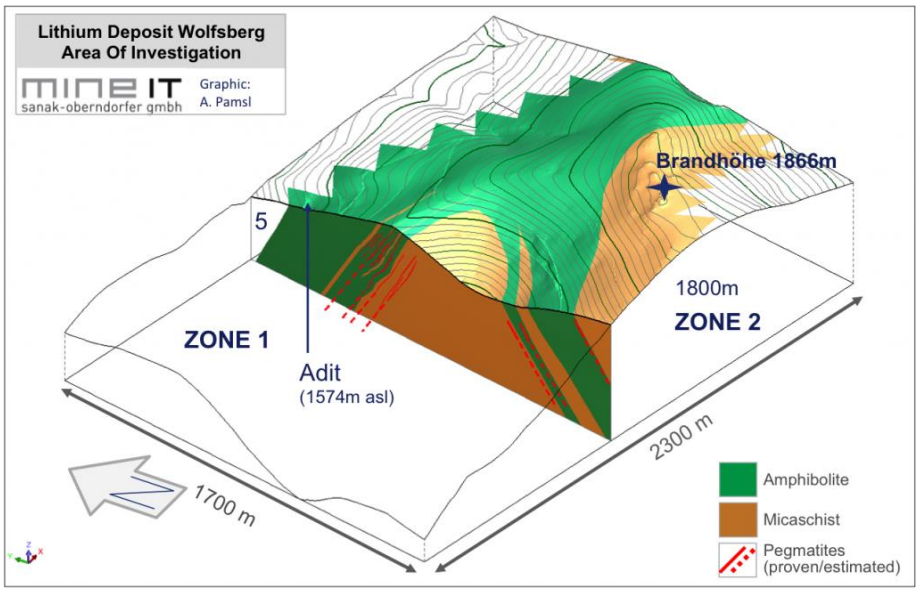
*Zone 2 has been the focus of current exploration*

Exploration work completed to date includes geological mapping, structural mapping and interpretation, geochemical soil surveys, pitting, trenching, drilling, development of an underground access decline and drives along selected veins, underground trial mining and excavation of two 500t bulk samples from each of the two ore types.

In general, the exploration results have been very positive, identifying substantial resources of lithium mineralisation which EUR intends to further explore and evaluate with a view to delineating additional high grade commercially viable lithium resources.

It is the opinion of the Competent Person that with further exploration this project has the potential to host additional economic lithium resources and warrants further detailed exploration. Future exploration programs are expected to comprise a range of exploration techniques with a focus on trenching, geophysical surveys where applicable, (to provide further insight into local structural features that may have influenced control on mineralisation emplacement) and subsequent drilling and evaluation.

FIGURE 5: ZONES 1 & 2




*Source: Company Reports*

## Mining

*Competent mining conditions support bulk mining methods*

The Minerex drilling data was utilised to develop a three-dimensional resource model for use in mine planning. The Montanuniversitat Leoben carried out rock mechanics studies. Boliden, an international mining company, also undertook underground mining studies, including trial mining, and they concluded that both long hole open stoping and cut-and-fill mining were suitable mining methods. It is a testament to ground conditions that the workings remain competent today after almost 40 years.

Austroplan, a consulting group within the Government OEIAG, was engaged by Minerex to prepare a Feasibility Study on the project. Austroplan recognised that the work was not as detailed as would normally be expected for a feasibility study and it should be considered a pre-feasibility study.

Following the acquisition of the WLP, GSM undertook exploration drilling in 2012 on the southern limb of the anticline, which confirmed the structural interpretation, and presence of lithium bearing pegmatite veins. Mining was undertaken in 2013 to validate the mining license and to collect 500 tonne bulk samples from the two ore types for metallurgical testing.

Following the declaration of a measured and indicated resource the Company has reported that mine design studies will commence to determine optimum mining methods and production rate.

FIGURE 6: UNDERGROUND MINE WORKINGS

*Light pegmatite visible in competent underground workings*

*Source: Company Reports*

## Metallurgy

*Good recoveries from both ore types*

Minerex undertook mineral processing studies between 1982 and 1987 on selected samples from the Wolfsberg pegmatites at the Minerals Research Laboratory of the North Carolina State University College of Engineering (NCSU) due to its spodumene expertise.

As a result of the NCSU flotation and magnetic separation test work, spodumene concentrates with $Li_2O$ grades >6% with spodumene recoveries of over 85% could be produced from both high grade and low grade ores contaminated with 10% amphibolite or 10% mica schist. Spodumene concentrates were then tested at the Versuchsanstalt fur Chemie der Hoheren Bundeslehr und Versuchsanstalt fur Chemische Industrie laboratory in Vienna for conversion to lithium carbonate. A 96% $Li_2CO_3$ product was produced at a 93% recovery from a 6% $Li_2O$ spodumene concentrate.

Ceramic grade feldspar could also be produced with feldspar recoveries of >90% at concentrate grades of >86% feldspar from both ore types. The recovered feldspar amounted to 28-32% of the head feed.

*Valuable by-products also recoverable*

Glass grade quartz concentrate was also produced from both ore types with recoveries ranging from 15-17% of the head feed achieved.

A mica concentrate was also considered a possible by-product using screening after milling.

Since the original test work there have been a number of technological developments that could be applicable to the Wolfsberg deposit. In particular the use of sensor based/optical sorting to separate the dark waste rock from the light coloured pegmatite could minimise waste dilution in the ore feed to the concentrator and maximise lithium grade. Dense Media Separation (DMS) is another technology that could be applicable to the Wolfsberg deposit. A simple process of crushing, screening and DMS to obtain a spodumene concentrate

would be a small and low capital cost facility. Such a concentrate could be marketed to the glass-ceramic producers in Europe that are currently importing spodumene concentrate from Australia and lithium carbonate from South America.

*Opportunity to fast track production for early cash flow*

If successful this would give the company an opportunity to fast track limited production and cash flow whilst the rest of the mineral processing facilities were being constructed. These technologies will be early and key components of the Dorfner Anzaplan test work, which will aim to optimise and simplify the process design of MRL and recover spodumene concentrate and marketable by-products. In 2013, as part of the process to confirm the mining licence, two 500 tonne underground bulk samples were mined from pegmatite veins in the two host rocks (amphibolite and mica schist).

These bulk samples were stored for subsequent metallurgical test work. Representative 4 tonne samples from each host rock have been taken, shipped to and received by Dorfner Anzaplan. Metallurgical test work is currently in progress. After the process design to concentrate has been optimised Dorfner Anzaplan will operate a pilot plant to produce larger quantities of spodumene concentrate. This will be used for downstream testing of the conversion to lithium carbonate and lithium hydroxide for both technical and battery use. This programme is scheduled to complete by end first quarter of 2017.

## Environmental

The WLP is located in a commercial forest and the Company has a land access agreement in place with the landowner. There are no areas of natural wilderness or water protection zones in proximity to the project. Environmental base line studies have commenced.

# Directors and Management

## Board of Directors

**Tony Sage** – *Non Executive Chairman*

Mr Sage has more than 30 years' experience in corporate advisory services, funds management and capital raising predominantly within the resource sector. Mr Sage is based in Western Australia and has been involved in the management and financing of listed mining companies for the last 18 years. Mr Sage currently holds the position of Executive Chairman of ASX listed Cape Lambert Resources Limited and Cauldron Energy Limited and Non-Executive Chairman of ASX listed Fe Limited. He is also the Non-Executive Director of International Petroleum Limited

**Paul Lloyd** - *Non Executive Director*

Mr Lloyd holds a Bachelor of Business and a Chartered Accountant with over 25 years commercial experience. Mr Lloyd operates his own corporate consulting business, specialising in the area of corporate, financial and management advisory services. After commencing his career with an international accounting firm, he was employed for approximately 10 years as the General Manager of Finance for a Western Australian based international drilling contractor working extensively in Asia and Africa. Mr Lloyd has been responsible for a number of Initial public offerings on the ASX in the mining and oil and gas industries.

**Malcolm Day** - *Non Executive Director*

Mr Day holds a Bachelor of Applied Science in Surveying and Mapping. Mr Day was the founder and inaugural Managing Director of Adultshop.com, which listed on ASX in June 1999. In October 2010 Adultshop.com was privatised. Prior to founding Adultshop.com in 1996, Mr Day worked in the civil construction industry for ten years, 6 of which were spent in senior management as a Licensed Surveyor and then later as a Civil Engineer. Whilst working as a Surveyor, Mr Day spent 3 years conducting mining and exploration surveys in remote Western Australia. Mr Day is a Member of the Australian Institute of Company Directors. Mr Day is the Managing Director of ASX listed entity Delecta Limited (ASX Code: DLC).

## Management

**Steve Kesler –** *CEO*

Dr Kesler has more than 35 years' experience in the mining sector with both major and junior mining companies. Dr Kesler has experience in all phases of the mining industry from exploration through to managing operations in multiple commodities notably uranium, copper, nickel, zinc, coal/lignite, gold/silver and iron ore. He has lived and worked professionally for mining companies in Namibia, South Africa, Chile, Philippines, UK, USA, Canada and Colombia.
Dr Kesler has considerable public company board and company leadership experience including previous roles as CEO and director for TSX and AIM listed Greystar Resources, President of Mining for URS Corporation (NYSE), Executive Director at Billiton plc which was listed on the Main Market and JSE prior to the takeover by BHP, CEO and director at Pacific Nickel Limited (ASX), CEO at Minera Doña Ines de Collahuasi Ltda (Chile), General Manager and director of Rossing Uranium Limited (Namibia) and Vice President of Business Development for Minera Escondida Ltda (Chile).
Dr Kesler holds a B.Sc (Mining Engineering) and Ph.D. (Mineral Technology) from Imperial College and the Advanced Management Programme from Templeton College, University of Oxford and is a Chartered Engineer and Fellow of the Institution of Materials, Minerals and Mining.

**Amy Fink** – *CFO & Company Secretary*

Ms Fink has 15 years' of experience in the accounting profession, primarily in the area of corporate administration and financial reporting. Ms Fink has worked in Australia and the United Kingdom for both listed and private companies and has been involved in a number of initial public offerings/capital raisings. Ms Fink has a Bachelor of Commerce (Accounting & Finance) degree and is a member of the Institute of Chartered Accountants, Australia.

## Shareholders

FIGURE 7: TOP 20 SHAREHOLDERS

| Rank | Name | Shares (m) | % |
|---|---|---|---|
| 1. | Dempsey Resources Pty Ltd | 49.1 | 13.6 |
| 2. | Exchange Minerals Ltd | 30.9 | 8.5 |
| 3. | Anglo Menda Pty Ltd | 12.9 | 3.6 |
| 4. | HR Moser & Associates | 12.5 | 3.5 |
| 5. | Delecta Ltd | 11.0 | 3.0 |
| 6. | Cedarland Consulting Ltd | 10.9 | 3.0 |
| 7. | Belloc Pty Ltd | 10.8 | 3.0 |
| 8. | Exchange Minerals Ltd | 10.3 | 2.9 |
| 9. | Suburban Holdings Pty Ltd | 9.7 | 2.7 |
| 10. | King Dragon (Far East) Ltd | 8.3 | 2.3 |
| 11. | Pure Steel Ltd | 8.1 | 2.2 |
| 12. | Daniel Fox-Davies | 6.8 | 1.9 |
| 13. | European Lithium Ltd | 6.2 | 1.7 |
| 14. | Citicorp Nominees Ltd | 4.9 | 1.4 |
| 15. | Andrew William Spencer | 4.9 | 1.4 |
| 16. | Karntner Montanindustrie | 4.1 | 1.1 |
| 17. | Anthony William Paul Sage | 3.9 | 1.1 |
| 18. | Daniel Fox-Davies | 3.2 | 0.9 |
| 19. | Chifley Portfolios Pty Ltd | 3.1 | 0.9 |
| 20. | Australian Share Nominees Pty Ltd | 3.0 | 0.8 |
| | **Top 20 Ordinary Shares** | **214.7** | **59.3** |

*Source: Company Reports*

# Appendix 1

## The Lithium Market

### Background

Lithium (chemical symbol: Li) is soft and silvery white and it is the least dense of the metals. It is highly reactive and does not occur freely in nature and is contained within stable minerals in a range of hard rock types or in solution in brine bodies within salt lakes ("salars"), in seawater or geothermal brines. The contained concentration of lithium is generally low and there are only a limited number of known resources where lithium can be economically extracted.

There are three lithium minerals commercially mined today: spodumene, petalite and lepidolite. Spodumene is the most important commercially mined lithium mineral given its higher inherent lithium content. Both open pit and underground mining methods are used to extract lithium minerals. Typically, the mineralized rock contains approximately 12% to 20% spodumene, or approximately 1% to 1.5% lithium oxide. A variety of factors drive the economics of lithium production.

*Lithium is rare and highest energy density of any metal and …….*

Lithium's high electrochemical potential makes it the standard material for lithium-ion (high energy-density rechargeable) batteries. Lithium ion batteries generally have a very high efficiency, typically in the range of 95% - 98%. Nearly any discharge time from seconds to weeks can be realized, which makes them a flexible and universal storage technology.

Lithium can be processed to form a variety of different chemicals depending on its end use. Lithium carbonate represents approximately half of the total global consumption of lithium chemicals. The next most common chemical is lithium hydroxide, which represents 16% of total global consumption. Other forms of lithium consumed include lithium bromide, lithium chloride and lithium minerals. Uses are:

*……. has a broad range of uses from energy storage to pharmaceuticals*

- As lithium carbonate, it's a pharmaceutical. It's been prescribed for conditions such as manic depression and bipolar disorder. It acts on the nervous system, and it can modify your actions and behaviour.
- It is also used as an alloy mixed with aluminium, so that it can strengthen aircraft. This alloy can also be used for high-speed trains and high quality bicycle frames.
- Alloyed with magnesium, it is used to make armour plating.
- It is used as lithium oxide in glass ceramics and special glasses.
- It is also used as a desiccant in air conditioning systems, as lithium bromide and lithium chloride.
- As lithium stearate (grease), it is used as an all-purpose lubricant although it is especially ideal for high temperatures.
- And as lithium hydride, it can store hydrogen so it can be used as fuel.

Industry has divided product specification into 3 broad categories:

- Industrial grade (+96% Li) - glass, casting powders and greases.
- Technical grade (~99.5% Li) - ceramics, greases and batteries.
- Battery grade (>99.5% Li) - high end battery cathode materials

Lithium and lithium compounds are often measured in terms of Lithium Carbonate Equivalent (LCE) but other measures such as lithium hydroxide (LiOH), lithium oxide ($Li_2O$) and lithium metal (Li) are also used. The following table summarises conversion factors between the compounds.

FIGURE 8: LITHIUM CONVERSION FACTORS

| Convert from | | Convert to Li | Convert to $Li_2O$ | Convert to $Li_2CO_3$ |
|---|---|---|---|---|
| Lithium | Li | 1.00 | 2.15 | 5.32 |
| Lithium Oxide | $Li_2O$ | 0.46 | 1.00 | 2.47 |
| Lithium Carbonate | $Li_2CO_3$ | 0.19 | 0.40 | 1.00 |

*Source: Company Reports*

## Demand

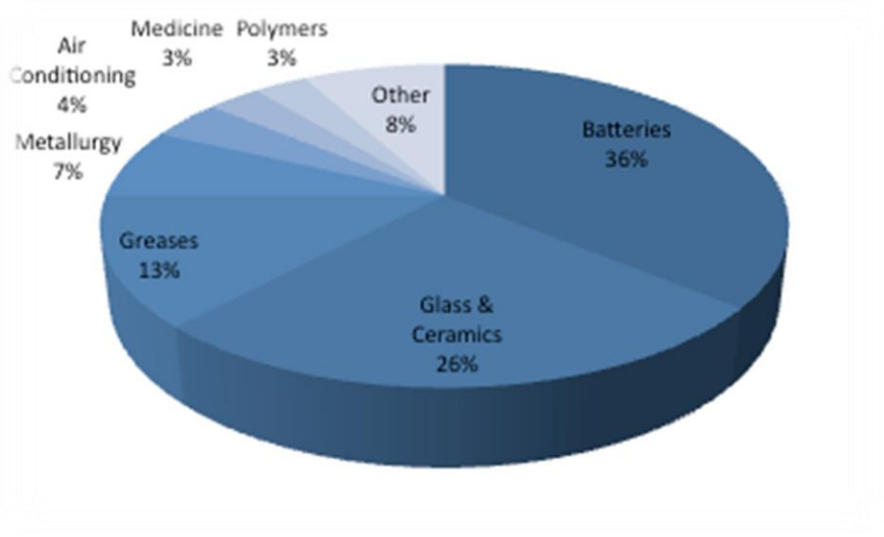
*Current demand is estimated at 160kt LCE with most market commentators expecting annual growth around 10%*

The consumption of lithium has experienced exceptional growth with the overall market more than doubling in just twelve years from 2000. Market demand for lithium products is largely driven by the increase in use of rechargeable batteries in portable electronic devices and electric transportation. Lithium-ion batteries provide power for cell phones, smartphones, tablets, laptop computers, power tools, and many other mobile consumer devices. Larger format lithium-ion batteries provide power for electric cars, scooter, electric bikes, buses, forklifts and other forms of transportation. New applications for lithium are emerging in the areas of grid energy storage, solar and nuclear energy generation, and other industrial uses.

Current demand is estimated at 160kt LCE with most market commentators expecting annual growth around 10%

FIGURE 9: LITHIUM DEMAND

*Battery demand currently dominates lithium demand*




*Source: signumBOX, Bloomberg*

In the automotive sector, the advent of lithium-ion hybrids (HEV), plug-in hybrids (PHEV) and fully electric vehicles (EV) require large format batteries. These batteries will require kilos of lithium, rather than the grams used today in portable electronic applications.

*EVs are likely to provide explosive growth*

Electric vehicles can be grouped into three main categories:

- Hybrid Electric Vehicles (HEV): Capable of storing charge (usually only in small amounts). Do not plug into an electric outlet, but instead are recharged by a separate internal combustion engine which is the principal power source (e.g. Toyota Prius). HEVs consume approximately 0.5-2.0 kg Li per vehicle.
- Plug-in Hybrid Electric Vehicles (PHEV): Have both electric and conventional motors, but are distinct from HEVs in that they can be

recharged from an electric outlet via a plug (e.g. Chevy Volt). PHEVs consume approximately 1.8-4.2 kg Li per vehicle.

- Electric Vehicles (EV): Fully electric vehicles that do not contain a combustion engine. Their battery packs and driving ranges between recharges tend to be much larger than other EVs since they do not have auxiliary power sources such as an internal combustion engine. Example: Tesla Model S. EVs consume approximately 10-20 kg Li per vehicle.

While portable consumer goods alone continue to provide impressive growth in demand for lithium batteries, the start of mass production of hybrid, plug-in hybrid and electric vehicles presents the most significant upside "step growth" potential for lithium demand.

Given the increasing political and consumer focus on environmental consciousness, auto manufacturers are striving to lower both carbon emissions and fuel consumption in transport applications. In 2013 alone the number of electric vehicle models grew from 11 to 17 with a wide range of consumer choices offered by all the major global automotive brands. Electric vehicle options range from the zippy-city-drive Nissan Leaf to the long-range sporty performance of the Tesla Model-S.

*Government incentive programs and the drive for lower carbon emissions will underpin demand*

Determining the future growth in electric vehicles is difficult to predict and there are a wide range of forecasts as to the number of electric vehicles that will be on the road within the next decade and the resultant additional potential lithium consumption requirement. However, there has been a large number of government incentive programs, globally, recently announced to advance the development, production and use of HEVs, PHEVs, and EVs. Despite near-term uncertainty as to the growth of lithium-ion batteries in the electric vehicle segment, we believe the increasing drive for lower carbon emissions by governments and consumers, significant investments by a number of parties globally in new battery technology for transport applications, and technology improvements within car manufacturers themselves, will provide significant future demand growth for lithium.

According to Goldman Sachs lithium demand for all EV applications could grow more than 11x by 2025, adding more than 310,000mt of LCE demand. This compares to current EV demand that represents only 27,000mt of LCE (17% of the current overall lithium market). In short, growth in EV applications alone could triple the size of the entire lithium market from 160kt today to 470kt by 2025.

Tesla exclusively makes electric cars powered by rechargeable batteries, and the company has just released its latest model – at a much lower price point that its previous models (US$35,000) – and already has 400,000 orders for the car.The company says it will build 500,000 cars a year by 2018, a massive ramp up from its existing production levels of 80,000 to 90,000 cars a year. By 2020, CEO Elon Musk says the company is aiming for one million cars.

*Car companies are rushing to construct battery production capacity in anticipation of EV demand*

Several others are rushing to compete with Tesla, and all will require rechargeable batteries. Many countries in Europe are leading the world in uptake of EVs using lithium-ion batteries, with EVs already totaling 22% of all new vehicle sales in Norway. Lithium-ion batteries are already being produced in Europe to meet this increasing demand, and production capacity in car-producing countries such as Germany is growing dramatically to keep up, with Daimler recently announcing a new €500M battery factory, and Volkswagen likely to soon follow suit. Samsung SDI has announced a lithium battery plant in Hungary, Nissan in the UK, Tesla a Gigafactory 2 in Europe whilst Jaguar Land Rover, Ford and BMW are studying a joint lithium battery factory in Europe. In addition to batteries for EV's there is growing understanding that Europe's drive towards increase use of renewables requires fixed energy storage and that lithium batteries can be an important component of this which will further increase battery and lithium demand. Battery producers will need more supply from safe, nearby jurisdictions. Sourcing lithium

from Europe would also reduce the carbon footprint of the car production supply chain.

## Supply

Commercial lithium production currently comes from two sources:

- Brines: lithium rich brines from salt lakes, or salars; and
- Minerals: pegmatite rock deposits containing lithium bearing minerals.

The process of producing lithium from brines is generally much lower cost than that from hard rock minerals but capital costs tend to be higher.

Nearly one-half of the world's lithium production comes from lithium brines in the Andes mountains region. In the mid-1990s, the development of these large-scale, low-cost brine resources in Chile and Argentina by SQM, Albermarle and FMC Global fundamentally changed global lithium supply. With its cost advantage over mineral-based production, brine producers lowered prices to gain market share, resulting in closure of mineral conversion plants in the USA, Russia and China.

*The lithium oligopoly poses a challenge for EV and battery producers*

Hard rock supply is dominated by Australia's Greenbushes mine owned by Talison Lithium supplying close to 40% of market requirements. Talison is hardly an independent, being 49 percent-owned by Albemarle and 51 percent by China's Tianqi Lithium, which takes an increasing amount of the mine's output for processing in China. Talison has recently announced that it is proceeding with a lithium hydroxide plant in Western Australia supplied by concentrate from Greenbushes. European glass-ceramic producers currently reliant on supply from Talison clearly would welcome a spodumene producer in Europe.

Current global production of lithium is also highly concentrated, both geographically and in corporate ownership. We estimate that about 85% of world production comes from Chile (Sociedad de Quimica Minera de Chile SA (SQM) and Albermarle), Argentina (FMC Corp), and Australia (Talison Lithium).

This oligopoly poses a real challenge for EV and battery producers. Interestingly Tesla seems to placing its faith in the new generation of producers. In Europe we would expect Daimler, VW and the like to also support new suppliers of lithium with particular focus on European producers, placing EUR in a strong position.

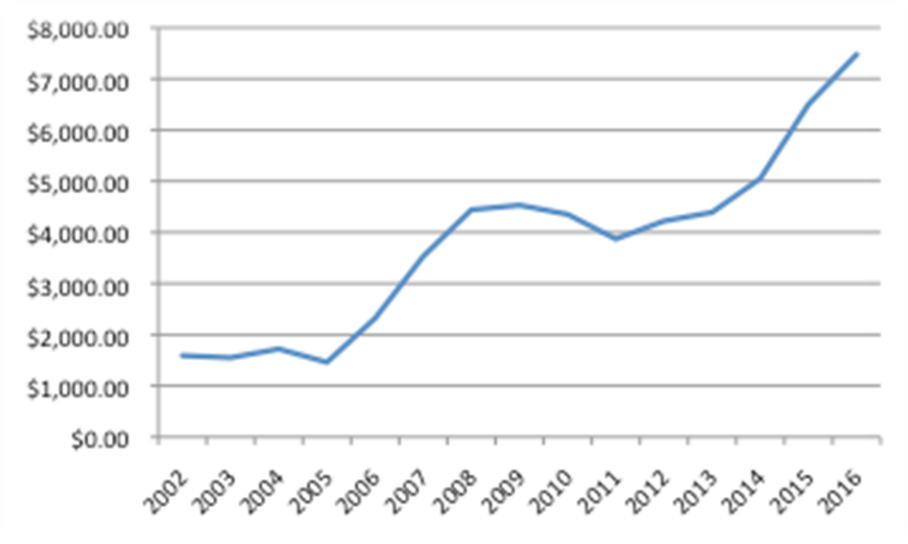
## Pricing

There are a number of problems when looking at pricing. The first is the bewildering number of products that can be made from lithium, ranging from lithium stearate (industrial grease) to lithium fluoride (aluminum smelting) to butyllithium (organic compounds).

All are normally converted for pricing into lithium carbonate, largely used for battery manufacture.

*If lithium is going to become an integral part of the global energy supply chain, its market opacity is a big problem.*

FIGURE 10: LCE PRICNG




*Source: Metalary*

But even then the picture is complex. There are different types of carbonate, with lower-grade material for the ceramics and glass industries, for instance, while higher-grade material used in batteries. Nor are lithium-ion batteries themselves homogenous. There are five major types, each using a different lithium compound.

*Lithium pricing is extraordinarily opaque…….*

The second problem with lithium pricing is that most trade is conducted between a small number of producers and their customers. There is no exchange trading, no terminal storage market and only an extremely limited spot market and prices vary by product, consumer and contract types. This means that price assessments from commentators rely on published trade volumes and trade values, or contacts within industry. This is made more difficult by the complexity of the lithium product chain.

*…….but prices are on the rise.*

Either way prices are on the rise. CRU reports that battery grade material is trading at more than USD20,000/t on the Chinese spot market. It is believed that new contract prices for battery grade material exceed USD7000/t. Prices for lithium concentrates used for conversion into chemicals are correlated to, and tend to follow the same trend as, lithium carbonate prices.

# Appendix 2

## Austria

### Overview

Austria is a mountainous country that is located in the Alps. Austria is bordered with Germany, Hungary, Slovakia, Slovenia, Italy, Switzerland, Liechtenstein and Czech Republic. With its well-developed market economy, skilled labor force, and high standard of living, is closely tied to other EU economies, especially Germany's. Its economy features a large service sector, a relatively sound industrial sector, and a small, but highly developed agricultural sector.

Economic growth has been relatively weak in recent years, approaching 0.9% in 2015 with GDP of just over USD370B. Austria's 5.8% unemployment rate (population 8.7M), while low by European standards, is at its highest rate since the end of World War II, driven by an increased number of refugees and EU migrants entering the labour market. Without extensive vocational training programs and generous early retirement, the unemployment rate would be even higher. Currently, the budget deficit stands at 2.7% of GDP and public debt has reached a post-war high of 84.2% of the GDP. In 2013 the value of the country's marketed mineral industry production was approximately 8% of GDP.

FIGURE 11: AUSTRIA AND WOLFSBERG LITHIUM PROJECT


*Source: Google Maps*

### Austria's Mining Law

The basis of Austria's mining law is the Mineralrohstoffgesetz (MinroG) of 1999, as amended by Federal laws. The MinroG applies to mineral exploration, production, and processing and the use of geologic structures for holding or storing substances, such as liquid and gaseous mineral fuels.

Three environmental laws apply to mineral production and processing operations: the Remediation Act of 1989; the Environmental Information Act of 1993; and the Environmental Impact Assessment Act of 2000.

Austria's mineral resources are legally classified into the following three main categories: Bergfreie (free mineral raw materials), Bundeseigene (state-owned mineral raw materials), and Grundeigene (other mineral raw materials).

The Bergfreie category includes metallic ores, such as iron ore and

tungsten; oil shale; and many industrial minerals, including clays (such as bentonite and kaolin), diatomite, graphite, gypsum, limestone, marble that contains at least 95% calcium carbonate, magnesite, silica sand that contains at least 80% SiO2, and talc. Lithium also falls in this category. The holder of the mining license for minerals in the Bergfreie category has ownership of those minerals in the deposit for which one has a license to mine ie free right to the extraction of mineral resources.

The Bundeseigene classification includes mineral fuels, such as oil and natural gas, and related materials, such as uranium, and all salt, whether contained in brines, solution, or rock salt. The resources in this category are state owned, no matter who is awarded a license to extract and produce them.

The Grundeigene classification includes stone, sand, and gravel not included in the first category and feldspar. The owner of the land, who must still obtain a license before producing any of these mineral commodities, owns the resources in this category.

Exploration Licences are granted for a five-year period. A precondition for undertaking exploration works is the submission of a works program to the Mining Authority. The exploration licences can be renewed for a further 5 years term providing the exploration works reports have been approved for the preceding 5 years. Performing work in one licence is sufficient for the prolongation for up to 100 other exploration licences. There are no minimum expenditure requirements however there are annual prospecting fees of €8.72 per licence payable to the Mining Authority.

Prior to the commencement of exploration, the holder of a licence must first obtain surface access permission from the landowner. If permission for access is not forthcoming, the licence holder may apply to the Mining Authority for compulsory admission to the property determined on a case-by-case basis.

Should a mineral deposit be defined and deemed to be economic, a Mining Licence may be applied for. Mining licences entitle the holder to exclusively mine “bergfreie” minerals and entitle the holder to exclusive title to the ore mined. Additionally, the holder of a mining licence is entitled to acquire title to “grundeigene” minerals which are all those not listed in Sec 3 and 4 of MinroG, which includes feldspar and quartz, if they result from the mining of “bergfreie” minerals. Mining Licences are granted for an indefinite period subject to meeting the requirements of the mining law and are registered into the Mining Register.

An annual fee of €26.00 is payable to the Mining Authority for each Mining Licence. A maximum of 16 rectangular mining licences, each with a surface area of up to 48,000m², may be granted to a single applicant. If less than 16 mining licences have been granted the applicant may apply for additional licences at any stage. There are no depth restrictions on a mining licence.

The holder of a Mining Licence is entitled to access underground water for use in extraction and processing operations. A Mining Licence also entitles the holder to engage in the treatment of minerals, as well as the use of mining and other operational equipment. However, additional permits are required under the Mining Act at each stage of development. These include, but are not limited to, Construction Permit, Operating Permit, Operating Vehicle Permit and Installation Permit.

On granting of an Exploration or Mining Licence, the ownership of the minerals is allocated to the owner of the licence. For this reason, there are no royalty payments on “bergfreie” mineral production to either the Regional or Federal authorities. Both Exploration and Mining Licences are transferable to third

parties.

Additional laws dealing with occupational health and safety and the protection of the environment are not administered under the Mining Act. The Occupational Health and Safety Act is administered by the Arbeitsinspektorat (Department of Labour) in Salzburg, whilst the protection of the environment is the responsibility of two departments, the Bezirkshauptmannschaft (local environmental authority, or the mayor) and the Landesregierung (the provincial government).

Under Federal and Provincial Law, the local administrative authority is responsible for permitting and annual reporting of environmental issues, as well as providing the conduit for information between Alpine and the provincial government. The provincial government is responsible for administering and enforcing the Environmental Act.

## Mining In Austria

The Erzberg open pit iron ore mine at Eisenerz in the State of Styria and the underground tungsten mine at Mittersill in the State of Salzburg continue to be the two main metal mines in operation in Austria.

In June 2013, Styromagnesit Steirische Magnesitindustrie GmbH reopened a new open pit magnesite mine in Hohentauern after being closed for 20 years. In October the same year, the Wolfsberg lithium mine was reopened after 25 years and the first ore bulk sample was extracted by its majority owner Global Strategic Metals of Australia for sampling. Assaying work was carried out at the Rotgulden Mine in southwestern Austria by Noricum Gold Ltd. for high-grade gold, silver, and copper, and the company is assessing the most optimal path to realise value from the previously closed mine.

Austria continues to play an important role in mineral markets on a world scale for graphite, magnesite, talc, and tungsten, despite being a relatively small mining country. In 2013 Austria was the fourth-ranked producer of magnesite in the world and the fifth-ranked producer of tungsten and accounted for 4.2% and about 1.1%, respectively, of world production.

Industrial minerals production continues to be an important component of Austria's mineral industry, with the importance of construction minerals increasing. The country produces dolomite, graphite, gypsum, kaolin, lime, limestone, magnesite, salt, silica sand, and talc. Salt mines still provide an important portion of domestic supply. Both natural gas and crude petroleum are still believed to be produced in Austria, but domestic output meets only a small portion of national demand for mineral fuels. Coal extraction ended in 2006, and nuclear energy was banned in the country in 1978.

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