PITT STREET RESEARCH

Piedmont Lithium Ltd

Lithium made in the USA

Share Price: A$0.11

ASX: PLL

Sector: Materials

18 May 2020

An integrated and low-cost lithium processing play

Piedmont Lithium is developing a hard-rock lithium mine and associated processing operation in North Carolina. Like Kidman (acquired in 2019 for $776m) PLL intends to be an integrated player from spodumene mining to hydroxide processing. PLL's mine has a higher-than-average lithium grade, is already ESG-compliant and is in the advanced stage of development.

A US-based integrated alternative

Currently a great deal of lithium carbonate and hydroxide has to be sourced from China. Given the ongoing US-China trade war and the expected backlash against China related to the Coronavirus, a US-based lithium supplier with reduced supply chain risk is likely to be welcomed by potential customers.

Lithium hydroxide demand on the rise

Given its technological superiority, lithium-ion battery makers for Electric Vehicles are gradually shifting from lithium carbonate to lithium hydroxide, with demand for the latter material expected to rise 25% p.a. for the next five years. PLL expects to benefit from this shift with its hydroxide plant.

Valuation range of A$0.34–0.62 per share

We value PLL at A$0.34 per share base case and A$0.62 per share optimistic case using a DCF approach. We expect a steady growth in lithium prices, further progress on the project development plan and clarity on project funding will help re-rate the stock to our valuation range.

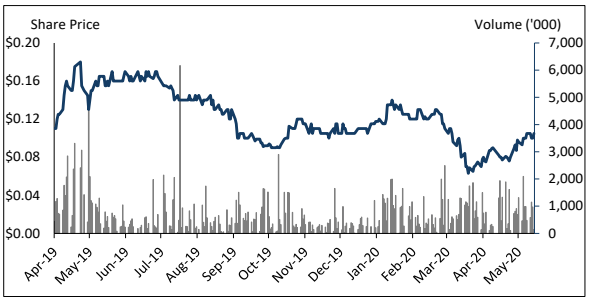
Year to June (A$)	2019A	2020F	2021F	2022F	2023F
Sales (m)	0.0	0.0	0.0	0.0	199.3
EBITDA (m)	(17.2)	(16.2)	(16.5)	(16.3)	155.2
Net Profit (m)	(17.0)	(16.1)	(16.4)	(16.0)	92.9
EBITDA Margin (%)	NM	NM	NM	NM	77.9%
ROA (%)	NM	NM	NM	NM	26.7%
EPS (cent)	NM	NM	NM	NM	4.9
DPS	NA	NA	NA	NA	NA
EV/Sales	NM	NM	NM	NM	1.5x
EV/EBITDA	NM	NM	NM	NM	1.9x
P/E	NM	NM	NM	NM	2.2x

Source: Company, Pitt Street Research

Market Cap. (A$ m)	86.8
# shares outstanding (m)	826.3
# shares fully diluted	866.5
Market Cap Ful. Dil. (A$ m)	92.7
Free Float	89.7%
52-week high/low (A$)	0.175 / 0.062
Avg. 12M daily volume ('1000)	666.1
Website	piedmontlithium.com

Source: Company, Pitt Street Research

Share price (A$) and avg. daily volume (k, r.h.s.)



Source: Thomson, Pitt Street Research

Valuation metrics	
DCF fair valuation range (A$)	0.34 – 0.62
WACC	12.1%
Assumed terminal growth rate	None

Source: Pitt Street Research

Subscribe to our research HERE

Analysts: Stuart Roberts, Cheng Ge

Tel: +61 (0)447 247 909

stuart.roberts@pittstreetresearch.com

cheng.ge@pittstreetresearch.com

Piedmont Lithium Ltd

Profit & Loss (US$M)	2018A	2019A	2020F	2021F	2022F	2023F	2024F	2025F
Sales Revenue	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**115.2**	**131.2**	**157.7**
Operating expenses	-10.1	-9.9	-9.4	-9.5	-9.4	-25.5	-31.8	-48.9
Adjusted EBITDA	**-10.1**	**-9.9**	**-9.4**	**-9.5**	**-9.4**	**89.7**	**99.4**	**108.8**
Depn & Amort	0.0	0.0	-0.1	-0.1	-0.1	-18.4	-23.0	-29.1
Adjusted EBIT	**-10.1**	**-10.0**	**-9.4**	**-9.6**	**-9.5**	**79.1**	**86.1**	**91.9**
Net Interest	0.0	0.0	0.0	0.0	0.0	-9.4	-9.4	-22.0
Profit before tax (before exceptional)	**-10.0**	**-9.8**	**-9.3**	**-9.5**	**-9.2**	**69.7**	**77.8**	**70.1**
Tax expense	0.0	0.0	0.0	0.0	0.0	-16.0	-17.9	-16.1
NPAT	**-10.0**	**-9.8**	**-9.3**	**-9.5**	**-9.2**	**53.7**	**59.9**	**54.0**

Cash Flow (US$M)	2018A	2019A	2020F	2021F	2022F	2023F	2024F	2025F
Profit after tax	-10.0	-9.8	-9.3	-9.5	-9.2	53.7	59.9	54.0
Depreciation	0.0	0.0	0.0	0.0	0.0	10.6	13.3	16.8
Changes in working capital	0.0	0.0	0.4	0.4	0.4	0.4	0.4	0.4
Other operating activities	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Operating cashflow	**-7.6**	**-9.8**	**-8.9**	**-9.0**	**-8.8**	**64.7**	**73.6**	**71.2**
Capex	0.0	0.0	-0.7	0.0	-167.9	-5.9	-350.0	-5.9
Other investing activities	-0.6	-1.5	-1.2	0.0	0.0	0.0	0.0	0.0
Investing cashflow	**-0.6**	**-1.6**	**-1.8**	**0.0**	**-167.9**	**-5.9**	**-350.0**	**-5.9**
Equity raised	12.5	8.8	14.7	16.0	50.4	0.0	67.2	0.0
Net proceeds from borrowings	0.0	0.0	0.0	0.0	117.5	0.0	156.9	0.0
Other financing activities	-0.7	-0.5	-0.7	-0.9	-2.9	0.0	-3.9	0.0
Net change in cash	3.6	-3.0	3.3	6.1	-11.7	58.8	-56.2	65.3
Cash at End Period	7.2	4.4	7.7	13.8	2.1	60.9	4.7	70.0

Balance Sheet (US$M)	2018A	2019A	2020F	2021F	2022F	2023F	2024F	2025F
Cash	7.2	4.4	7.7	13.8	2.1	60.9	4.7	70.0
Total Assets	8.1	6.8	11.9	18.1	174.3	228.5	509.1	563.6
Total Liabilities	2.0	2.1	2.6	3.1	121.2	121.7	279.0	279.5
Shareholders' Funds	6.1	4.6	9.3	15.0	53.2	106.9	230.1	284.1

Ratios	2018A	2019A	2020F	2021F	2022F	2023F	2024F	2025F
Net debt/Equity	nm	nm	nm	nm	375.7%	91.7%	202.8%	124.5%
Total Cash / Total Assets	89.8%	65.3%	64.6%	76.3%	1.2%	26.6%	0.9%	12.4%
Return on Equity (%)	nm	nm	nm	nm	nm	67.1%	35.5%	21.0%

Table of Contents

Introducing Piedmont Lithium

Piedmont Lithium Ltd (ASX: PLL, Nasdaq: PLL) is a Perth-based company engaged in developing a hard-rock lithium mine in the US state of North Carolina. Previously known as W C Penfold Limited, the company used to engage in prospective gold, uranium, copper and base metal projects. However, after securing the core landholding of what is now the Piedmont Lithium Project in September 2016, the company changed its name from WCP Resources (ASX: WCP) to its current one.

Piedmont plateau is a low-cost, environmentally sustainable, historically proven site

Piedmont Lithium project is located within the Tin-Spodumene Belt (TSB) in North Carolina, the oldest and most lithium-rich area globally. The belt, which spans >60km, has a history of ~70 years of lithium mining. The presence of pre-existing transport infrastructure and processing facilities, and requisite low-cost skilled work pool in the region, is a bonus.

PLL project has railway infrastructure access 5km to the north and 13km to its south; the international airport is a 30-minute drive; Albemarle and Livent operate lithium processing facilities in close vicinity

PLL's hard-rock property of approximately 2,130 acres has 361 diamond core holes totalling 56,230m of exploration drilling. The acreage is in an exclusively spodumene-based lithium area with favourable topography and water source, resulting in higher probability of low-cost recoveries (state royalty is 0%). The project has 25 years of life, a resource estimate of 27.9Mt of 1.11% lithium oxide (Li_2O) and an estimated NPV of US$1.45bn. PLL has been granted the operational permit under the Clean Water Act, which requires an environment-compliant due-diligence to be concluded by various state and federal agencies. Consequently, PLL's low-cost production project is also ESG-compliant and future ready.

Substantial uptick in demand for lithium hydroxide is expected as US automakers reduce reliance on Chinese supply

According to global forecasts, demand for lithium hydroxide is expected to grow at a CAGR of 37% till 2025, as the world move towards electric vehicles (EVs). Due to the operational superiority of nickel-cathode-based rechargeable lithium-ion batteries, the ones used by EVs, the hydroxide compound of lithium is taking precedence over the earlier used carbonate compound. With US-based OEMs gearing for EV production, one of their priorities is to diversify raw material supply, away from Australia and China (approximately 60% supply in 2018). Consequently, the demand for PLL to expedite project initiation is rising consistently.

Progress on project work is expected to unlock value

PLL is moving to a 'one step' model of development where it starts up its chemical plant at the same time as its mine

An important aspect of the PLL story is the way the company has moved from a 'two steps' development process to a 'single step'. Formerly PLL had intended to start producing spodumene concentrate and later produce lithium hydroxide. Now, due to increased interest from potential customers, it wants to start producing spodumene concentrate at the same time as it produces lithium hydroxide, with a tentative start-up date of late 2022/early-2023.

The company has already completed two scoping studies and obtained its most important permit to build the proposed mine and concentrator. PLL is currently undertaking hydroxide test work, 90% of which has been concluded with positive results. The currently ongoing chemical plant pre-feasibility study (PFS), expected to conclude in Q2 2020, will likely highlight the

favourable capital and operating costs. plans to start production by late 2022/early-2023.

The steady progress on all the processes (required for initiating production) is a significant positive for PLL. As the company approaches production commencement, the need for investor funding will subside; consequently, its intrinsic value will be unlocked.

Ten reasons to look at PLL

1) The Piedmont Lithium project possesses rich lithium oxide reserves sources (27.9Mt) with a higher-than-average lithium grade (1.11%).
2) The project site is situated in one of the world's most lithium-rich region, the Tin–Spodumene Belt (TSB) of North Carolina. The region has pre-existing infrastructure such as electricity, high quality groundwater, logistical support, and skilled and semiskilled labour.
3) Increasing EV uptake bodes well for lithium prices as it is a key component in EV batteries. Governments across the globe have taken various initiatives to increase the number of EVs on the roads.
4) PLL intends to become an integrated spodumene-to-hydroxide producer. Lithium-ion battery makers are leaning towards using nickel-cathode-based batteries, as they provide a higher range and superior operations. This process increasingly uses a hydroxide compound, instead of the currently used carbonate compound. This shift to hydroxide provides a significant market opportunity for PLL.
5) The pure spodumene nature of PLL's core mining acreage is expected to support a simplified project flowsheet and high lithium recoveries. This translates to cost savings on the back of fewer steps involved in the process to convert spodumene deposits into concentrate.
6) PLL's lithium project has an additional advantage — the presence of nearby end markets. As most global OEMs have EV production facilities across the US and Europe, PLL can cater to them more effectively. For OEMs, sourcing of raw material from PLL offers two advantages: a) diversification and b) cost advantage over sourcing from far-off places such as Australia and China.
7) Compared with some other mining regions, e.g., Western Australia, the cost of lithium hydroxide production in North Carolina is relatively cheap. Due to the presence of abundant skilled and semi-skilled labour, and government incentives such as 0% royalty, PLL is at an advantage to produce the same material at a lower cost.
8) PLL's project is in the advanced stage of production initiation. The company has received its site development permit after due-diligence by Federal and state agencies, and is ESG compliant.
9) PLL has an experienced team with years of geology and mining experience. Team members have previously delivered large complex mine and plant projects in the region, with total project capital expenditure of over US$10bn.
10) We believe PLL is currently undervalued. Considering it is yet to start generating revenue and is dependent on investor's money for project site development, investors' interest has been subdued. However, as the project nears production commencement and the end market, the stock is expected to reach its intrinsic value. We value the company at A$0.34 per share base case and A$0.62 per share

optimistic case using a DCF approach with conservative assumptions on lithium prices and cost of capital.

Piedmont Lithium project has all the makings of a major resource supplier

PLL owns 100% acreage in the vertically integrated Piedmont Lithium project, a hard-rock lithium play located in North Carolina. The project includes a lithium hydroxide chemical plant and an open pit mine and concentrator. The total acreage comprises three properties, acquired by the company in the last four years – Core, Central and Sunnyside. Currently, PLL's exploration efforts are focussed on the Core and Central properties.

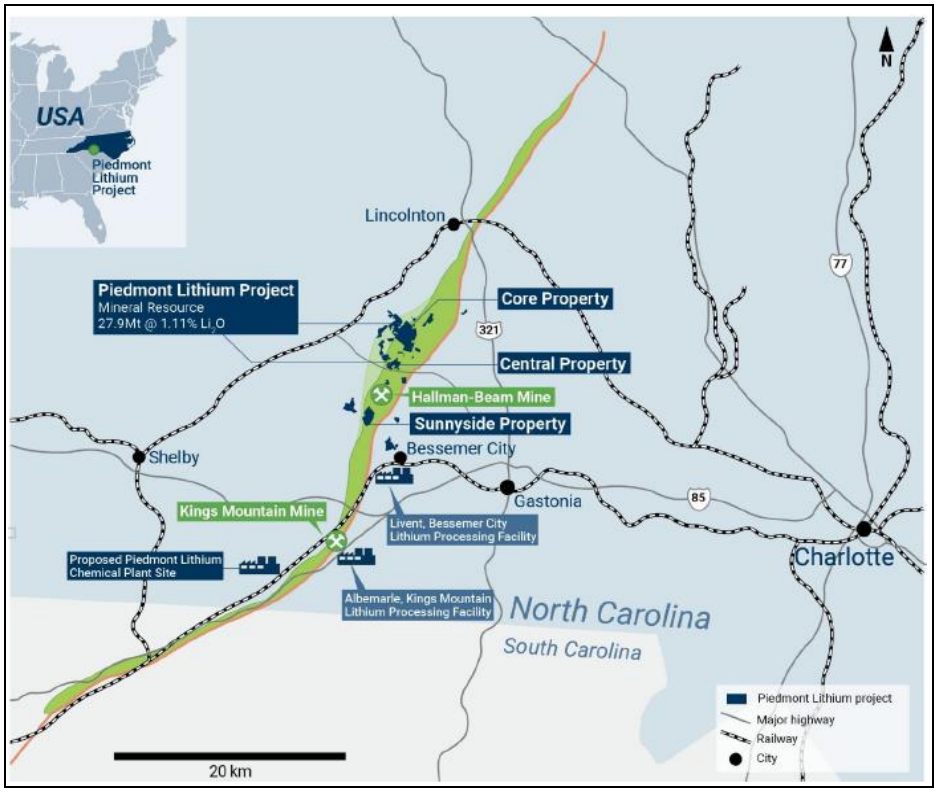
PLL's acreage in the historically proven site includes substantial resource estimates

The company has already completed two scoping studies on the acreage so far, which yielded substantial positive results. These include a JORC 2012 mineral resource estimate (MRE) of 27.9Mt of 1.11% at Li_2O, project life of 25 years and NPV of US$1.45bn.

In addition, we believe the following parameters have the potential to underpin PLL's re-rating in the medium term:

A favourable location. The Piedmont Lithium project is located within the Tin–Spodumene Belt (TSB) in North Carolina (Figure 1). The belt has a length of over 60km and is situated approximately 40km west of Charlotte, North Carolina. This close proximity to the city of Charlotte translates to availability of low-cost and skilled labour force for PLL.

Figure 1: Piedmont Lithium project is favourably located near existing infrastructure



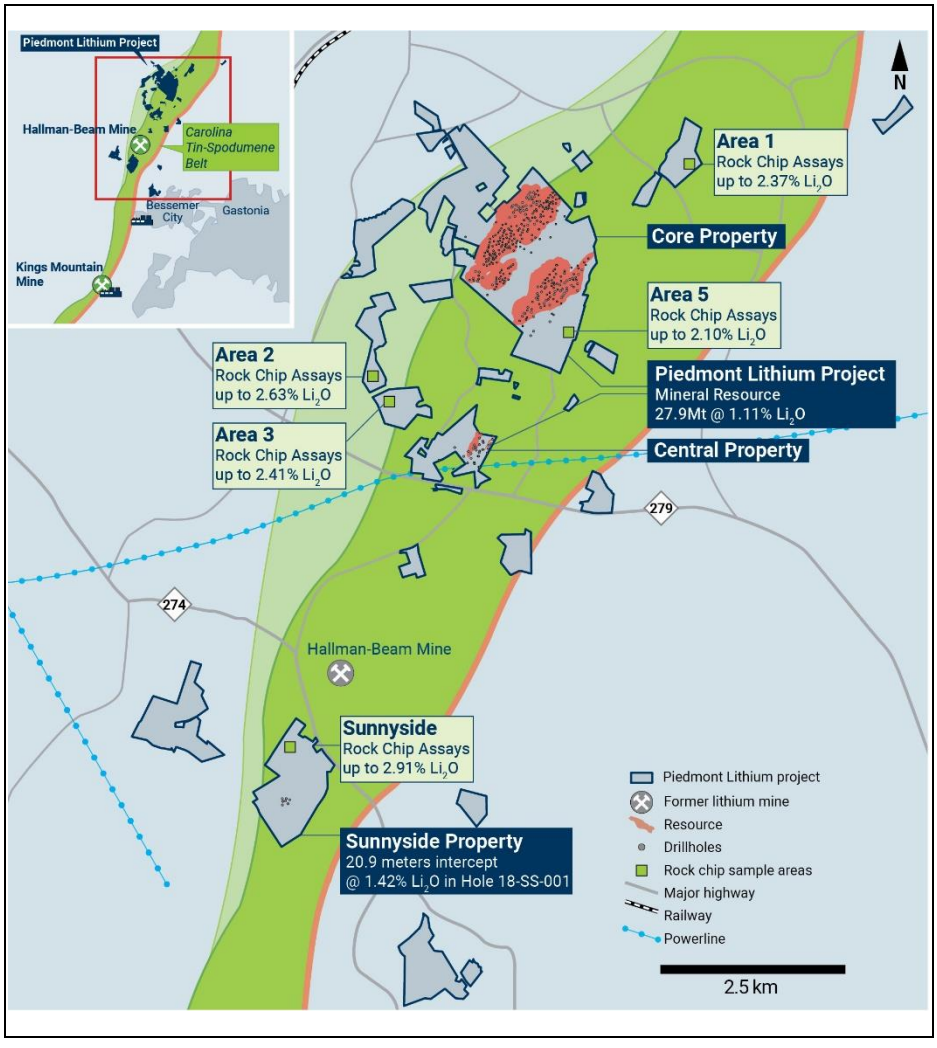
Source: Company

Large players, such as Albemarle and Livent (formerly FMC Lithium), also have major downstream processing facilities and research centres in the region (Figure 1). In our view, this is indicative of the high prospectivity of the acreage. Further, due to the presence of these operations, the local market is well supplied with fabrication, maintenance and technical service contractors.

The TSB also enjoys infrastructural benefits such as accessibility through major highways, proximity to four major US ports, the Charlotte-Douglas International Airport and Class I railroads. Moreover, the project is located near the US 'Auto Alley' and is close to upcoming gigafactories, such as Tesla's gigafactory for Model Y, which is expected to be on the East Coast.

Favourable geology. The region has a rich and proven history of over 60 years of lithium production. PLL's acreage in the belt trends along the Hallman Beam and Kings Mountain mines, which were major suppliers of spodumene from the 1950s to the 1980s. Originally, portions of the project site were explored by the Lithium Corporation of America, before it was acquired by FMC Corporation. Later, in 2009–2010, North Arrow Minerals (a Canada-based exploration company) also completed a 19-drill hole, 2,544-meter exploration program on the property.

Figure 2: Substantial mineral resource indicated in the latest scoping study



Source: Company

- **Core property**: Spanning 1,004 acres, this area is characterised by spodumene pegmatites with thickness of 1–20 meters. These are held in amphibolite rock formations that are fine–medium grained and weakly–moderately foliated. Notably, this property plays host to over 100 spodumene pegmatite bodies, with some mineralised dikes having lateral extent of >500 meters. Currently, the acreage consists of 326 holes totalling 51,047 meters (Figure 2).
- **Central property**: Located approximately 1 mile south of the Core property, this acreage hosts spodumene pegmatite in metasediments. The property includes 18 diamond core holes, covering 2,840 meters of the acreage (Figure 2). Currently, the resource is found in two subparallel spodumene bearing pegmatite dikes – the western and the eastern dike. Notably, the eastern dike, which hosts 5 drill holes, has produced the best drill results for PLL so far.
- **Sunnyside property**: This acreage spans 255 contiguous acres and hosts significant occurrences of spodumene pegmatite. As PLL is currently focussed on the Core and Central property, the Sunnyside acreage has only undergone one drilling campaign. This campaign included seven holes, totalling 911 meters, with spodumene pegmatites found in five of the seven holes.

Favourable mineralogy. The results from the latest mineralogical analysis, released in June 2019, indicated the pure spodumene nature of the project's core body. Usually, hard-rock lithium projects contain multiple lithium-bearing minerals, such petalite and lepidolite, in addition to spodumene. However, the Piedmont Lithium project covers relatively pure spodumene, which should translate to a simplified flowsheet and higher recoveries. Moreover, spodumene contains higher lithium content (8.03% Li_2O) than petalite (4.86% Li_2O) and lepidolite (7.70% Li_2O).

Acreage includes pure spodumene mineralogy and by products like mica, quartz and feldspar

In addition to lithium, the acreage plays host to other by-products, including quartz, feldspar and mica. As per the latest scoping study results, the by-product mineral at the project site has the potential to be converted into substantial saleable by-product. The study estimates production and sales of by-product concentrate to the tune of 1.9Mt of quartz, 2.8Mt of feldspar and 0.3Mt of mica, over the 25 years of mine life.

Favourable jurisdiction. The encouraging tax regime of North Carolina, and the US in general, boosts the economics for the project. While the corporate tax rate in North Carolina stands at 2.5%, the federal tax rate in the US is 21%. This results in an effective tax rate of 23% for a mine operator in North Carolina, significantly less than tax rates of 30% and 33% currently prevailing in Western Australia and Canada, respectively. Moreover, North Carolina does not charge any state mining royalties.

Substantial mineral resource. PLL has so far received results from two mineralogical analyses conducted on the project by independent consultant CSA Global Pty Ltd. The company conducted the latest mineralogical analysis on 36 mineralised pegmatite samples and 10 composite samples, sourced from all three of the project properties via diamond drilling. The mineralogical testing included semi-quantitative and quantitative x-ray diffraction (XRD) analysis. While the initial JORC 2012 MRE of 16.19Mt of 1.12% Li_2O was announced in June 2018, it was later updated to 27.9Mt of 1.11% Li_2O in June 2019 (Figure 3). This indicated a 55% increase in the MRE on Core property, from 16.19Mt in June 2018 to 25.1Mt in June 2019.

Figure 3: Project-wide MRE for the Piedmont Lithium project (0.4% cut-off) as per 2019 study

Resource category	Core property		Central property		Total			
	Tonnes (Mt)	Grade (Li_2O%)	Tonnes (Mt)	Grade (Li_2O%)	Tonnes (Mt)	Grade (Li_2O%)	Li_2O% (t)	LCE (t)
Indicated	12.5	1.13	1.41	1.38	13.91	1.16	161,000	398,000
Inferred	12.6	1.04	1.39	1.29	13.99	1.06	148,000	366,000
Total	**25.1**	**1.09**	**2.80**	**1.34**	**27.9**	**1.11**	**309,000**	**764,000**

Source: Company

Notably, the latest mineralogical analysis also demonstrated that 74% (i.e., 18.6Mt of Li_2O) of the MRE at Core property lies within 100 meters of the surface, while 97% (or 24.6Mt of Li_2O) is within 150 meters of the surface. This shallow nature of the core body is expected to enhance project economics.

Strong project economics. The results of the latest scoping study, released in August 2019, suggested favourable economics for the project. With an initial cash outlay of US$168m, PLL plans to bring online the mine producing 160,000 tonnes of 6% spodumene concentrate per year (Figure 4). The Company now plans to construct the US$344m lithium hydroxide chemical plant to produce 22,700 tonnes of battery-quality lithium hydroxide per year together with the mine in a single phase, which should accelerate lithium hydroxide production compared with the most recent scoping study.

The study also included a DCF calculation with reasonable assumptions for medium-term pricing of lithium hydroxide and spodumene concentrate. The results indicated a project NPV of US$1.45bn, at a discount rate of 8%, and an ungeared IRR of 34%. In our view, these strong project economics are expected to drive the re-rating of PLL's stock.

Figure 4: Significant improvement demonstrated by Scoping Study results

Resource	Unit	2019 Study	2018 Study	% change
Mineral resource estimate		27.9Mt @ 1.11% Li_2O%	16.2Mt @ 1.12% Li_2O%	72%
Project life	years	25	13	92%
Life-of-project spodumene concentrate produced	kt	3,810	1,960	94%
Life-of-project lithium hydroxide produced	kt	489	216	126%
Average steady state EBITDA	US$M/y	$298	$235	27%
After-tax net present value (NPV)	US$M	$1,447	$888	63%
Internal rate of return (IRR)	%	34	46	-26%
Initial capex - integrated project	US$M	512	470	9%
Lithium hydroxide cash costs	US$/t	3,105	3,112	0%

Source: Company

PLL's simplified project flowsheet to unlock further potential

As mentioned before, the pure spodumene nature of the core body is expected to underpin a simplified project flowsheet. This translates to cost savings on the back of fewer steps involved in the process to convert spodumene deposits into concentrate.

The processing of spodumene deposits includes conventional hard-rock mining and processing practices. PLL plans to excavate and truck the ore mined from its open pits to the concentrator, which will be located at the

mine site just to the northwest of the planned open pit mines. Upon reaching the concentrator, the size of the ore will be reduced via multiple stages of crushing. Subsequently, through the deployment of dense medium, flotation and magnetic separation techniques, wet concentrate will be obtained. The concentrate will then be filtered and prepared for transportation as 6% Li_2O concentrate to the chemical plant (Figure 6). Once the concentrate reaches the chemical plant, PLL plans to deploy a direct-to-hydroxide conversion approach to produce battery-grade lithium hydroxide monohydrate. However, for now, the company has retained the option for the production of lithium carbonate products.

Notably, at the rougher flotation stage, the ore yields flotation tailings, which form the feed for by-product flotation and magnetic separation circuits. Through these separate circuits, PLL plans to produce concentrates for quartz, feldspar, and mica. Remarkably, the company has already secured a partner to market these by-products by signing an LOI with Ion Carbon & Minerals, LLC, a wholly-owned subsidiary of AMCI.

Results from the latest metallurgical test work program indicate good recoveries

While the simplified nature of the flowsheet drives economies for the project, it is strongly underpinned by the good recoveries obtained from the latest metallurgical test work. Following the success of the bench-scale test work completed by PLL in 2018, the company undertook a pre-feasibility study (PFS) level metallurgical program in 2019. The tests were conducted to evaluate the impact of Dense Medium Separation (DMS) technology as a pre-concentration step. Additionally, PLL aimed to verify the results of the prior test work and estimate recoveries via locked-cycle flotation tests (LCT).

Metallurgical test work indicates high-grade Li_2O recoveries with low impurities

The metallurgical test was conducted in partnership with SGS Laboratories, at its Lakefield facility (Ontario). The results of the two tests demonstrated high quality of spodumene concentrate, with a Li_2O grade of more than 6%, and low impurities, with iron oxide at <1% (Figure 5).

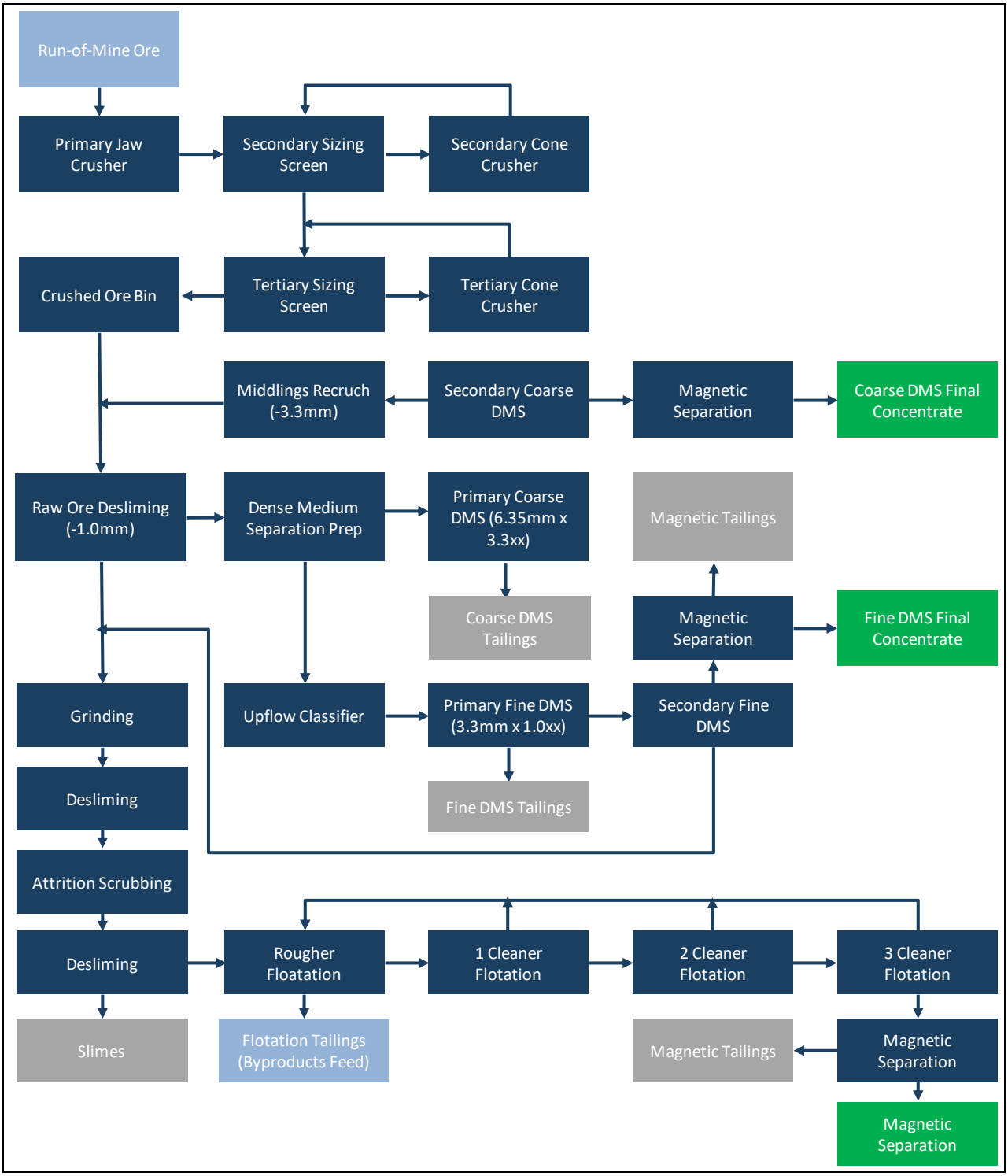
Figure 5: Results of dense medium separation + locked cycle flotation test

Sample	Feed Grade (Li_2O%)	Concentrate Grade (Li_2O%)	Fe_2O_3 (%)	Na_2O (%)	K_2O (%)	CaO + MgO + MnO (%)	P_2O_5 (%)
Dense medium separation		6.42	0.97	0.56	0.45	0.51	0.12
Locked cycle test		6.31	0.90	0.68	0.52	1.25	0.46
Piedmont composite sample 1	1.11	6.35	0.93	0.63	0.49	0.96	0.32

Source: Company

The use of DMS technology indicated the potential to produce a high-quality lithium concentrate by functioning as a concentration step in the flowsheet (Figure 6). Additionally, the seven cycles of LCT conducted on samples demonstrated substantial lithium recovery of 77% at a grade of 6.35% Li_2O. Moreover, test work simulations demonstrated the potential for increase in overall recovery of 85%, if PLL targets a 6% Li_2O concentrate.

Figure 6: Proposed spodumene concentrator workflow



Source: Company

In 2018, PLL undertook a bench-scale test work for its by-products, at the North Carolina State University's Minerals Research Laboratory (MRL). The results for quartz, obtained from analysis of three samples, demonstrated suitability for the clear glass and optical glass markets. Similarly, the results

for feldspar and mica also indicated that the samples met the market specification of the mineral.

We believe these substantial recoveries, combined with robust project economics, should position Piedmont Lithium as a key resource supplier in the US market in the medium term.

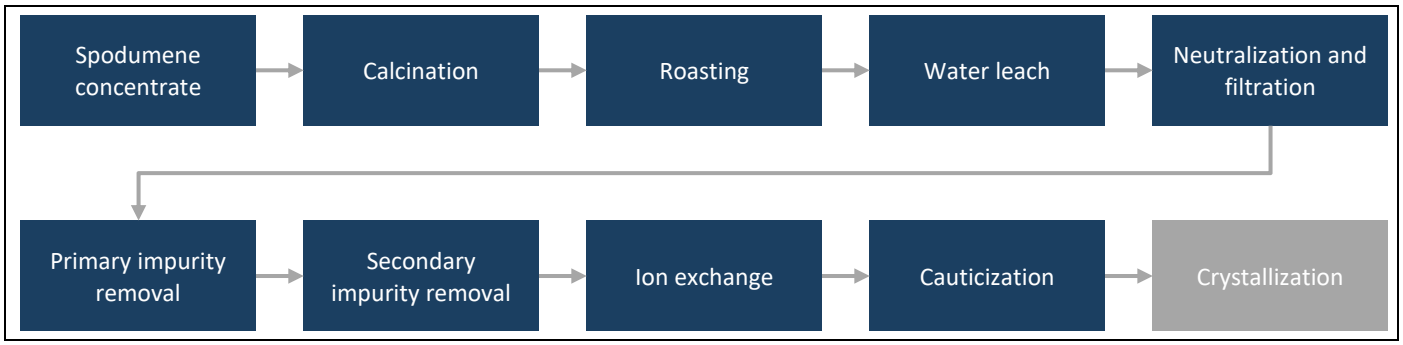
Lithium hydroxide strategy accelerated amid rising customer interest

Strong customer interest resulted in acceleration of the development of LiOH chemical plant

Following growing interest shown by off-take partners in PLL's lithium hydroxide (LiOH), the company has decided to accelerate its efforts for developing the chemical plant. Initially, PLL had intended to build the Piedmont Lithium project in two stages – development of the mine and concentrator, followed by construction of the chemical plant. However, now PLL has compressed its timeline into a single-stage development strategy. To achieve this, PLL has pulled forward the development of the chemical plant by one year and deferred the start date for the construction of the mine/concentrator by a year.

PLL is progressing well on the test work for lithium hydroxide at the SGS' Lakefield facility. As of February 2020, the bench-scale test work of the samples had already reached 90% completion, with only the last stage of testing remaining, i.e., multi-stage LiOH crystallisation and final assay results (Figure 7). We note that completion of the bench-scale testwork program has been impacted by the COVID-19 pandemic, but that delay is not expected to impact the Company's overall development timeline.

Figure 7: Diagram of the LiOH conversion program



Source: Company

Once the test work is successfully completed, PLL will be able to send LiOH samples to prospective off-take partners. This will be followed by a PFS of the chemical plant, with an expected completion in 2Q20, and an integrated definitive feasibility study (DFS) that is expected to reach completion in 4Q20.

While PLL has switched gears to accelerate the development of the chemical plant, we believe the move will position the company for substantial growth in the medium term. This will be driven by the higher margins associated with LiOH sales, which will further contribute to improved project economics.

Grant of federal permit significantly de-risks the project

In November 2019, PLL received the federal permit under the Clean Water Act Section 404, from the US Army Corps of Engineers (USACE). Notably, this gives PLL the green light at the federal level to develop the mine and concentrator at its Piedmont Lithium project. Remaining state and local approvals are expected in 2020.

PLL has been granted the only permit required to build mine and concentrator

The permit was granted after the completion of an Environmental Assessment conducted by USACE and six other state and federal agencies. In addition to this, PLL was granted Section 401 Individual Water Quality Certification by the North Carolina Division of Water Resources.

The grant of these permits uniquely positions the Piedmont Lithium project in the US lithium landscape. It also complements the project's positioning as the only US-based spodumene-to-hydroxide project.

In our view, the grant of this permit significantly de-risks the project as it was the only federal permit required for the development of the mine and concentrator. Consequently, this puts PLL a step closer to the commercialisation of its significant prospective resources at the acreage. However, in line with its recent shift in lithium hydroxide strategy, PLL will prioritise receiving the necessary permits for its chemical plant in 2020.

Piedmont's approach to sustainability is in step with its customers

An important aspect of the rise of the Electric Vehicle is the concern that EV developers have that the way their products are made and used is are sustainable. We think Piedmont Lithium will be able to satisfy its customer's need for sustainable product on multiple levels:

- Piedmont's raw material source and its lithium hydroxide plant will be in driving distance of the many auto assembly plants in the south-eastern US, eventually giving Piedmont one of the lowest carbon footprints of any lithium producer on the planet.
- The electricity used in the plants will likely be lower-carbon than elsewhere in the US since the majority of the electricity in North Carolina does not come from coal. North Caroline is currently the No. 2 solar-producing state in the US[1].
- Piedmont's operations will adhere to US environmental standards and comply with the mining and chemical production codes of the US, so there will be little concern about environmental impact. As we noted above, Piedmont has already been granted its all-important federal environmental permit for its mine.
- Despite Piedmont's low expected production costs, Piedmont's employees will be well-trained and well-compensated in a region that values Piedmont's investments.
- With US manufacturers having to conform to standards set by OSHA, MSHA, state regulators, and so on, they can make the case that their occupational health and safety record surpasses that of many other emerging countries attempting to grow their lithium industries.

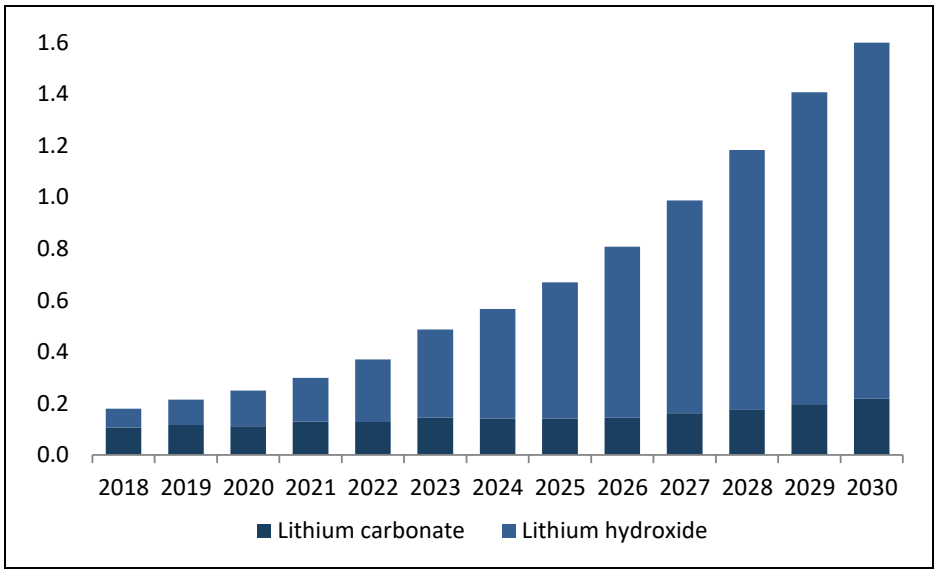
[1] See eia.gov/state/?sid=NC.

Covid-19 could actually be helpful for Piedmont in the medium term

We see Covid-19 as having a downside and an upside for PLL.

- **The downside**: Obviously Covid-19 is potentially disruptive of development activity which Piedmont is seeking to do, most notably the discussions with potential customers who are likely more focused on near-term cost control. Also, Covid-19 has caused sales of EVs to slow so it may impact expansion plans for auto makers;
- **The upside**: Covid-19 has likely made potential customers more aware of the need to shorten their supply chain, which, the longer it is, the greater the chance of disruption of an event like a novel virus pandemic. Also, it has likely brought into perspective the dangers of over-reliance on China, where a potential backlash may be coming[2].

Figure 8: Lithium hydroxide is set to gain market share (million metric tonne LCE)



Source: BloombergNEF (October 2019)

Lithium hydroxide is quickly gaining traction within industry

Use of lithium in rechargeable batteries is the current driver for demand

Historically, the demand for lithium has been driven by the ceramic and glass industries, which used to account for 40% market demand. At the time, other applications for lithium included its use in lubricant greases, air treatment, production of polymers and metallurgical casting powers.

However, with the commercialisation of rechargeable lithium-ion batteries, demand dynamics for lithium changed from the late 1990s onwards. During 2000–2017, demand for lithium from lithium-ion batteries increased 12x to approximately 60,000 tonnes. On the other hand, demand for lithium from legacy sources only doubled to 56,000 tonnes.

More recently, the tailwind for lithium demand is expected to come from the use of lithium for larger lithium-ion batteries used in e-mobility. With growing concerns around climate change and the subsequent change in vehicle

[2] For perspective here see *Global Backlash Builds Against China Over Coronavirus* by Steven Erlanger, New York Times, 3 May 2020

emissions policies across the global economies, demand for electric vehicles (EVs) is set to grow.

Initially, lithium carbonate dominated the market as the compound of choice for rechargeable batteries. However, the changing battery materials for EVs are expected to drive demand for LiOH. As a result, going forward, demand for LiOH is expected to outpace demand for lithium carbonate.

BloombergNEF (BNEF) forecasts demand for battery-grade LiOH to reach nearly 1.4Mt LCE by 2030, while demand for lithium carbonate is expected to reach 218,000 tonnes LCE during the same period (Figure 8).

What makes lithium hydroxide better than lithium carbonate?

Lithium-ion battery cells comprise three components: a cathode (positive electrode), anode (negative electrode) and electrolyte solution. While the latter two components have not undergone much change since the commercialisation of lithium-ion batteries in 1990s, the former has witnessed dramatic changes. This was driven by the need to improve safety and energy density, as well as lower the cost of the battery cell.

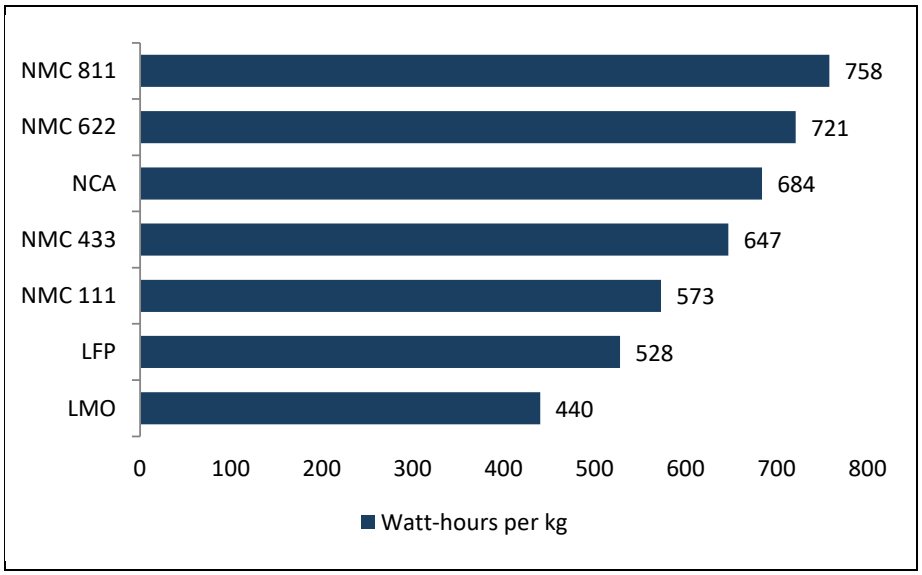
The higher nickel content in new cathode technologies is driving demand for LiOH

Previously, cathode technologies (such as lithium manganese oxide and lithium iron phosphate) used to rely on lithium carbonate. However, for cathode technologies such as nickel manganese cobalt (NMC), which have nickel content of over 60%, LiOH is the compound of choice. This is because the high temperatures required to synthesise the higher nickel content with lithium carbonate causes damage to the crystal structure of the cathode. Hydroxide, on the other hand, allows the synthesis to occur rapidly at lower temperatures, which helps maintain battery performance.

Moreover, nickel-based cathodes are gaining industry attention owing to their higher energy density, longer life cycle and cost effectiveness vis-à-vis cobalt-based cells (Figure 9). Notably, higher energy density translates to more energy being extracted from a battery pack without adding to weight. This would incentivise battery makers to include higher nickel content in their battery cell, and simultaneously reduce the use of the costlier cobalt. Consequently, demand for LiOH is expected to rise in tandem with increasing nickel content in the cathode.

Another driving factor for LiOH is the lower cost of production vis-à-vis lithium carbonate, when sourced from spodumene. When LiOH is produced directly from spodumene concentrate and does not flow through the circuit of production of lithium carbonate, the flowsheet becomes simplified. Notably, this is the method that PLL intends to use at its chemical plant, and thereby leverage on the economics of a simplified flowsheet.

Figure 9: Rising battery-cell energy densities



Source: BloombergNEF, Pitt Street Research[3]

Demand for battery-grade LiOH expected to increase substantially

Major EV and battery manufacturers are locking in supply for LiOH

As a result of the growing adoption of LiOH as the compound of choice for lithium-ion batteries, its demand is expected to increase substantially in the short–medium term. As per a recent report by MarketWatch, the global LiOH market is expected to reach US$874.7m by 2026, growing at a CAGR of 10.6% during 2021–2026.

Notably, many major companies have already shifted gears to LiOH owing to its technical advances. One such example is Tesla, which is using LiOH for its EVs, such as Model 3 and Model Y. The importance of a steady LiOH supply can be gauged from the agreement Tesla entered into with China-based Ganfeng Lithium. In September 2018, Tesla signed a three-year agreement with Ganfeng Lithium (ending 2020), to secure the supply of LiOH for its Nevada-based Gigafactory 1, built in collaboration with Panasonic. The deal is said to account for 20% of Ganfeng's annual LiOH production.

Markedly, just a month before signing this deal, in August 2018, Gangfeng had signed another long-term supply agreement, this time with LG Chem. The five-year agreement ending 2022 would see Gangfeng supplying 48,000 tonnes of LiOH to LG Chem for manufacturing EV batteries.

Moreover, with the increasing production of EVs, demand for LiOH is set to grow in tandem. For instance, Tesla plans to expand its output for battery cell production at its Gigafactory 1, to support the production of its Model 3 as well as to build new capacity for production of its upcoming Model Y. In our view, this shift by EV makers towards LiOH for their battery cells represents a substantial growth opportunity for PLL.

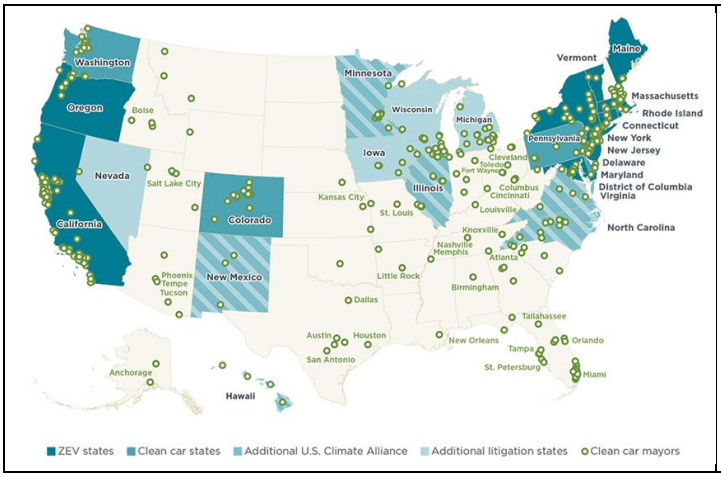
[3] N: Nickle; M: Manganese; C: Cobalt; LFP: lithium iron phosphate

Domestic EV market to underpin growth for PLL

Amid rising concerns around climate crisis and the resulting tightening of emissions legislation, demand for EVs is on the rise across the globe. The trend continues in the US, where various state and local authorities are driving EV sales through clean cars standards and monetary incentives (Figure 10). States such as California, Oregon and Maine have adopted the Zero Emission Vehicle (ZEV) standards. As of April 2019, these states' and cities' commitment to cleaner cars represented 60% of the total US auto market. Additionally, governments have invested heavily in building the supporting infrastructure to drive the adoption rates for EVs.

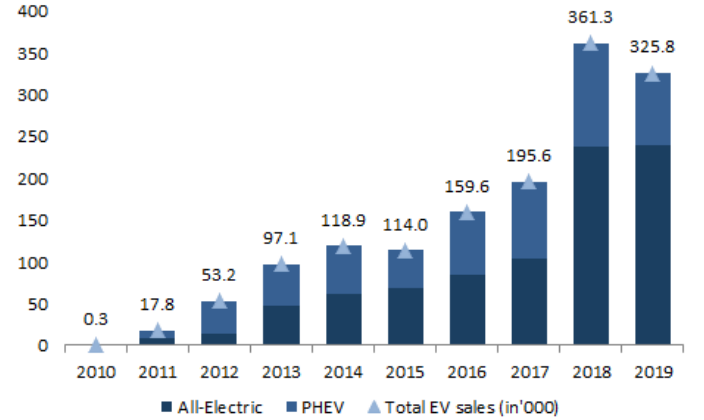
As a result of these measures, EV sales in the US witnessed almost explosive growth in the past decade. As per data from the Argonne National Laboratory, the sales of all-electric and plug-in hybrid EVs (PHEV) increased at a CAGR of 117%, from c.300 units sold in 2010 to approximately 325,800 units in 2019 (Figure 11).

Figure 10: States and cities with existing clean car standards



Source: ICCT Factsheet – US (April 2019)

Figure 11: Electric vehicle sales in the US (in '000)



Source: Argonne National Laboratory (December 2019)

Notably, the all-electric EV sales levelled off in 2019, while the sales in the PHEV segment witnessed a decrease. This was primarily due to a decline in supply as legacy models were phased out. For instance, Toyota phased out the 1st generation Prius PHEV without a ready successor.

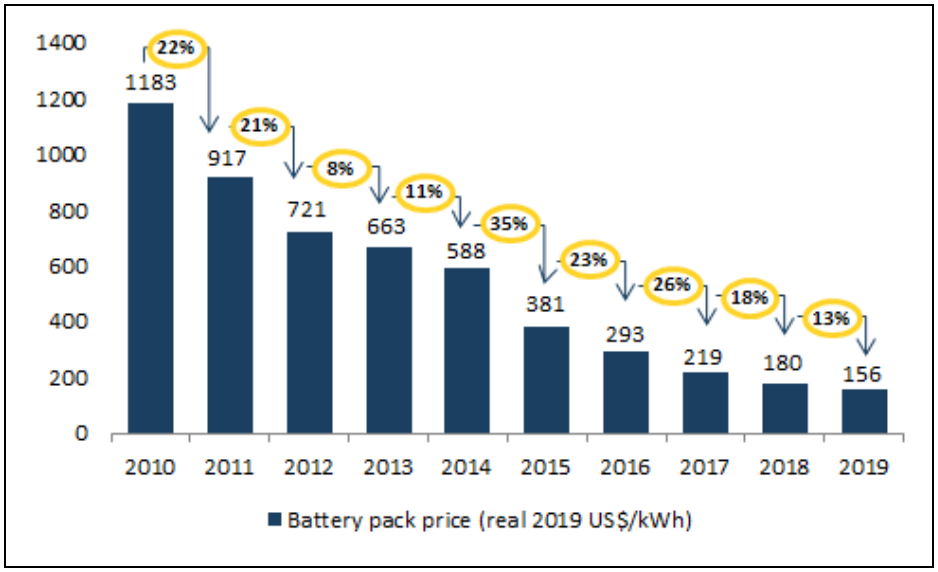
EV sales growth prospects are expected to remain strong

It is noteworthy that the recent decline in EV sales is temporary, and is nothing new in the US EV sales history, case in point year 2015 (Figure 11). As per the forecasts of EVAdoption, EV sales in the US are expected to reach 1.5m in 2025, representing 8.82% of the total vehicle sales. Below are some factors that we believe are set to drive EV sales in the US in the medium term:

– **Improving battery capacity**. With battery manufacturers constantly chasing higher energy densities and longer battery lives, the performance of new batteries has improved significantly. As newer EV models come with enhanced batteries that allow longer ranges on a full charge, the adoption rates of EVs are set to rise.

– **Decreasing cost of lithium-ion battery**. As a result of the change in battery chemistries, the cost of producing lithium-ion batteries has reduced substantially over the last few years (Figure 12). As per BNEF, the cost is expected to decline even more over the medium term, reaching US$100/kWh by 2023. Given that battery cost forms a major component of the price of an EV, this is expected to drive price parity with traditional internal combustion engines (ICE).

Figure 12: Lithium-ion battery price trend



Source: BloombergNEF 2019 Battery Price Survey

Increase in charging stations to support the adoption of EV

– **Greater availability of charging stations**. In order to facilitate the adoption of EVs, governments all over the world are investing in building the requisite infrastructure. As per ICCT, the total number of charging points across the globe grew 60% over 2013–2018 to reach nearly 600,000. The trend continues in the US, which is expected to see a rise in charging stations as state and federal governments invest to build the requisite structure to support EV charging demands of 2025. For instance, regulators in California plan to install 250,000 public charging stations in the state by 2025, in order to support the target of 5m zero-emission vehicles in the state by 2030. We believe that as the number of charging stations rises, EV sales should grow in tandem.

– **Electrification in heavy vehicle segments**. Notably, many heavy vehicles such as trucks and buses are also undergoing electrification. As per BNEF's estimations[4], 81% of the global municipal buses fleet will be electric by 2040. On the other hand, commercial vehicles segmented as light, medium and heavy vehicles are expected to account for 56%, 31% and 19% of the total sales in each segment, respectively, by 2040.

– **Monetary incentives by government**. Monetary benefits, such as tax credits, are proving to be a major driver for EV demand in the short–medium term. For instance, California, the state with the highest EV adoption rates in the US, offers discounts of up to US$7,000 to qualifying buyers and vehicles. Similarly, Colorado offers a US$5,000 state tax credit for buying a new EV, and US$2,500 credit for leasing an EV. We believe

[4] Source: Article *"Electric Transport Revolution Set To Spread Rapidly Into Light and Medium Commercial Vehicle Market"* (May 2019); https://about.bnef.com/blog/electric-transport-revolution-set-spread-rapidly-light-medium-commercial-vehicle-market/

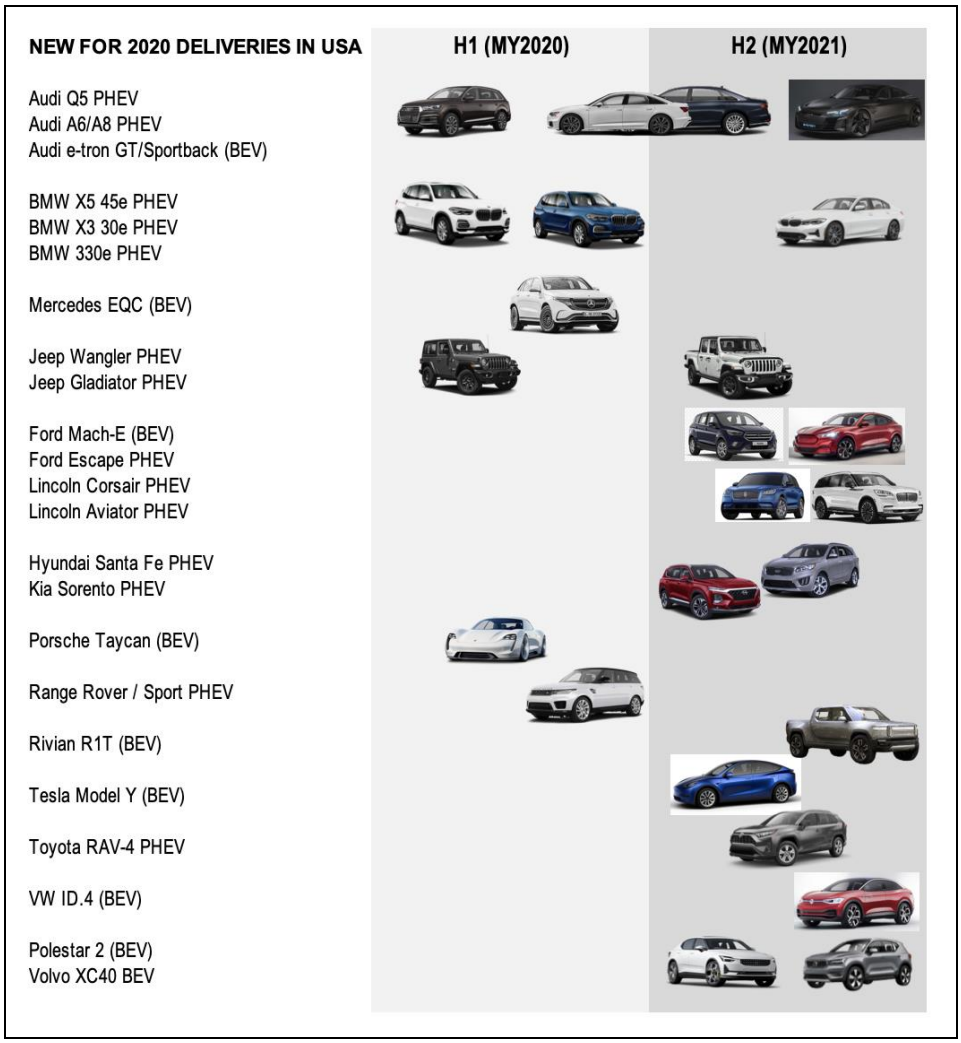
that as these states continue to provide monetary incentives, in order to meet their emission targets, the demand for EVs is bound to increase as well.

Shared mobility market. A major trend observed in the e-mobility market is the acceptance of EVs in the shared mobility space. Underpinned by savings in fuel and maintenance, scaled by how much the vehicle is driven, EVs are being increasingly used by ride sharing service providers. As per Rocky Mountain Institute, a full-time cab driver who works 50 hours a week can save averagely US$5,200 per year in total expenses on switching to an EV vs. a gas vehicle. Moreover, as more people substitute personal vehicles for eco-friendly and relatively hassle-free carpooling services, demand for EVs in the shared mobility market is expected to rise.

– **Customers are expected to be spoiled for choice**. Notably, Tesla is not the only major company targeting a slice of the US EV market. Automakers from all geographies, from Audi and BMW to Toyota, plan to launch new EV models for US consumers in 2020 (Figure 13). As new models enter the market, they are set to ignite the interest of customers towards EVs. In our view, this will further help drive demand for EVs in the US.

In our view, as EV demand rises in the medium term, underpinned by the abovementioned factors, the need for inputs such as lithium-ion batteries are set to grow in tandem. This, in turn, will drive demand for battery-grade LiOH, thereby providing substantial upside potential to PLL.

Figure 13: Robust new model pipeline for EVs in the US



Source: EV-Volumes

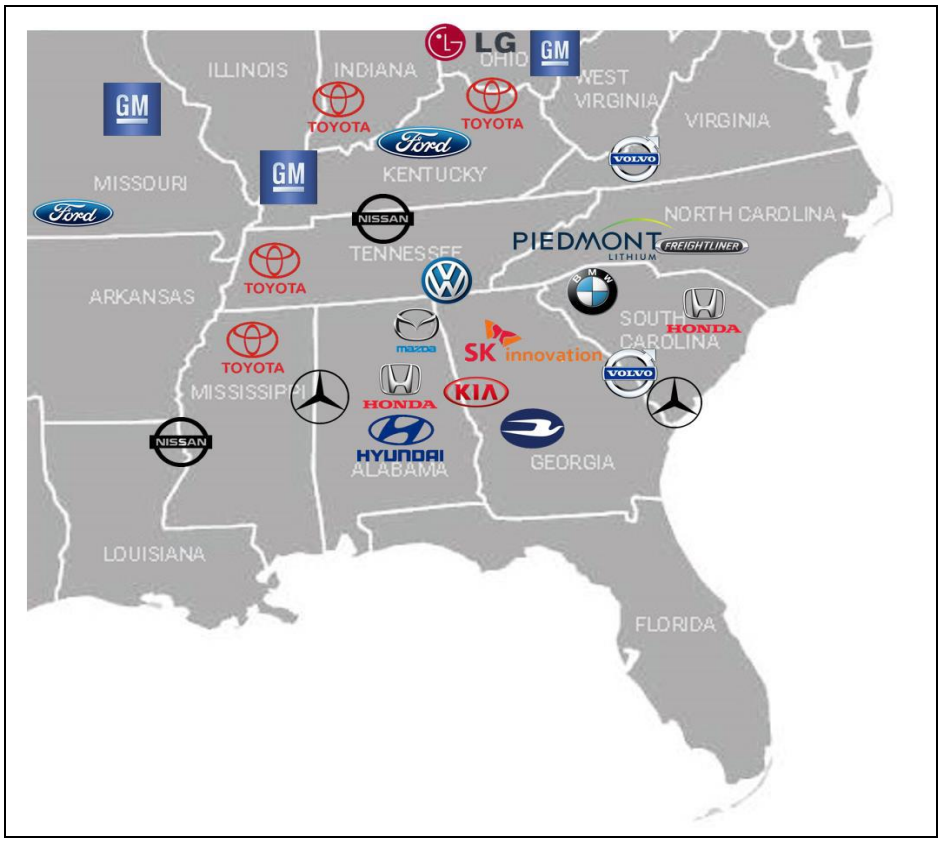
US auto manufacturers in search of options to decrease reliance on China for inputs

The recent US–China trade war brought to forefront the high dependence of US industries on Chinese raw materials. In order to reduce the risk of tariff volatility and ensure a smoother supply of production inputs, various US industries, including auto manufacturers, are looking for domestic solutions. In our view, this is a major growth opportunity for PLL.

PLL's location proves to be a crucial advantage

Given the proximity to the US Auto Valley (Figure 14), PLL is advantageously located to reap the benefits of the ongoing vehicle electrification revolution. Auto manufacturers looking to ramp up their production of EVs, in order to gain market share in the EV space, are set to require a steady supply of LiOH to build inventory. This is where PLL comes into play. Leveraging the beneficial logistics infrastructure of its acreage, PLL can offer quality battery-grade LiOH to automakers in the Auto Valley.

Figure 14: Piedmont Lithium project's proximity to the US Auto Alley



Source: Company

Upcoming projects further boost growth prospects

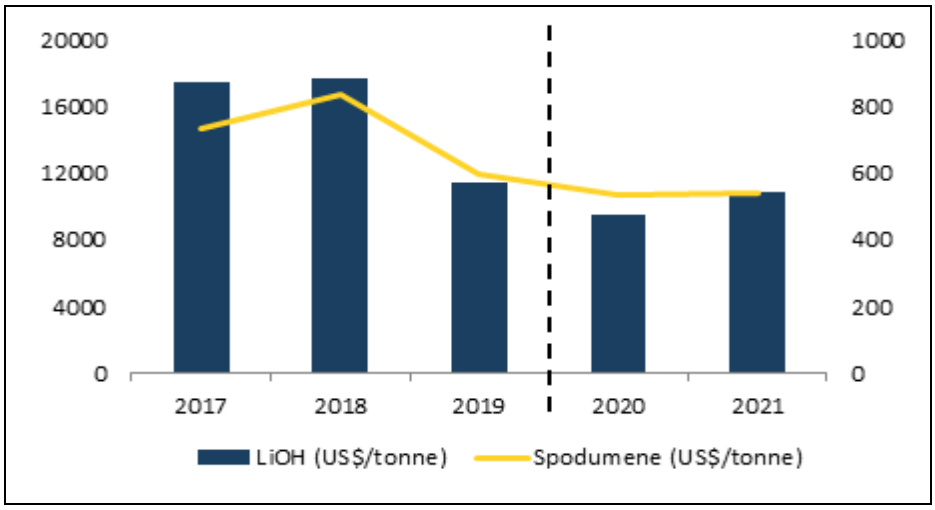
Moreover, there are a number of plants and gigafactories that are expected to come online in the US in the medium term. For example, Tesla has hinted at building another Gigafactory, this time on the East Coast, to support the production of its Model Y. Additionally, driven by its high demand for lithium-ion cells, South Korean giant SK Innovations is planning to build another 10GWh plant in Georgia, in addition to the 9.8GWh plant in the same state currently under construction and expected to come online in 2022.

With more such projects anticipated to come online in the medium term, the demand for requisite raw materials is set to grow. We believe that with its high-grade LiOH, the company is well positioned to leverage this growth opportunity.

Decline in lithium prices an added advantage for PLL

According to the Australian government's Department of Industry, Science, Energy and Resources, the prices of LiOH and spodumene are expected to remain stable over the next two years. In 2019, prices declined 30% and are expected to further drop 10–20%. However, they are expected to return to the 2019 levels in 2021 (Figure 15). PLL, which is expected to initiate mine construction in 2022 and production of spodumene in 2023, is anticipated to receive higher prices for its product.

Figure 15: Lithium Hydroxide and Spodumene prices are expected to remain stable



Source: Resources and Energy Quarterly (Dec 2019); Department of Industry, Innovation and Science, Government of Australia

The decline in LiOH prices over the last one year has forced many miners to rationalise operations — deferring mine construction, downsizing operations, and even completely halting production. We believe this situation could turn out to be advantageous for PLL. Due to its low-cost structure, PLL is relatively better placed than other mines and is expected to benefit from the supply gap caused due to low prices. In addition, being closer to the end market means that PLL can transport the final product rather quickly to its clients, and at a fraction of the cost (for user), than some other miners from China and Australia. This is expected to help PLL gain market share at the expense of more costly and far-off mines.

By-products offer an array of opportunities

In addition to spodumene, the Piedmont Lithium project includes three by-products – mica, quartz and feldspar.

Mica

As per the July 2019 scoping study, the Piedmont Lithium project has a JORC 2012 MRE of 1.12Mt mica. Mica is used extensively in integrated circuits and automotive parts. Increasing use of mica in paint technology, especially in clear and pearlescent coats, is a key trend. The mineral's growing demand stems from the rapid pace of development in emerging economies. As per Zion Market Research, the global mica market is expected to grow at a CAGR of 3.6% during 2019–2025 to reach US$727m.

Quartz

PLL has a JORC 2012 MRE of 7.36Mt of quartz in its Piedmont Lithium project. Quartz is a significant mineral with several applications in the glassmaking and electronics industries. Manufacture of silicon semiconductors, radios and watches involves the use of quartz as a key raw material. Notably, the metallurgy of quartz found at PLL's acreage is most suitable for semiconductor fillers, LCD and optical glass applications.

As per Allied Market Research, the global market for quartz is forecast to be worth US$13.6bn, growing at a CAGR of 6.4% over 2019–2026. The market for quartz is highly fragmented, with the presence of global and regional players such as Shin-Etsu Chemical Co. Ltd, Nihon Dempa Kogyo and Seiko Epson.

China, the leading producer of mineral and quartz products, has been accused by the US Commerce Department of illegal dumping of imported quartz products in the US and, as a result, tariffs have increased. While this has hampered market growth, it offers a silver lining for domestic suppliers such as PLL.

Feldspar

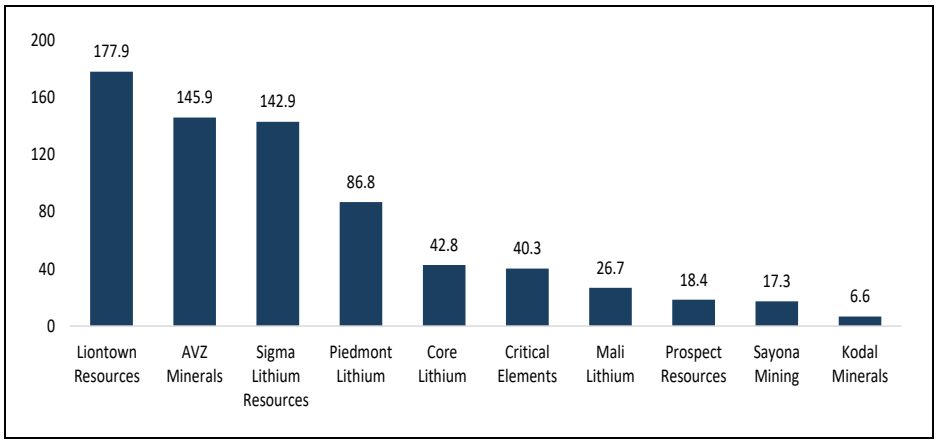
Feldspar is a common ingredient in the glass and ceramics industries, where it is used as a fluxing agent and to increase strength and durability. PLL has a JORC 2012 MRE of 11.13Mt of Feldspar at its acreage, with chemical specifications close to those of K-spar and Na-spar. Both potassium feldspar (K-spar) and sodium feldspar (Na-spar) are more prevalent in the glass industry.

As per the latest study by Future Market Insights, the global market for feldspar was estimated to be US$1.3bn in 2018 and is poised to grow at a CAGR of 5% over 2019–2029. Increased spending from developing economies on construction activities is expected to contribute a significant portion of this expansion. However, Europe is set to remain the leader in the global feldspar market, with close to 59% of the global demand.

Companies to watch out for in the Lithium mining space

Based on our assessment, restricted to pure hard-rock lithium play companies, the following nine companies are comparable to Piedmont Lithium (Figure 16):

Figure 16: Peer group market capitalisation (A$m)



Source: Pitt Street Research

Sigma Lithium Resources Corp. (TSXV: SGMA). The company focusses on the acquisition and development of lithium projects. Sigma has 28 mineral rights in four assets spread over 188 km2 in Brazil. The flagship asset is the Grota do

Cirilo property, which includes 10 mining concessions. Sigma specialises in producing high-quality battery-grade lithium concentrates.

Liontown Resources Limited (ASX: LTR). Liontown is a battery metals exploration and development company. Its flagship project, the Kathleen Valley lithium project, is located in Western Australia and has a mineral resource estimate of 139Mt. Additionally, it wholly owns Buldania Lithium Project (14.9Mt mineral resource base) and Toolebuc Vanadium Project (approximately 84Mt vanadium resource base).

AVZ Minerals Limited (ASX: AVZ). Formerly Avonlea Minerals Limited, the company explores lithium, tin, tantalum and associated mineral deposits in the Democratic Republic of Congo. AVZ holds 60% interest in the Manono Project and 100% interest in surrounding Manono Extension, with an estimated resource at the Roche Dure deposit of 400Mt of 1.65% Li_2O. The Manono Project is one of the largest lithium-rich LCT (lithium, calcium, tantalum) pegmatite deposits in the world.

Critical Elements (TSXV: CRE). CRE's main project is the Rose Lithium-Tantalum project located in James Bay, Quebec. It is in an advanced exploration stage. The mine will excavate a total of 26.8m tons of ore grading an average of 0.85% Li_2O and 133ppm Ta_2O_5. It has a processing capacity of 1.61Mtpa and will produce 236.5Kt of spodumene and 0.95Mlbs of tantalite concentrate.

Prospect Resources (ASX: PSC). PSC is an Australia-based company focussed on the development of its 87% owned Arcadia Lithium Project in Zimbabwe. One of the largest hard-rock lithium assets, it has JORC 2012 MRE of 72.7Mt at 1.11% lithium grade. The mine primarily produces spodumene (6% Li_2O) and petalite, while the plant has an intended throughput of 2.4Mtpa.

Sayona Mining (ASX: SYA). Formerly DiamonEx Limited, it is an Australia-based company that owns various hard-rock lithium plays, including the Authier Project (Canada) and West Australia Lithium projects. Its flagship Authier project has a JORC 2012 MRE of 20.94Mt at 1.01% Li_2O and ore reserve of 12.1Mt at 1% Li_2O.

Core Lithium (ASX: CXO). Core Lithium is an Australia-based company focussed on its 100% owned Finniss Lithium Project located in the Northern Territory. The project has a JORC 2012 MRE of 9.63Mt at 1.4% Li_2O. The company is currently working towards increasing its mineral resource and ore reserves, as well as the mine life of the project, via a feasibility study targeted to be completed in 1H20.

Kodal Minerals (AIM: KOD). Kodal is a UK-based development and exploration company focussed on the Bougouni Lithium Project in southern Mali. The project has a JORC 2012 MRE of 21.3Mt at 1.11% Li_2O. Notably, KOD has already secured an offtake partner – Singapore-based Suay Chin International Pte Ltd – which is also a strategic investor in the company.

Valuation

Based on a DCF analysis of the integrated Piedmont project, we value PLL at A$0.34 per share base case and A$0.62 per share optimistic case. Our modelling is predominantly based on the 2019 updated Scoping Study.

We expect PLL to begin its Stage 1 construction of the mine and concentrator in 2022, with the first production of the spodumene concentrate in 2023 and a 25-year mine life. Further, we assume PLL to commence its Stage 2 construction of the chemical plant in 2024, with the first production of LiOH in 2025, sequentially ramping up towards its nameplate capacity in 2028.

Figure 17 shows our base case operational assumptions.

Figure 17: Piedmont Lithium project valuation

Piedmont Lithium Project (100% owned by PLL)	
Mine/Concentrator	
Year of construction for mine/concentrator	2022
Years needed for commencement of SC6.0 production	1
Mine life (Yrs)	25
Mineral resource (Mt)	27.9
ROM ore extracted LOM (Mt)	25.6
Mining production rate at steady state (Mtpa)	1.15
Strip ratio (t:t)	10.4
Waste rock generated (Mt)	265.9
Upfront capex for mine/concentrator (US$M)	167.9
Sustaining capex for mine/concentrator (US$M)	147.9
SC6.0 production rate (Ktpa)	160.0
SC6.0 produced LOM (Mt)	3.8
SC6.0 sold to third party (Mt)	0.7
SC6.0 cash operating cost (US$/t)	199.0
SC6.0 LT price (US$/t)	566.0
Chemical Plant	
Year of construction for chemical plant	2024
Years needed for commencement of LiOH production	1
Plant life (Yrs)	23
Upfront capex for chemical plant (US$M)	344.1
Sustaining capex for chemical plant (US$M)	86.5
LiOH production rate (Ktpa)	22.7
LiOH produced LOM (Kt)	489.0
LiOH cash operating cost (US$/t)	3,105.0
LiOH price (US$/t)	16,345.0
Tax rate	22.98%
USD/AUD	1.73

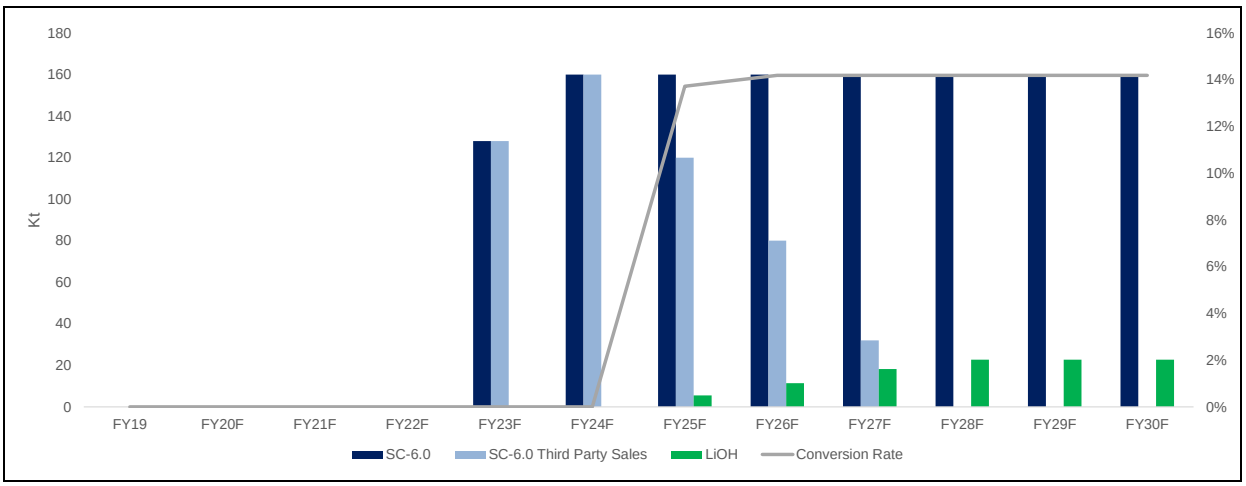
Source: Pitt Street Research

- **Discount rate**. A discount rate of 12.1% is assumed, as the integrated Piedmont project is in the pre-DFS stage. As PLL achieves more project milestones, we will reduce the discount rate accordingly.

- **Product pricing**. In line with the Scoping Study, our base case assumes approximately US$550/t for a spodumene concentrate with 6% lithia content (SC-6.0) and approximately US$16,000/t for LiOH, with our optimistic case attracting an additional 15% premium for each product. As mentioned in the market section of this report, we expect a robust outlook for LiOH pricing driven by a steady demand growth trajectory of LiOH-grade rechargeable batteries.
- **Operating costs**. As guided by the Scoping Study, our base case assumed total cash costs of US$199/t for SC-6.0 and US$3,105/t for LiOH conversion, both of which are inclusive of G&A expenses associated with mining operations, royalties and transport. Credits from by-products quartz, feldspar and mica have also been factored into the cash costs. Our optimistic case assumes PLL is able to achieve operational cost savings and hence reduce both cash costs by 10%, driving higher margins than our base case.
- **Funding**. We assume Stage 1 upfront capex to be funded 70/30 between debt and equity. For Stage 2 upfront capex, we assume it will be partially funded by internal free cash flows, which are expected to be generated from third-party sales of SC-6.0 in 2023 and 2024. On the residual Stage 2 upfront capex, we assume a 70/30 debt-to-equity funding arrangement.
- **Further equity capital**. For the sake of conservatism, our base case assumes that PLL conducts equity issuance at A$0.11 per share, reflecting the stock's current market capitalisation. Our optimistic case, however, assumes a higher equity price at A$0.16 per share as we assume that PLL will re-rate as it achieves near-term milestones, such as the completion of DFS – expected to demonstrate more robust project economics vs. the 2019 Scoping Study – as well as the signing of offtake agreements. With a higher equity price from which PLL could base its capital raise on, the resultant effect would be less dilution.
- **Tax**. We have assumed a corporate tax rate of approx. 23%.

Figure 18 illustrates our base case production outlook for SC-6.0 and LiOH, which assumes a staged construction for the integrated Piedmont project that commences in FY22F, with the first production of SC-6.0 expected in FY23F and LiOH in FY25F. We have modelled approximately 0.5Mt of SC-6.0 to be sold to third parties between FY23F and FY27F.

Figure 18: Base case production outlook for PLL



Source: Pitt Street Research

Figure 19 shows our valuation summary for the integrated Piedmont project. The midpoint of our valuation range is A$0.48 per share. Included within our valuation is an assumed US$133.6M equity raising between FY21F and FY24F, which would lift shares to 2,986m base case and 2,266m optimistic case.

Figure 19: NPV-based valuation for PLL

Valuation (Post Equity Financing)	Base	Optimistic
NPV of integrated Piedmont project	584.6	801.9
Net debt/(cash)	(7.7)	(7.7)
Minority Interest	-	-
Other Investments	-	-
Equity value (US$M)	**592.3**	**809.6**
Diluted shares (M) (Post equity raising)	2,986.4	2,266.4
Implied price (US$ per share)	0.20	0.36
Exchange rate	1.73	1.73
Implied price (A$ per share)	**0.34**	**0.62**
Current price (A$ per share)	0.11	0.11
Upside (%)	220.7%	477.6%

Source: Pitt Street Research

Peer analysis on hard-rock lithium players

We examined 14 listed hard-rock lithium developers and producers in our peer group analysis for PLL (Figure 20). Within this broader peer group of companies, we have identified 9 pure-play hard-rock lithium developers that we believe have features similar to PLL (highlighted in blue in Figure 20).

Figure 20: Peer Valuation for PLL

Company	Market Cap (A$m)	Project	Location	Stage	EV (A$m)	Resource (Mt)	Grade Li_2O (%)	EV/Resource (A$/t)	EV/Li_2O Resource (A$/t)
Core Lithium	42.8	Finniss	Australia	Development	39.6	9.6	1.30	4.1	316.3
Sigma Lithium Resources	142.9	Grota do Cirilo	Brazil	Development	145.2	52.4	1.43	2.8	193.8
Critical Elements	40.3	Rose Lithium-Tantalum	Canada	Development	44.8	26.8	0.96	1.7	174.1
Prospect Resources	18.4	Arcadia	Africa	Development	22.3	16.2	1.11	1.2	124.0
Liontown Resources	177.9	Kathleen Valley	Australia	Development	157.8	139.0	1.33	1.1	85.4
Sayona Mining	17.3	Authier	Canada	Development	17.0	20.9	1.01	0.8	80.4
Kodal Minerals	6.6	Bougouni	Africa	Development	6.1	21.3	1.11	0.3	25.8
AVZ Minerals	145.9	Manono	Africa	Development	145.9	400.0	1.65	0.2	22.1
Mali Lithium	26.7	Goulamina	Africa	Development	20.1	103.2	1.34	0.2	14.5
Altura Mining	122.4	Pilgangoora (AJM)	Australia	Production	312.4	45.7	1.06	6.8	644.9
Galaxy Resources	321.4	James Bay	Canada	Development	136.1	40.3	1.40	3.4	241.2
Pilbara Minerals	544.8	Pilgangoora (PLS)	Australia	Production	591.8	226.0	1.27	2.6	206.2
Lithium Americas	445.9	Thacker Pass	USA	Development	511.2	532.7	-	1.0	-
Ioneer	201.6	Rhyolite Ridge	USA	Development	80.0	150.6	-	0.5	-
Piedmont Lithium	**88.4**	**Piedmont Lithium**	**US**	**Development**	**72.0**	**27.9**	**1.11**	**2.6**	**232.5**

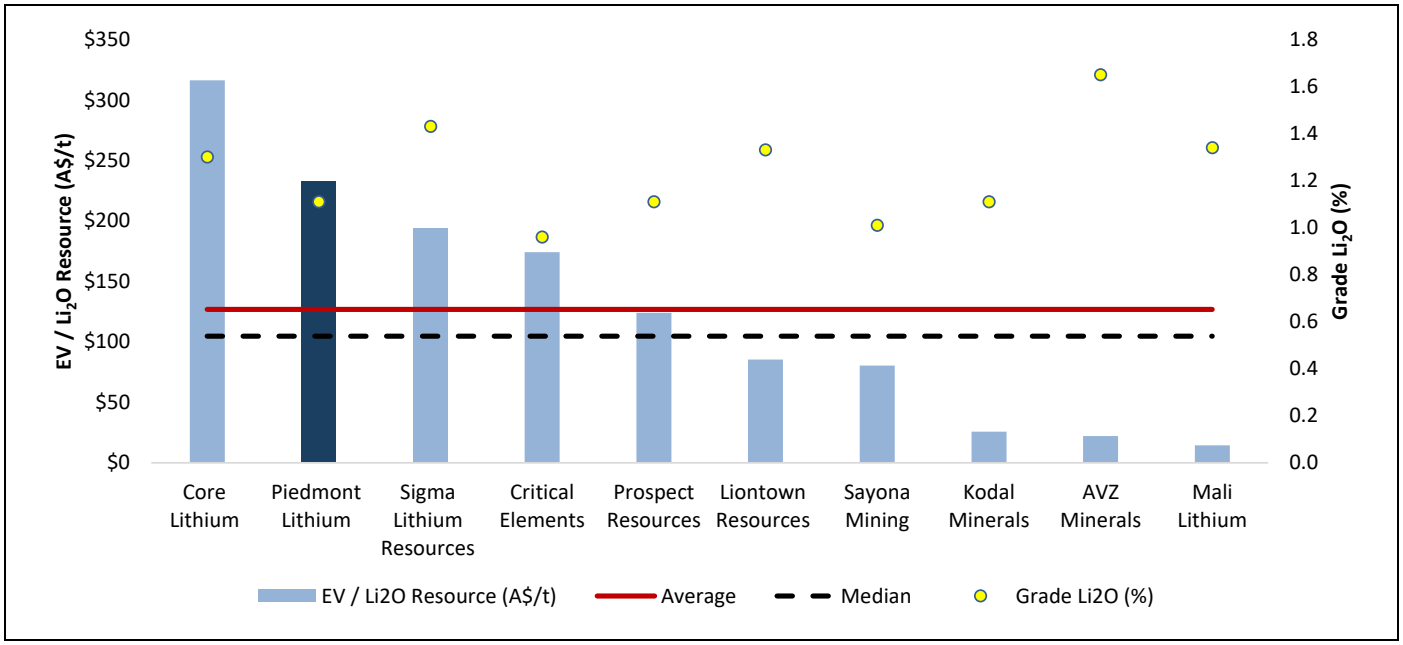
Source: Pitt Street Research

Figure 21 below displays EV/Li_2O Resource trading multiples from a range of hard-rock lithium developers that we see as comparable to PLL. By factoring the Li_2O grade into the traditional EV/Resource valuation multiple, we eliminated any bias associated with the differing grade of Li_2O.

At PLL's current EV of A$72m and Li_2O resource of 0.3Mt, we calculate that the company's Li_2O resource base is currently valued at A$232.5/t (vs. peer average of A$115.2/t). Accordingly, PLL is currently trading on a premium multiple compared with peer average trading multiples, which we believe are driven by i) excellent infrastructure vs. peers (close-by railway, lithium processing facilities in close vicinity), ii) high grades (approximately 1.1% Li_2O), iii) significant lithium potential in the Sunnyside Property, iv) low-cost recoveries due to favourable topography, and v) US mining jurisdiction offering a lower corporate tax rate than Australia and Canada.

What the value per tonne metric misses as far as Piedmont is concerned. What sets Piedmont apart from most of the above players is the fact that this company intends to be an integrated player. That means in the long run resource-based valuations will be less relevant.

Figure 21: EV/Li_2O Resource trading multiples



Source: Pitt Street Research

Re-rating Piedmont Lithium

PLL's stock is currently trading below our base case valuation. The primary factors that will support a re-rating of the stock are as follows:

1. Now that PLL has decided to accelerate its LiOH strategy, the results of the PFS for the chemical plant should provide confidence to potential investors on the management's execution abilities. Hatch is conducting the PFS study, which is expected to be completed by mid-2020.
2. Completion of the bench-scale hydroxide conversion test work would underpin the PFS for the chemical plant.
3. Binding offtake agreements with other partners for the production of LiOH at its chemical plant.

4. Further value engineering studies by Hatch and Primero Group or continuous improvement initiatives to increase project economics.
5. Completion of the Definitive Feasibility Study (DFS) for the integrated project (chemical plant + mine and concentrator) would substantially de-risk the project. PLL plans to complete the DFS by the end of 2020.

Risks

We see four main risks related to PLL's investment thesis:

1. **Pricing risk**: Prices of lithium have recently come under pressure due to the excess capacity built over the previous year. While PLL is at a relatively advantageous position to supply low-cost product quickly to end clients, any further decline in prices could prove to be detrimental to its funding and expansion plans.
2. **Geological risk**: The resource statistics for the Piedmont Lithium project are estimates, and it is possible that their characteristics may differ. There could be a risk of insufficient resources getting re-categorised as reserves.
3. **Funding risk**: Initially, PLL had planned to utilise the proceeds from spodumene concentrate sales to fund the construction of its chemical plant. However, now with the accelerated LiOH strategy, PLL decided to eliminate its spodumene concentrate sale to the Chinese market to ensure feed for its chemical plant. As a result, the company would need substantial funding in order to carry out its development plans for the vertically integrated project.
4. **Execution risk**: As the project is still in the development stage, there is an inherent risk associated with timely construction and development of the mine, concentrator and chemical plant. The ability of the management to secure offtake partners for its LiOH product also poses a risk.

Major Shareholders

The top five shareholders of PLL constitute ~43% of the total shares outstanding as of 31 March 2020. They are AustralianSuper Pty. Ltd. (10.7%), FMR LLC (9.0%), FIL Limited (8.9%), BNY Mellon Asset Management (8.5%) and Levi Mochkin (6.4%).

Conclusion

The Piedmont Lithium project has strong project dynamics, underpinned by a substantial resource base and an enviable location. The close proximity to current and upcoming gigafactories represents substantial growth opportunity for PLL. Moreover, the results of the latest scoping study provide visibility into robust project economics that can be achieved at Piedmont Lithium. The company has also received all the permits required to develop the mine and concentrator, and with accelerated plans for the development of the chemical plant, PLL is well positioned for significant upside potential.

SWOT Analysis

Strengths

- PLL has substantial JORC 2012 resource estimates, as well as favourable mineralogy as indicated by the pure spodumene nature of the reserves. The metallurgy test work also indicated high-grade Li_2O recoveries with low impurities.
- The Piedmont Lithium project has several positive qualities, such as favourable infrastructure, supportive government policies and compelling project economics.
- The vertically integrated nature of the project is set to provide significant advantages to PLL, as it is one of the few such projects in the region.
- The optimal location due to proximity to the US Auto Alley is expected to provide substantial advantage to PLL for marketing its LiOH.
- PLL has already secured an LOI with Ion Carbon for the marketing of its by-products, which should provide an additional revenue stream in the medium term.

Weaknesses

- Since the LiOH strategy has been accelerated, PLL would need substantial funding for the development of the chemical plant. Previously, this was planned to be funded by sale proceeds from spodumene concentrate, but now that the company does not have an existing revenue stream, it will have to look for external funding sources.

Opportunities

- The demand for LiOH is expected to remain strong in the medium term, driven by rising demand for EVs. With the tightening of emission policies, automakers are planning to increase their inventory of EVs and have robust EV sales targets for the medium term.
- Evolving battery chemistries, targeted at higher ranges and better performance, are expected to underpin demand for LiOH.
- New gigafactories that are expected to come online in the neighbouring states offer substantial growth potential for PLL.

Threats

- The recent decline in lithium prices points to the cyclical vulnerability of the sector. However, this risk is partially offset by the price premium that is enjoyed by LiOH, which provides it a safety cushion not available in case of lithium carbonate.

Appendix I – PLL's current capital structure

Class		% of fully diluted	Note
Ordinary shares, ASX code PLL (million)	826.3	95.6%	
Unlisted options (million)	37.9	4.4%	Average exercise price 21 cents; between July 20-June 22
Fully diluted shares	864.2		

Source: Pitt Street Research

Appendix II – PLL's Board of Directors

Name and Designation	Profile
Ian Middlemas **Chairman**	• Ian most recently worked with Normandy Mining Group, where he served as a senior group executive for approximately 10 years • He has substantial leadership experience and currently holds directorship in a number of public companies • Ian is a Chartered Accountant, holds a Bachelor's in Commerce, and is a member of the Financial Services Institute of Australasia
Keith Phillips **Managing Director, President & CEO**	• Keith has over 30 years of experience on Wall Street with expertise in the mining sector, and has worked on strategic and financing transactions worth over US$100bn • He has worked with many mining companies, advising exploration- and developmental-stage companies to achieve visibility in the US capital market • Keith holds an MBA from the University of Chicago and a Bachelor's in Commerce from Laurentian University, Canada
Anastasios (Taso) Arima **Non-Executive Director**	• Anastasios has extensive experience in forming and developing resources projects in North America • He previously served as executive director in three mining companies – Paringa Resources Ltd, Coalspur Mines Ltd and Prairie Mining Ltd • He holds a Bachelor's in Commerce and in Engineering from the University of Western Australia
Jeffrey Armstrong **Non-Executive Director**	• Jeffery is the CEO and Managing Partner of North Inlet Advisors, a financial advisory company in North Carolina, and has extensive relationships with major corporations and entrepreneurs in that community • Prior to this, he was a senior leader in Wells Fargo's Investment Banking division for almost 10 years, where he headed various groups, including Corporate Finance, Mergers and Acquisitions, and Private Equity • He holds an MBA from Darden School of Business, a B.S. in Finance from the University of Virginia, and a Bachelor's in Marketing from the McIntire School of Commerce
Jorge Beristain **Non-Executive Director**	• He has over 20 years of experience on Wall Street and currently serves as the CFO of Central Steel &Wire – a subsidiary of Ryerson Corp (NYSE: RYI) • Prior to this, he served as the Managing Director and Head of Deutsche Bank's Americas Metal and Mining equity research and has extensive

	international experience in valuation of mining projects and metal operations • He holds a Bachelor's in Commerce from the University of Alberta and is a Chartered Financial Analyst

Appendix III – Analyst qualifications

Stuart Roberts, lead analyst on this report, has been an equities analyst since 2002.

- Stuart obtained a Master of Applied Finance and Investment from the Securities Institute of Australia in 2002. Previously, from the Securities Institute of Australia, he obtained a Certificate of Financial Markets (1994) and a Graduate Diploma in Finance and Investment (1999).
- Stuart joined Southern Cross Equities as an equities analyst in April 2001. From February 2002 to July 2013, his research speciality at Southern Cross Equities and its acquirer, Bell Potter Securities, was Healthcare and Biotechnology. During this time, he covered a variety of established healthcare companies, such as CSL, Cochlear and Resmed, as well as numerous emerging companies. Stuart was a Healthcare and Biotechnology analyst at Baillieu Holst from October 2013 to January 2015.
- After 15 months over 2015–2016 doing Investor Relations for two ASX-listed cancer drug developers, Stuart founded NDF Research in May 2016 to provide issuer-sponsored equity research on ASX-listed Life Sciences companies.
- In July 2016, with Marc Kennis, Stuart co-founded Pitt Street Research Pty Ltd, which provides issuer-sponsored research on ASX-listed companies across the entire market, including Life Sciences companies.
- Since 2018, Stuart has led Pitt Street Research's Resources Sector franchise, spearheading research on both mining and energy companies.

Cheng Ge is an equities research analyst at Pitt Street Research.

- Cheng obtained a B.Com in Finance and LL.B from University of New South Wales, in 2013, and has passed all three levels of the CFA Program.
- Prior to joining Pitt Street Research, he has worked for several financial services firms in Sydney, where his focus was on financial advice.
- He joined Pitt Street Research in January 2020.

General advice warning, Disclaimer & Disclosures

Terms & Conditions

The information contained herein ("Content") has been prepared and issued by Pitt Street Research Pty Ltd ACN 626365615 ("Pitt Street Research"), an Authorised Representative (no: 1265112) of BR Securities Australia Pty Ltd. ABN 92 168 734 530, AFSL 456663. All intellectual property relating to the Content vests with Pitt Street Research unless otherwise noted.

Disclaimer

Pitt Street Research provides this financial advice as an honest and reasonable opinion held at a point in time about an investment's risk profile and merit and the information is provided by the Pitt Street Research in good faith. The views of the adviser(s) do not necessarily reflect the views of the AFS Licensee. Pitt Street Research has no obligation to update the opinion unless Pitt Street Research is currently contracted to provide such an updated opinion. Pitt Street Research does not warrant the accuracy of any information it sources from others. All statements as to future matters are not guaranteed to be accurate and any statements as to past performance do not represent future performance.

Assessment of risk can be subjective. Portfolios of equity investments need to be well diversified and the risk appropriate for the investor. Equity investments in a listed or unlisted company yet to achieve a profit or with an equity value less than $50 million should collectively be a small component of an individual investor's equity portfolio, with smaller individual investment sizes than otherwise. Investors are responsible for their own investment decisions, unless a contract stipulates otherwise.

Pitt Street Research does not stand behind the capital value or performance of any investment. Subject to any terms implied by law and which cannot be excluded, Pitt Street Research shall not be liable for any errors, omissions, defects or misrepresentations in the information (including by reasons of negligence, negligent misstatement or otherwise) or for any loss or damage (whether direct or indirect) suffered by persons who use or rely on the information. If any law prohibits the exclusion of such liability, Pitt Street Research limits its liability to the re-supply of the Information, provided that such limitation is permitted by law and is fair and reasonable.

General advice warning

The Content has been prepared for general information purposes only and is not (and cannot be construed or relied upon as) personal advice nor as an offer to buy/sell/subscribe to any of the financial products mentioned herein. No investment objectives, financial circumstances or needs of any individual have been taken into consideration in the preparation of the Content.

Financial products are complex, entail risk of loss, may rise and fall, and are impacted by a range of market and economic factors, and you should always obtain professional advice to ensure trading or investing in such products is suitable for your circumstances, and ensure you obtain, read and understand any applicable offer document.

Disclosures

Pitt Street Research has been commissioned to prepare the Content. From time to time, Pitt Street Research representatives or associates may hold interests, transact or hold directorships in, or perform paid services for, companies mentioned herein. Pitt Street Research and its associates, officers, directors and employees, may, from time to time hold securities in the companies referred to herein and may trade in those securities as principal, and in a manner which may be contrary to recommendations mentioned in this document.

Pitt Street Research receives fees from the company referred to in this document, for research services and other financial services or advice we may provide to that company. The analyst has received assistance from the company in preparing this document. The company has provided the analyst with communication with senior management and information on the company and industry. As part of due diligence, the analyst has independently and critically reviewed the assistance and information provided by the company to form the opinions expressed in the report. Diligent care has been taken by the analyst to maintain an honest and fair objectivity in writing this report and making the recommendation. Where Pitt Street Research has been commissioned to prepare Content and receives fees for its preparation, please note that NO part of the fee, compensation or employee remuneration paid will either directly or indirectly impact the Content provided.