CG Metals & Mining – EV Materials

Lithium | 2H'22 Recharge

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Please see important disclosures in Appendix

Canaccord Genuity Capital Markets

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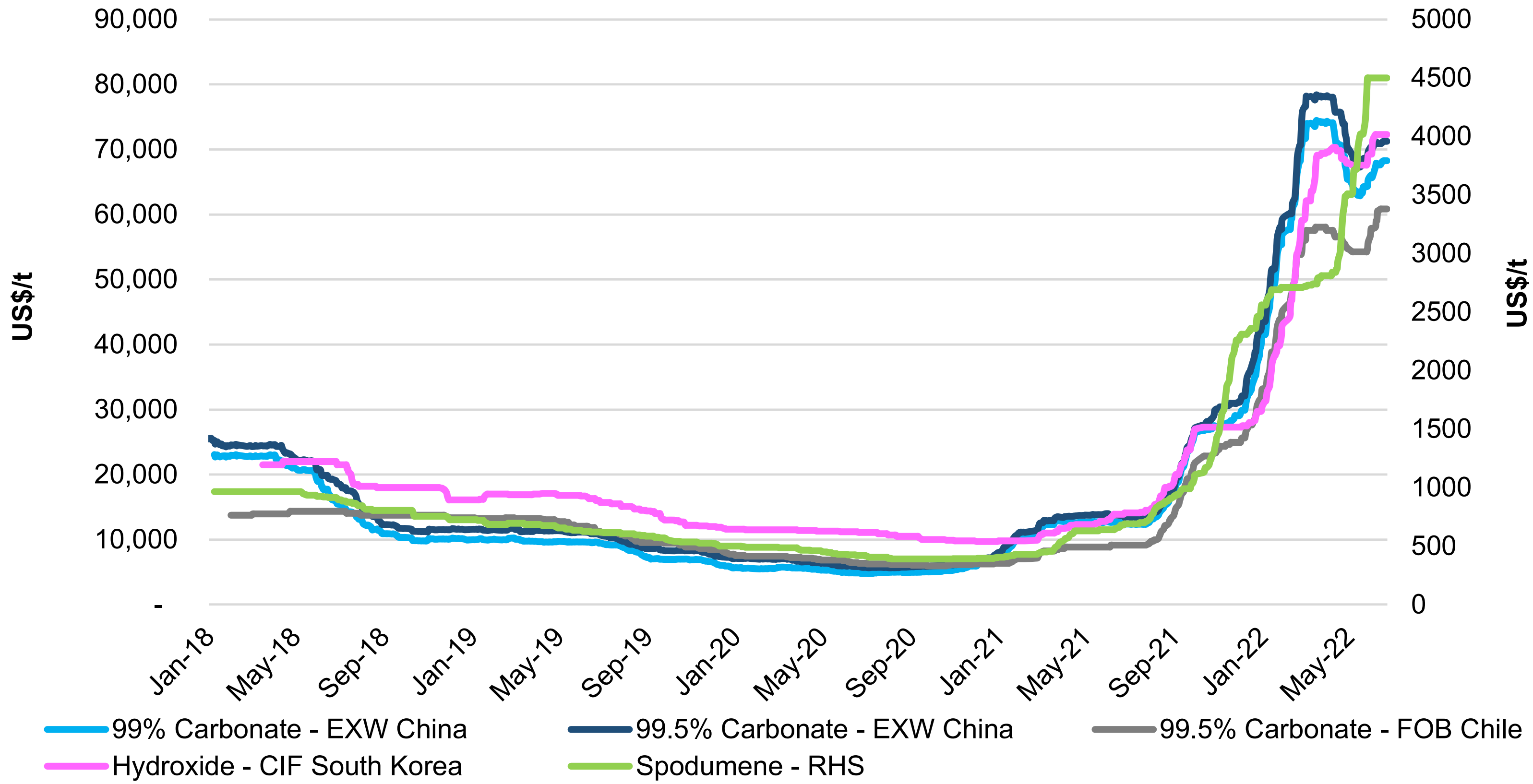
Lithium pricing hits all-time highs in 2022 driven on supply shortfalls and strong demand



Source: Asian Metal

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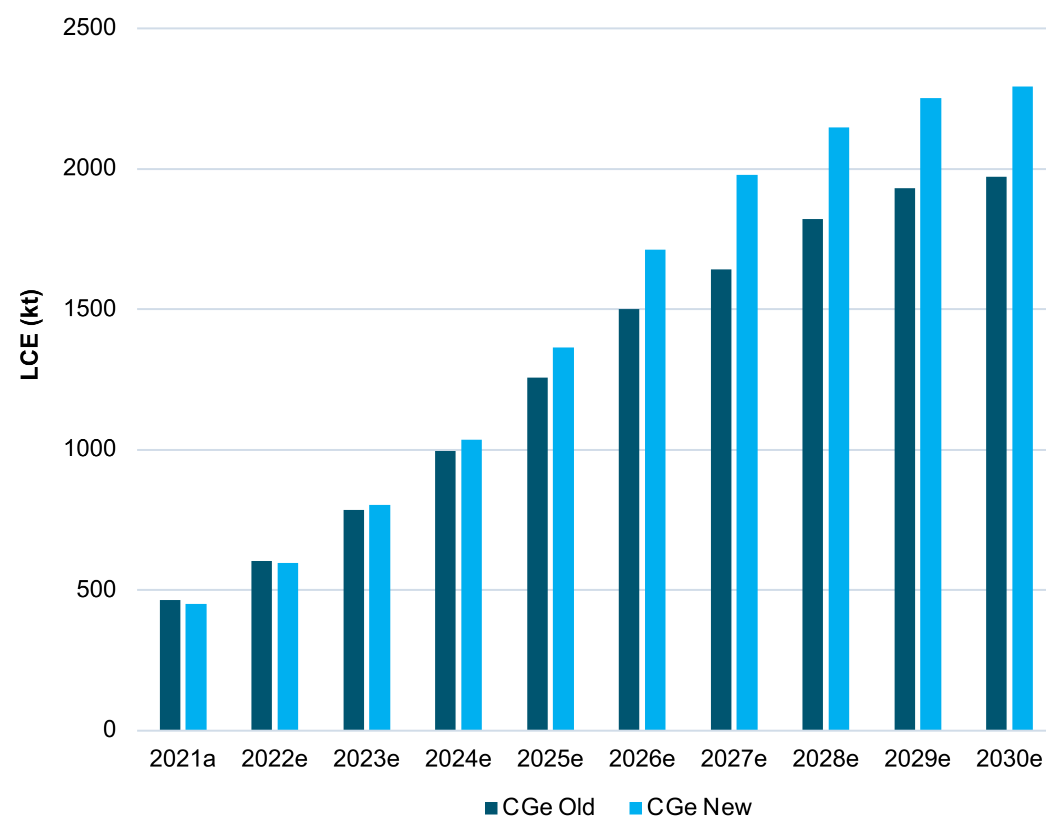
Prices well beyond incentive levels… supply is coming, but how much and when?

- High prices generating strong cashflow for incumbent producers (funding capacity expansions) and incentivising a significant development project pipeline
- CGe supply revisions – Anticipate minimal changes in the near term; increased supply in the longer term on higher incentive prices and demand pull – avg YoY supply growth of 15% based on our modelling/review of project pipeline
- High prices also incentivise “unconventional” sources of supply such as lithium micas and new process techs (i.e., DLE) applied to low-grade deposits



Source: Canaccord Genuity estimates

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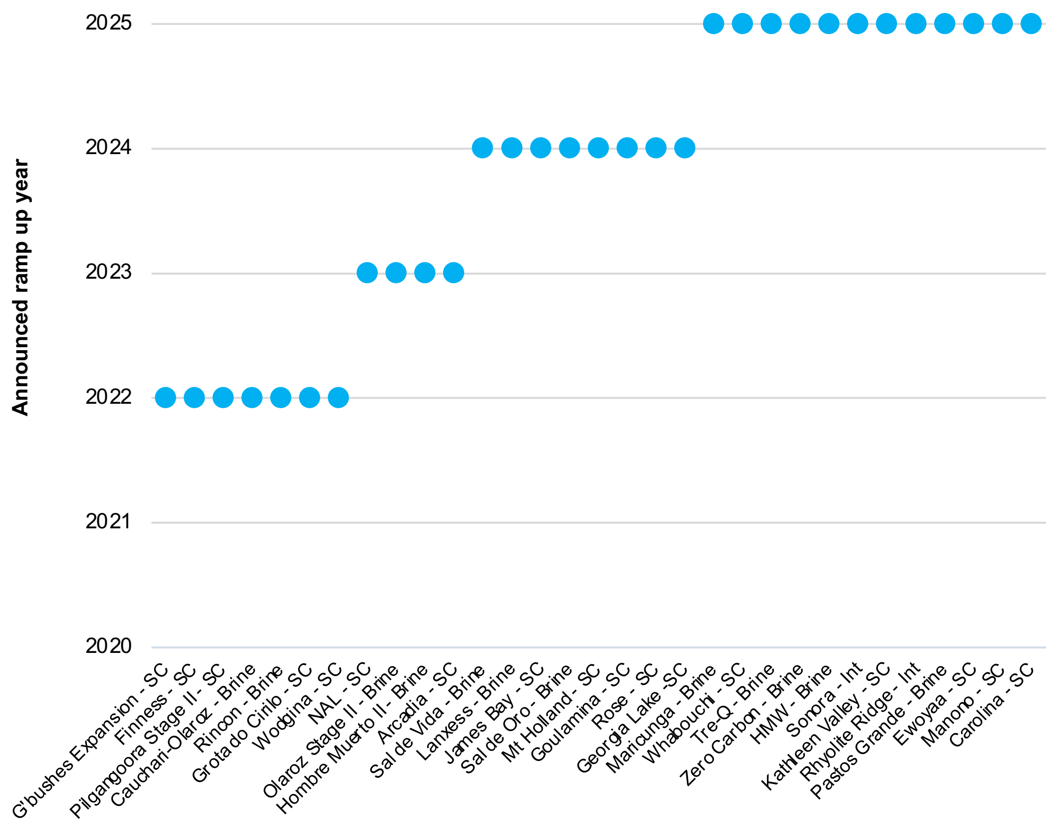
Prices well beyond incentive levels… supply is coming, but how much and when?

- Extensive near-term project pipeline – our project database (>100 projects) reveals 31 new projects (excl. ALB/SQM/LTHM brine expansions) which could enter production by 2025
- Near-term project pipeline represents total potential capacity of ~1Mt LCE (at nameplate)
  - We expect spodumene to represent a majority of new supply to 2025 (*we assume converter capacity increases in step*) at 57%
  - Greenfield projects represent 36% of modelled supply by 2025E



Source: Company reports, Canaccord Genuity estimates; * chart excludes ALB/SQM Atacama and LTHM capacity expansions

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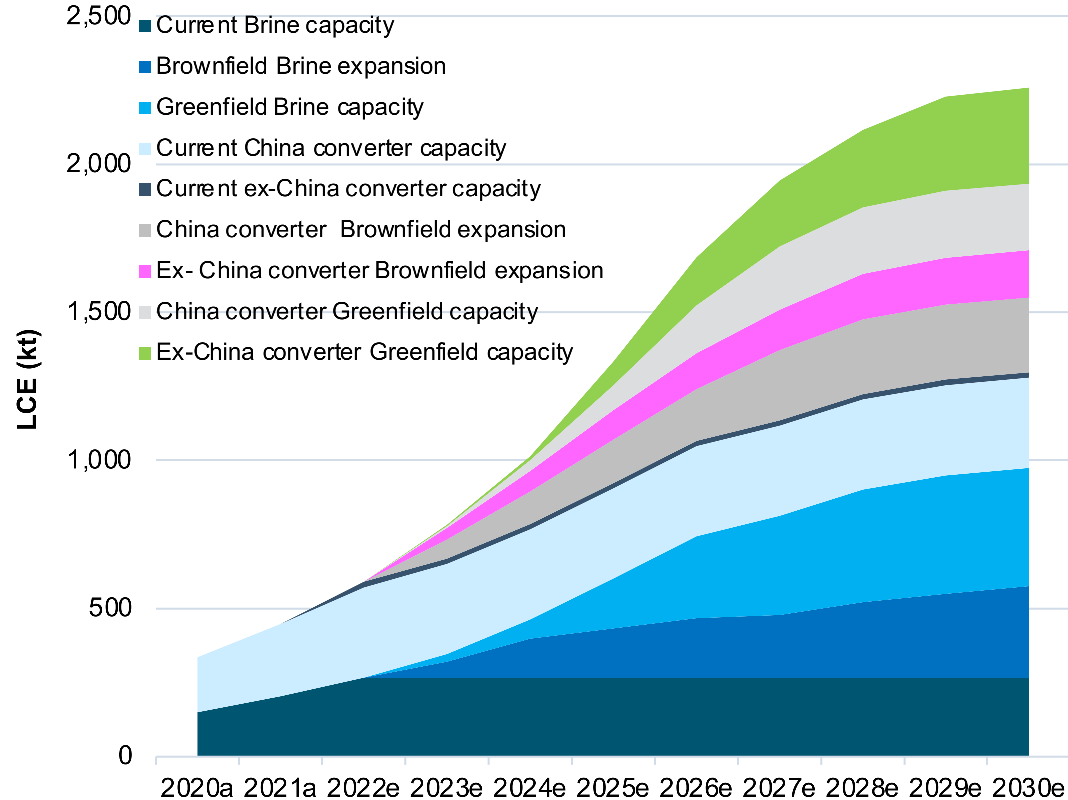
Prices well beyond incentive levels… supply is coming, but how much and when?

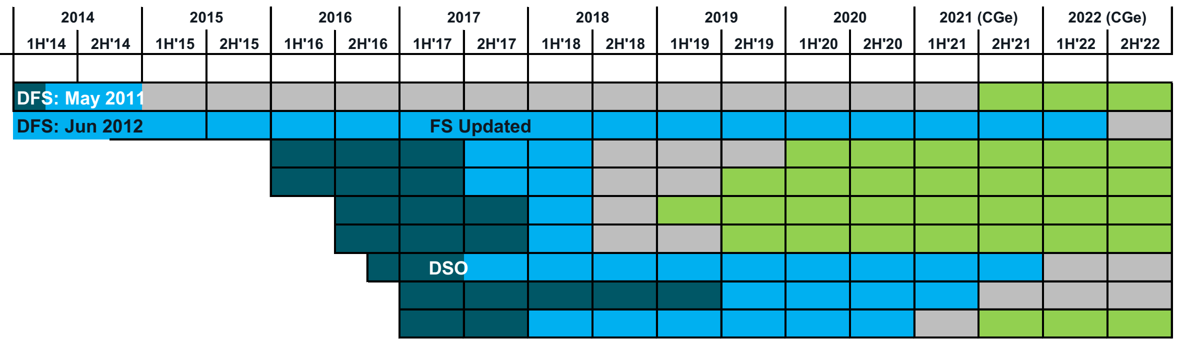
- Breaking down our modelled supply growth
  - Greenfield projects are critical to the supply outlook – new projects represent 57% of our modelled 2030 supply
  - We forecast converted hard rock to represent a majority (58%) of new supply by 2030
  - Ex-China conversion build-out could have implications for the concentrate market/outlook (i.e., rise of integrated hard rock projects could see China converter fleet short of feed stock)
- So, supply is coming… but we think it pays to be conservative with respect to supply growth expectations



Source: Company reports, Canaccord Genuity estimates

Why we should be conservative when it comes to supply #1 – industry has a poor track record

Company	Project	Dvlpt	Type	Capacity (LCE)
Selected current projects				
Orecobre	Olaroz Stage I	G'field	Brine	17.5
LAC/Ganfeng	Cauchari-Olaroz	G'field	Brine	40
Albemarle	La Negra II+	B'field	Brine	20
Altura Mining	Pilgangoora	G'field	H/rock	23
AMG	Mibra	G'field	H/rock	12
Pilbara Minerals	Pilgangoora Stage I	G'field	H/rock	40
Mineral Resources	Wodgina	B'field	H/rock	100
Talison	G'bushes Expansion	B'field	H/rock	85
SQM	Atacama Expansion	B'field	Brine	49



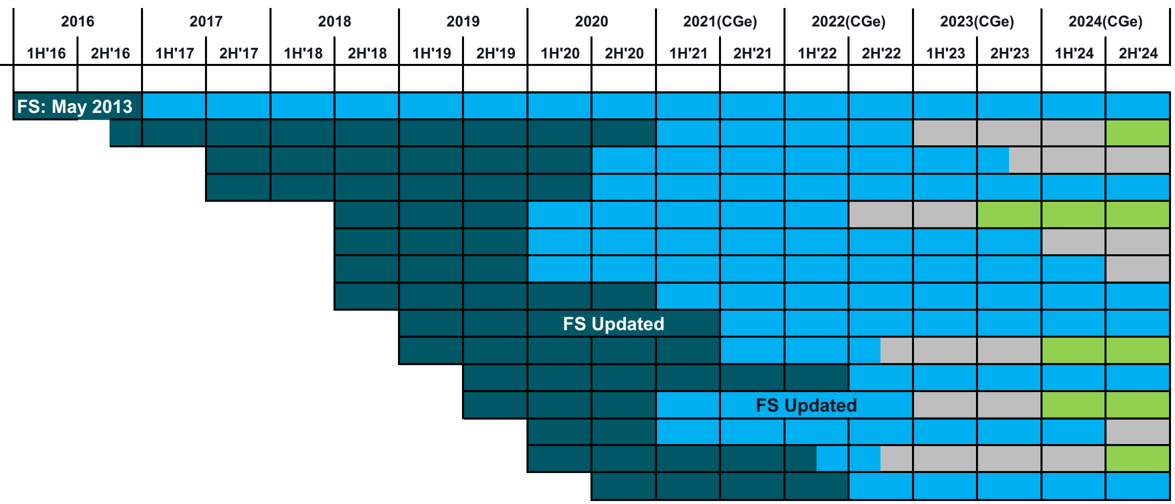
= PFS/DFS Complete > Planned start date

= Ramp up

= Planned start date > Actual Start Date (Delay)

= Steady State

Company	Project	Dvlpt	Type	Capacity (LCE)
Selected new projects				
Nemaska	Whabouchi	G'field	H/rock	31
Orecobre	Olaroz Stage II	B'field	Brine	25
Livent	H/Muerto Expansion	B'field	Brine	20
Critical Elements	Rose	G'field	H/rock	20
Pilbara Minerals	Pilgangoora Stage II	B'field	H/rock	60
SQM	Atacama Expansion II+	B'field	Brine	20
Allkem	Sal de Vida	G'field	Brine	30
ioneer	Rhyolite Ridge	G'field	H/rock	20
Piedmont Lithium	Carolina	G'field	H/Rock	38
Tianqi/IGO	Kwinana	G'field	Conv	24
Lithium Power Int	Maricunga	G'field	Brine	30
Sigma Lithium	Grota do Cirilo Stage I	G'field	H/rock	50
WES/SQM	Mt Holland	G'field	H/rock	50
Albermarle	Kemerton	G'field	Conv	25
LAC	Thacker Pass	G'field	Clay	40



= PFS/DFS Complete > Planned start date

= Ramp up

= Planned start date > Actual Start Date (Delay)

= Steady State

Source: Company reports, Canaccord Genuity estimates

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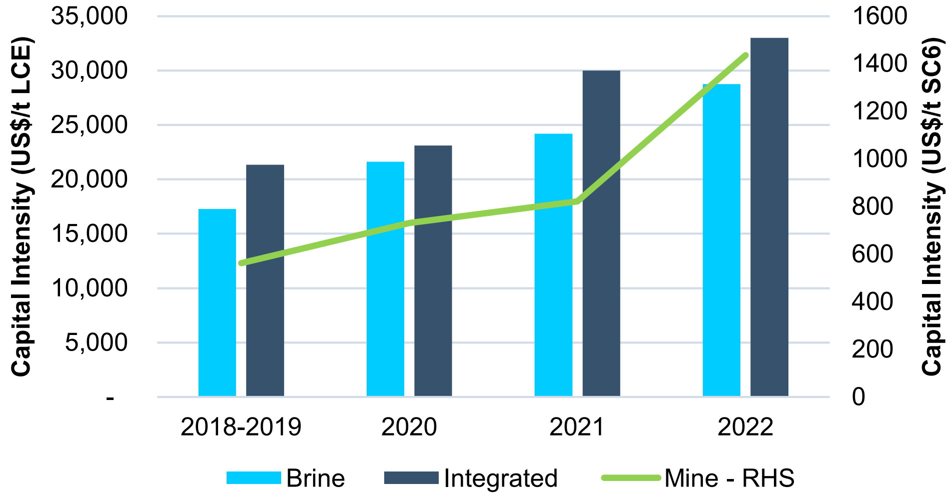
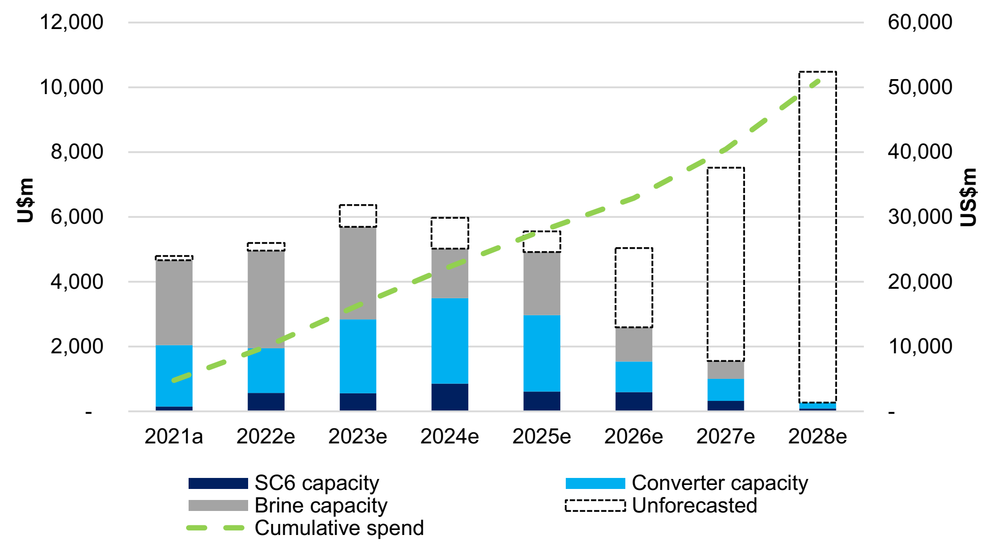
Why we should be conservative when it comes to supply #2 – industry capital intensities are rising

- Avg. capital intensity for greenfield projects (ex-China) have risen by ~50% since 2018 to w/avg. US$21k/t (US$26k/t greenfield brines, US$31k/t integrated hard rock).
- Many capex estimates outdated – current inflationary environment could push up industry capital costs further.
- Substantial financing risks face the industry in our view – adj. for inflation (~15%) could see a total of US$48bn required in upstream for supply to hit 2030 demand forecasts.
- Current rate of investment falls short of what is required (noting required project lead times)

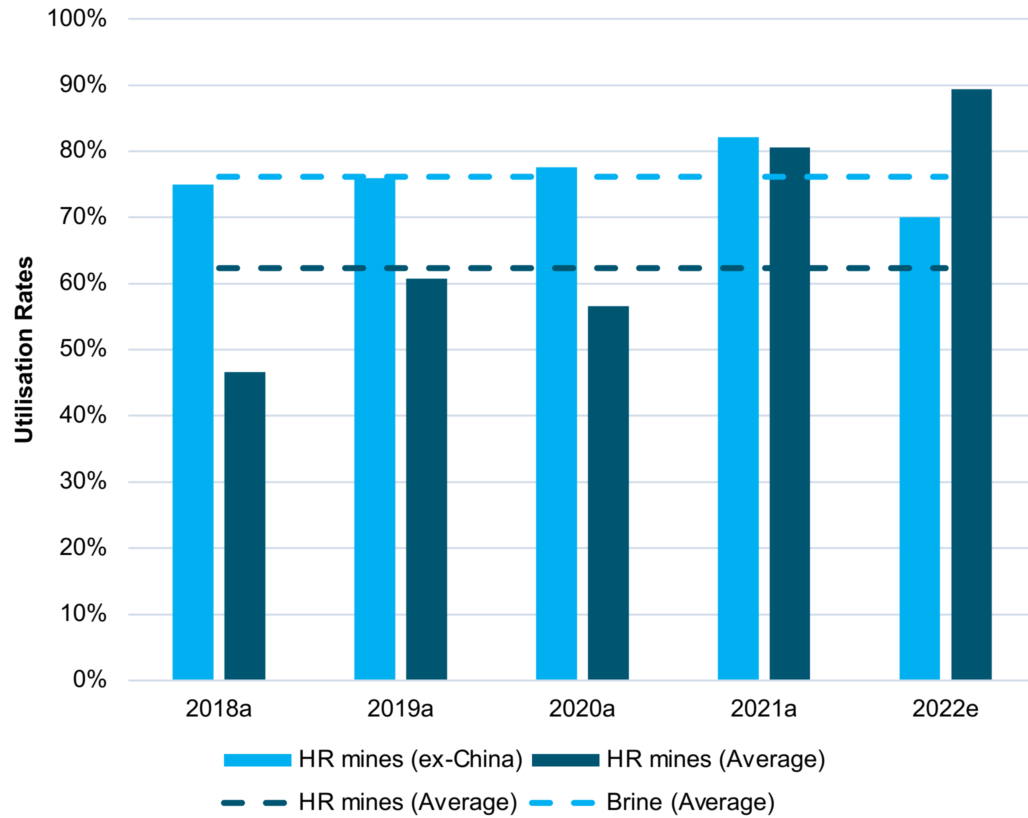




Source: Company reports, Canaccord Genuity estimates

Why we should be conservative when it comes to supply #3 – capacity ≠ market supply

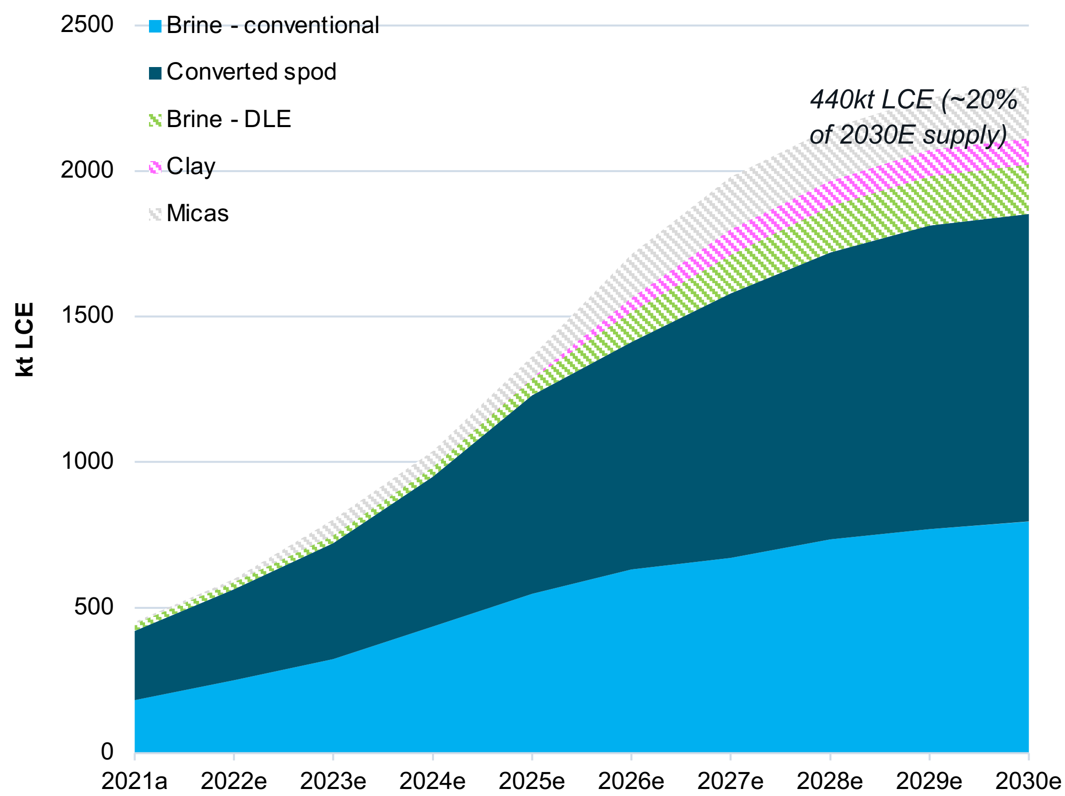
- Technical challenges during commissioning/ ramp up are common; we estimate industry average capacity utilisation rates of **70-80%**
- Operating experience (i.e., utilisation rates) should improve over time, especially for established producers
- However, overall industry average utilisation rates expected to remain lower due to the large number of new projects/expansions that need to go through commissioning and ramp up.



Source: Company reports, Canaccord Genuity estimates

Why we should be conservative when it comes to supply #4 – supply from "unconventional" Resources

- High prices and development of new process technologies (i.e., Direct Lithium Extraction) is incentivising potential supply from low grade/"unconventional" Resources (i.e., low grade/geothermal brines, sedimentary hosted/clays, lithium micas)
- We remain positive on the potential for DLE and sedimentary hosted/clays, but risks inc. tech/process/ scale up, permitting, capex/opex, sustainability factors.
- Potential supply from these sources (CGe 440kt LCE by 2030) need to be de-risked, and if successful, are likely to be longer dated
- Potential exploitation of lithium micas (i.e., lepidolite) has recently captured market/industry attention…



Source: Company reports, Canaccord Genuity estimates

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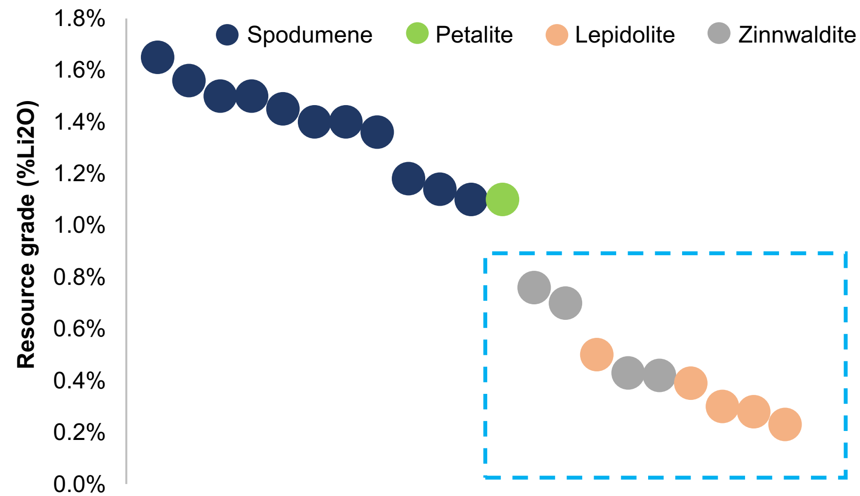
Deeper look into the potential of lithium micas

- Lithium micas – inc. lepidolite, zinnwaldite, and lithium-bearing muscovites (vs more widely exploited minerals such as spodumene/petalite).
- Elemental lithium content (expressed at Li_2O) can be high, but this should not be confused with Resource grades, **which are a key driver of project economics**. *Spodumene/petalite carry 2-3x the Li2O grades vs lepidolite*
- Historically been overlooked given inferior economics and challenging processing. Currently, only limited production from lithium micas (China)

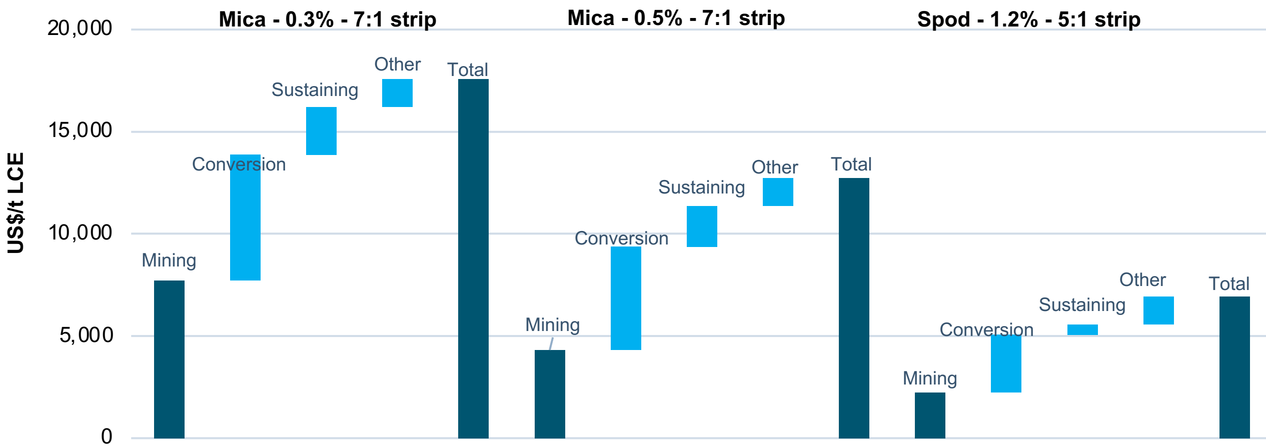
Mineral	Chemical formula	Elemental Li content (% Li)	Comments
Spodumene	$LiAlSi_2O_6$	3.7	Most common economic hard-rock lithium mineral
Petalite	$LiAlSi_4O_{10}$	1.6 - 2.3	ie. Bikita/Arcadia - Zimbabwe
Eucryptite	$LiAlSiO_4$	2.1 - 5.5	Secondary alteration product of spodumene
Hectorite	$Na_{0.3}(Mg,Li)_3Si_4O_{10}(OH)_2$	0.5	Product of hydrothermally altered volcanic ash ie. Thacker Pass, Nevada
Jadarite	$LiNaSiB_3O_7(OH)$	7.3	ie. Jadar, Serbia
Lepidolite	$K_2(Li, Al)_{5-6}\{Si_{6-7}Al_2-1O_20\}$	1.4 - 3.6	Micaceous lithium mineral often found with spodumene
Zinnwaldite	$KLiFeAl(AlSi_3)O_{10}(F,OH)_2$	1.6	ie. Zinwald/Cinovec - Eastern Europe; San Jose, Spain
Amblygonite	$(Li,Na)AlPO_4(F,OH)$	3.4 - 4.7	Lithium flourophosphate; occurs as a secondary lithium mineral with spodumene etc.



Source: Company reports, Canaccord Genuity estimates

Deeper look into the potential of lithium micas – an economic comparison

Mica operation - Low grade		Mica operation - Average grade		Spodumene operation	
Material moved (kt)	**63,129**	**Material moved (kt)**	**35172**	**Material moved**	**9655**
Waste Mined (kt)	55,238	Waste Mined (kt)	30776	Waste Mined	8046
Mined/prossesed (kt)	**7,891**	**Mined/prossesed (kt)**	**4,397**	**Mined/prossesed (kt)**	**1,609**
Strip	**7**	Strip	**7**	Strip	**5**
Grade (Li2O)	**0.30%**	Grade (Li2O)	**0.50%**	Grade (Li2O)	**1.20%**
Recoveries into conc	65%	Recoveries into conc	70%	Recoveries into conc	75%
Li2O recovered	15.39	Li2O recovered	15.39	Li2O recovered	14.48
LCE	37.5	LCE	37.5	LCE	35.3
Mica Concentrate	**616**	**Mica Concentrate**	**506**	**SC Concentrate**	**241**
Conc Grade (Li2O)	2.5%	Conc Grade (Li2O)	3.0%	Conc Grade (Li2O)	6.0%
Converter feed (kt)	**616**	Converter feed (kt)	**506**	Converter feed (kt)	**241**
Converter Recovery	80%	Converter Recovery	80%	Converter Recovery	85%
LCE production (kt)	**30.0**	**LCE production (kt)**	**30.0**	**LCE production (kt)**	**30.0**



Source: Company reports, Canaccord Genuity estimates

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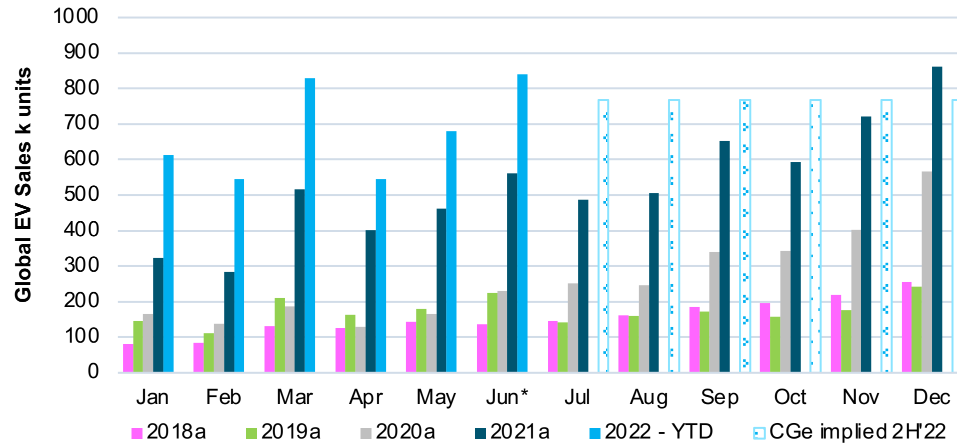
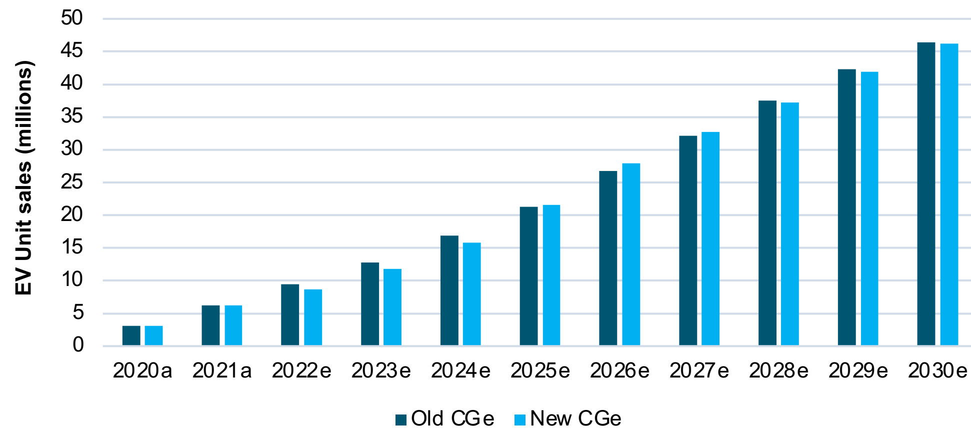
Demand – long-term trends intact, but there are some short-term risks

- EV's – recent data suggests ~40% YoY growth in 2022 to >8m units. EV's historically 2H weighted (driven by China) which implied 2022E of ~10m units (2022 6m)
- EV sales have proven to be resilient in the face of macro uncertainty, but this could be an overhang over 2022-24 (China hard landing, Europe recession, slower global growth)
- We have lowered our global EV sales expectations over the near term on macro risks





Source: RhoMotion, Canaccord Genuity estimates

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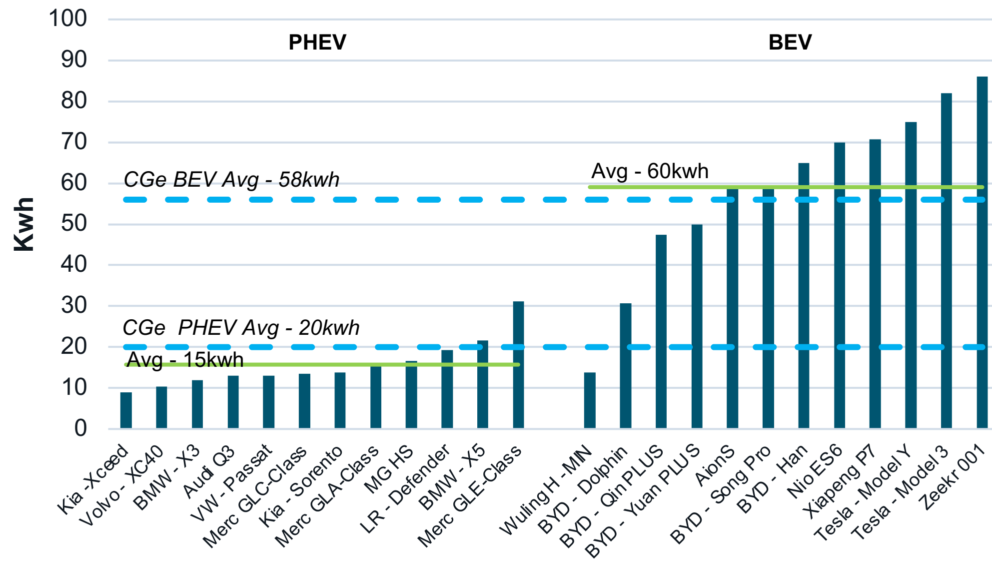
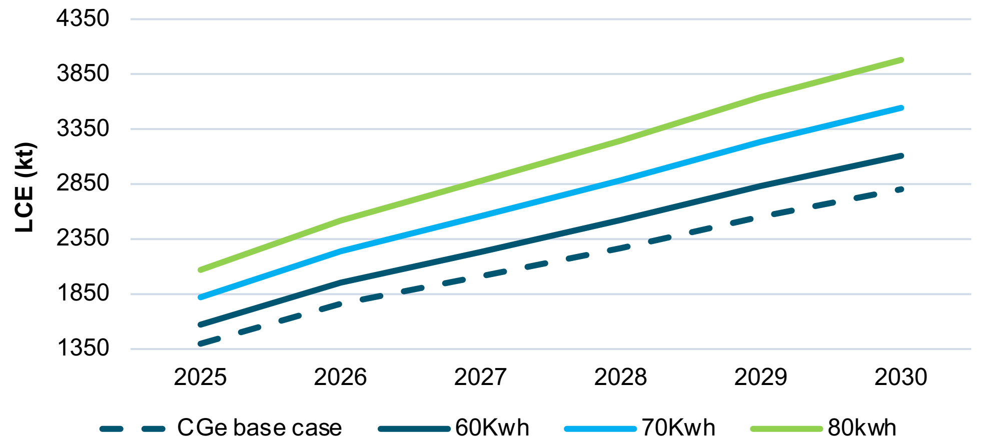
Demand – EV batteries are getting larger

- Our 2022-23 demand forecasts unchanged with lower EV sales offset by higher assumed battery sizes.
- Longer term – we forecast avg. demand growth of 21% p.a. to 2030, with total demand increasing by +340% from 2022E to 2030E to 2.8Mt.
- Demand highly sensitive to assumed battery size assumptions – rate of sales growth in BEVs outpacing PHEVs + mid-decade expected to see proliferation of new models in western markets (i.e., higher avg battery size)
- *Increasing assumed average battery size to 70kWh lifts 2030 demand forecast to ~3.5Mt LCE, +25% on our base case*

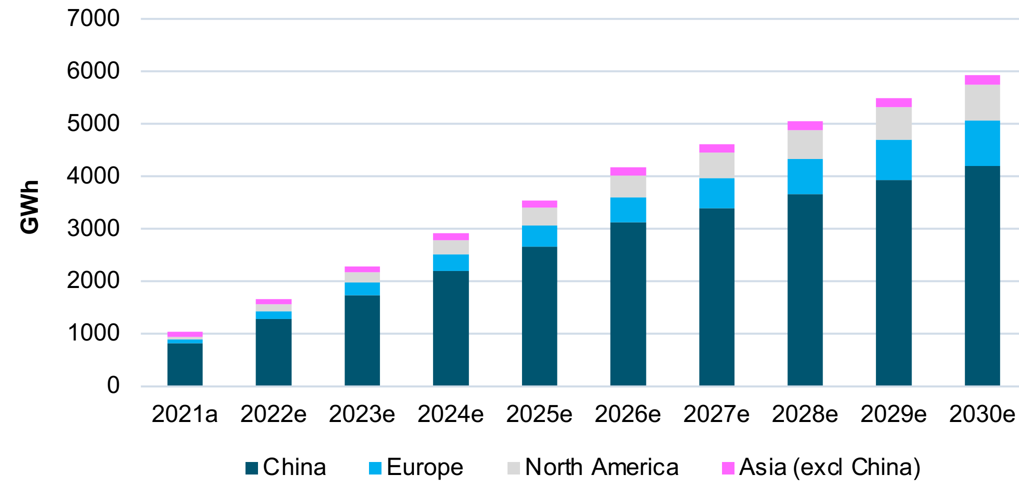


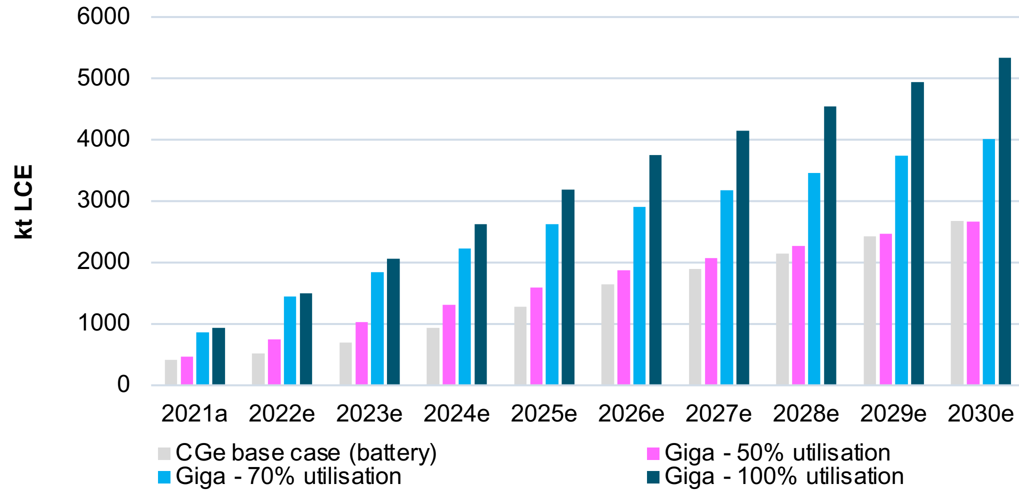


Source: RhoMotion, Canaccord Genuity estimates

Demand – is there a better way to look at future demand potential? Introducing our "giga-demand" scenario

- Battery factory capacity could represent a simpler, single point indicator of future lithium demand – third-party data suggests LiB factory capacity will increase from 1.6TWh in 2022 to 6TWh in 2030 (China ~70% share but rapid growth expected in Nth America/EU)
- If battery factory capacity is an indicator of future demand potential***, then we could be underestimating lithium demand by a significant margin***
- Adjusting for expected utilisation/scrap rates (*i.e., conservative utilisation of ~70% out to 2030*) implies 2030 demand at 4Mt LCE;
- *Our "giga demand" scenario* (55% avg factory capacity utilisation rate) implies 2030 EV penetration rate of 25% and 60% in 2025/2030 respectively





Source: Benchmark Mineral Intelligence, Canaccord Genuity estimates

We think the market remains in deficit

		2021e	2022e	2023e	2024e	2025e	2026e	2027e	2028e	2029e	2030e
Supply											
Brines	**kt LCE**	**207**	**276**	**349**	**468**	**605**	**734**	**804**	**892**	**941**	**966**
Existing brine supply	kt LCE	207	276	276	276	276	276	276	276	276	276
Brownfield expansions	kt LCE			53	131	166	201	211	256	284	309
Greenfield brine prod'n	kt LCE			21	62	164	258	318	361	381	381
Effective converter capacity	**kt LCE**	**244**	**296**	**454**	**569**	**759**	**979**	**1176**	**1255**	**1311**	**1327**
China	kt LCE	245	278	376	450	537	642	755	783	783	783
Ex-China	kt LCE		18	78	120	222	337	421	472	528	544
Total market supply	**kt LCE**	**451**	**572**	**803**	**1037**	**1364**	**1713**	**1979**	**2147**	**2252**	**2293**
YoY change	%	30%	27%	40%	29%	32%	26%	16%	8%	5%	2%
Demand											
Industrial use	kt LCE	107	109	111	113	115	118	120	122	125	127
Batteries - EV's	kt LCE	293	415	573	786	1094	1431	1679	1910	2149	2357
Batteries - other (inc WIP)	kt LCE	121	108	126	150	188	212	212	236	276	319
Total batteries	kt LCE	414	524	699	936	1282	1643	1891	2147	2426	2676
Total demand	**kt LCE**	**521**	**632**	**810**	**1049**	**1398**	**1761**	**2011**	**2269**	**2551**	**2803**
YOY change	%	67%	21%	28%	30%	33%	26%	14%	13%	12%	10%
Market surplus/(deficit)	**kt LCE**	**-70**	**-61**	**-7**	**-12**	**-34**	**-47**	**-32**	**-122**	**-298**	**-510**
%		-13%	-10%	-1%	-1%	-2%	-3%	-2%	-5%	-12%	-18%

Source: Company reports, Canaccord Genuity estimates

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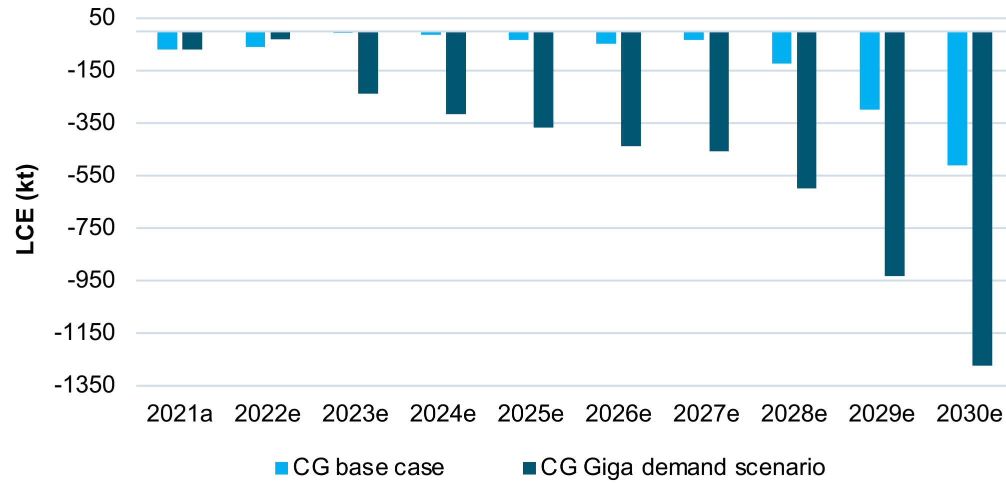
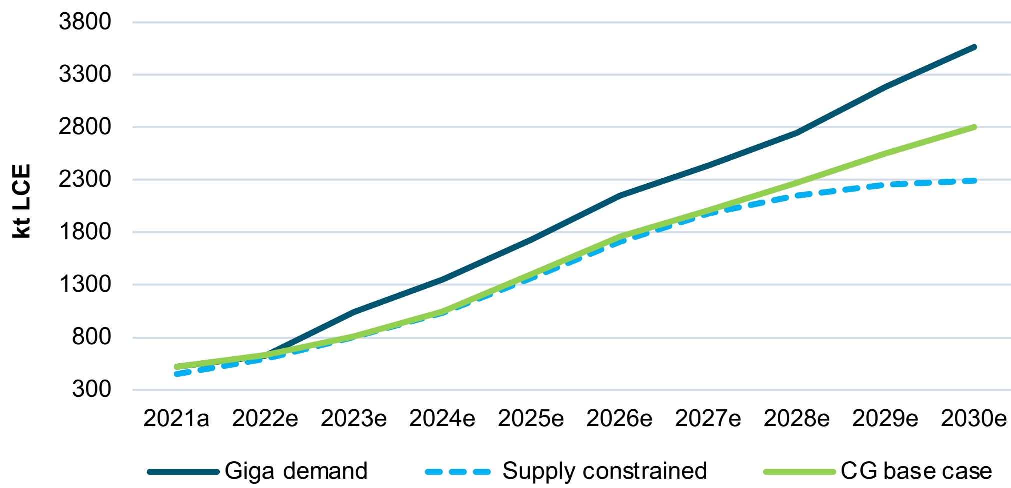
Demand upside risks… but we are not proponents of the *"large deficits into perpetuity"* view

- Under a "giga-demand" scenario, lithium market would see large, sustained deficits
- We are not proponents of "large deficits into perpetuity" view – such as scenario is theoretical as *actual* demand (i.e. EV sales) will be limited by lithium (and other battery raw material) supply
- A "supply-constrained" demand scenario implies longer-term EV penetration rates fall well short of consensus/OEM/Government targets





Source: Canaccord Genuity estimates

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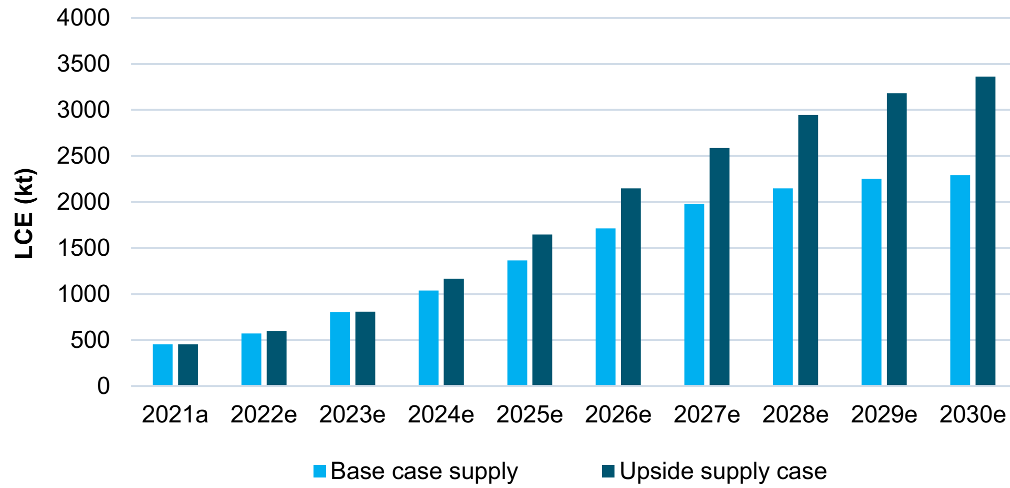
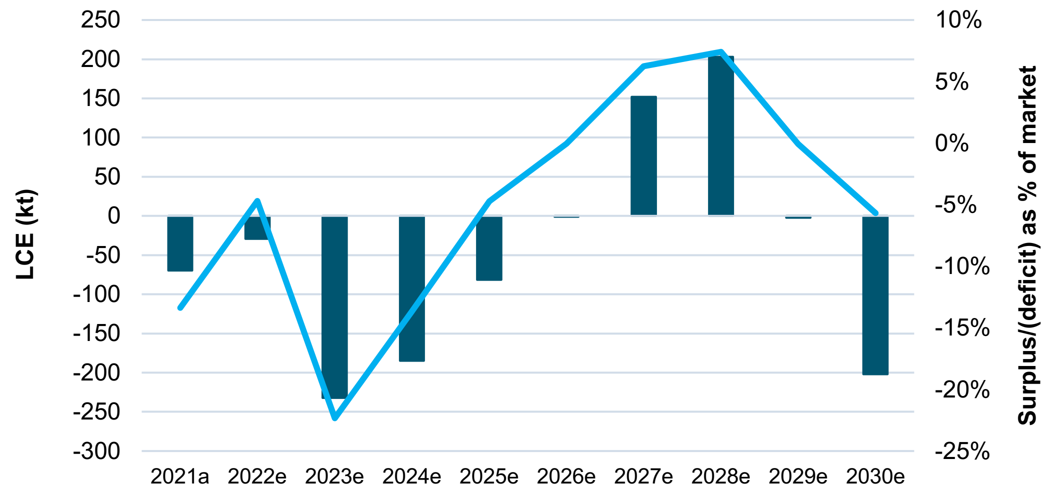
What if we said more supply = more demand?

- Could more supply be the key to higher demand over the longer term?
- A "Super supply" case (i.e., EVERY project comes on line on time and on budget *inc. a cumulative 3.2Mt LCE of unspecified new capacity!*) would serve to support any bull-case for demand
- Super supply vs giga-demand – could present an overall more sustainable supply/demand balance out to 2030 – excess demand would be deferred until there was sufficient supply
- Such a scenario would lead to more sustainable pricing outcomes, and potentially higher rates of EV adoption

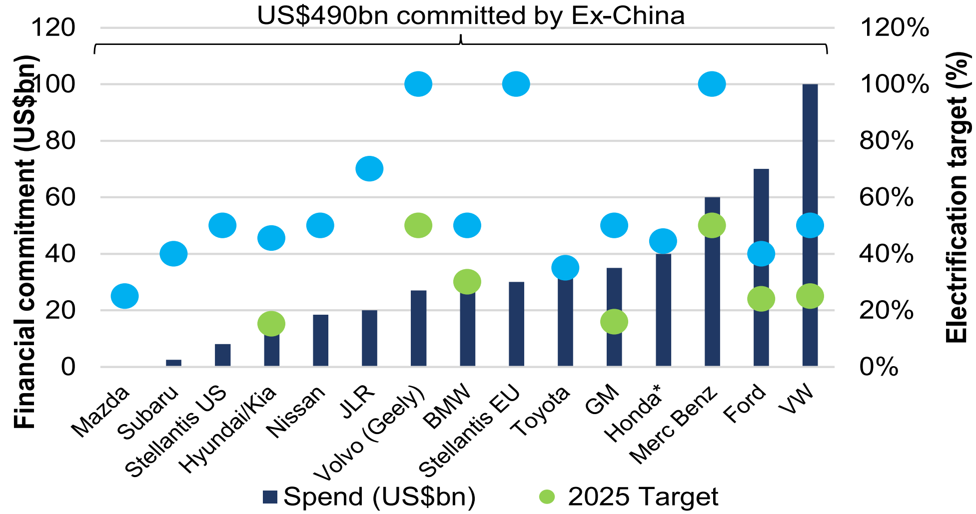


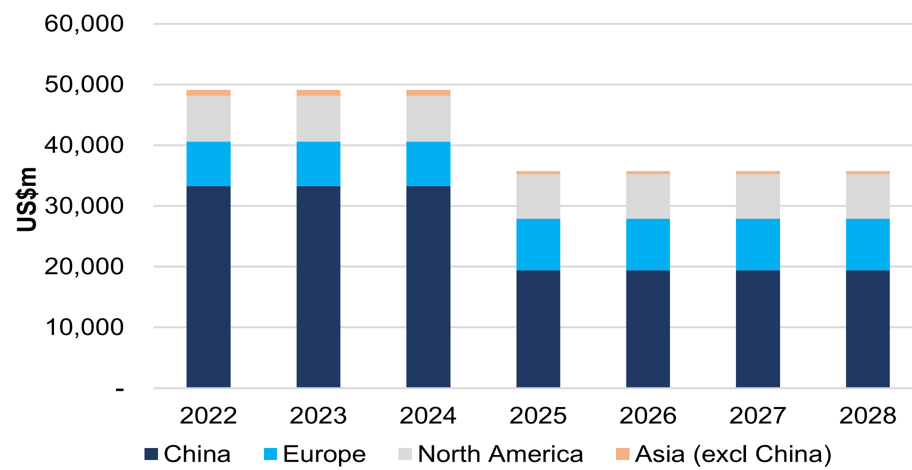


Source: Canaccord Genuity estimates

Downstream investment supports "giga-demand", but upstream falls well short

- US$490bn in planned investment has been announced by ex-China OEM's towards electrification
- Based on avg. capital intensity for a battery plant (~US$79m/GWh), planned battery factory roll out implies total planned spend of US$350bn
- This level of investment provides support for upside case for lithium demand, but we do not believe this is being matched by planned investment in supply
- Our base case forecasts require US$48bn in capex required – for supply to match a "giga-demand" scenario would require >US$100bn. Investment remains key to unlocking higher demand – ***lithium prices will need to remain high enough to incentivise this scale of capital investment***





Source: Company reports, Canaccord Genuity estimates

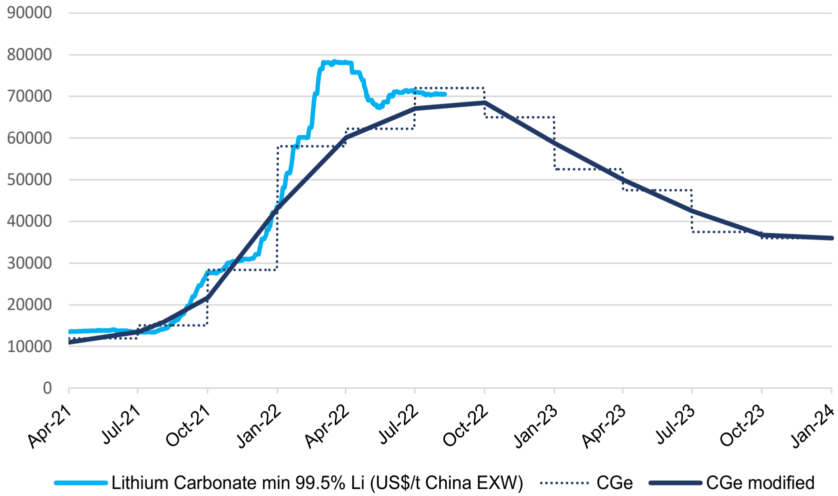
Lithium prices – higher for longer… upgrading near-term pricing forecasts

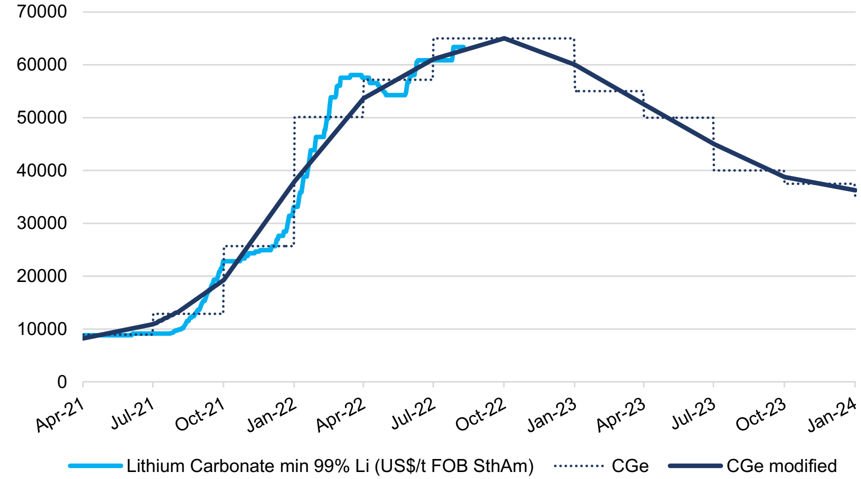
	2021a	2022e	MarQ'22a	JunQ'22a	SepQ'22e	DecQ'22e	2023e	2024e	2025e	2026e	2027e	Long term
NEW SC6 (US$/t FOB)	968	4,288	2,900	5,000	5,000	4,250	2,938	2,250	2,250	2,250	1,500	1,500
OLD SC6 (US$/t FOB)	968	3,425	2,900	3,700	3,600	3,000	1,963	1,025	750	1,000	1,000	1,000
chg	*0%*	*25%*	*0%*	*35%*	*39%*	*42%*	*50%*	*120%*	*200%*	*125%*	*50%*	*50%*
NEW Li2CO3 min 99.5% Li (US$/t China EXW)	16,365	64,323	58,051	62,242	72,000	65,000	43,375	36,000	31,000	31,000	22,500	22,500
OLD Li2CO3 min 99.5% Li (US$/t China EXW)	16,365	51,125	58,051	54,000	53,000	45,000	31,250	17,875	15,000	17,500	17,500	17,500
chg	*0%*	*26%*	*0%*	*15%*	*36%*	*44%*	*39%*	*101%*	*107%*	*77%*	*29%*	*29%*
NEW Li2CO3 min 99% Li (US$/t China EXW)	15,268	61,265	55,432	58,628	69,000	62,000	40,375	33,000	29,000	29,000	20,500	20,500
OLD Li2CO3 min 99% Li (US$/t China EXW)	15,268	50,375	55,432	53,500	52,500	43,500	29,875	17,125	14,250	16,750	16,750	16,750
chg	*0%*	*22%*	*0%*	*10%*	*31%*	*43%*	*35%*	*93%*	*104%*	*73%*	*22%*	*22%*
NEW Li2CO3 min 99% Li (US$/t FOB SthAm)	13,761	59,227	50,147	56,762	65,000	65,000	45,625	35,000	30,000	30,000	22,500	22,500
OLD Li2CO3 min 99% Li (US$/t FOB SthAm)	13,761	43,125	50,147	45,000	43,000	42,000	30,000	17,375	14,000	17,500	17,500	17,500
chg	*0%*	*37%*	*0%*	*26%*	*51%*	*55%*	*52%*	*101%*	*114%*	*71%*	*29%*	*29%*
NEW LiOH min 57% Li (US$/t China EXW)	14,505	61,096	49,171	60,214	70,000	65,000	45,000	37,500	32,500	32,500	22,500	22,500
OLD LiOH min 57% Li (US$/t China EXW)	14,505	40,250	49,171	41,500	40,000	37,000	29,250	16,813	14,250	17,500	17,500	17,500
chg	*0%*	*52%*	*0%*	*45%*	*75%*	*76%*	*54%*	*123%*	*128%*	*86%*	*29%*	*29%*
NEW LiOH min 57% Li (US$/t Asia CIF)	17,260	64,444	53,234	69,544	70,000	65,000	45,000	37,500	32,500	32,500	22,500	22,500
OLD LiOH min 57% Li (US$/t Asia CIF)	17,260	38,750	53,234	40,000	38,500	35,500	28,250	17,750	15,000	17,500	17,500	17,500
chg	*0%*	*66%*	*0%*	*74%*	*82%*	*83%*	*59%*	*111%*	*117%*	*86%*	*29%*	*29%*

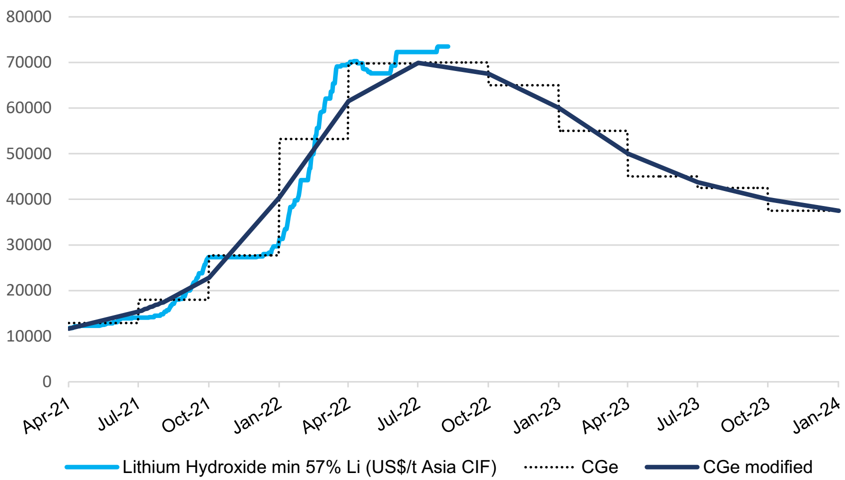
Source: Canaccord Genuity estimates

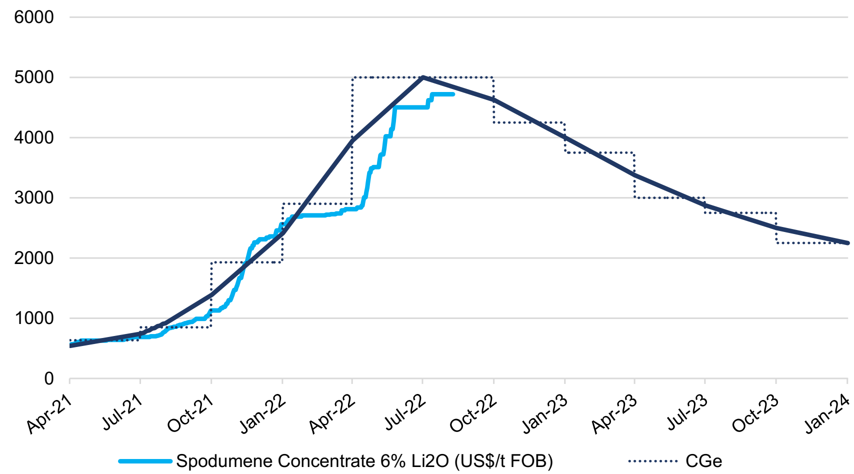
Lithium | 2H'22 Recharge

Lithium prices – higher for longer… upgrading near-term pricing forecasts







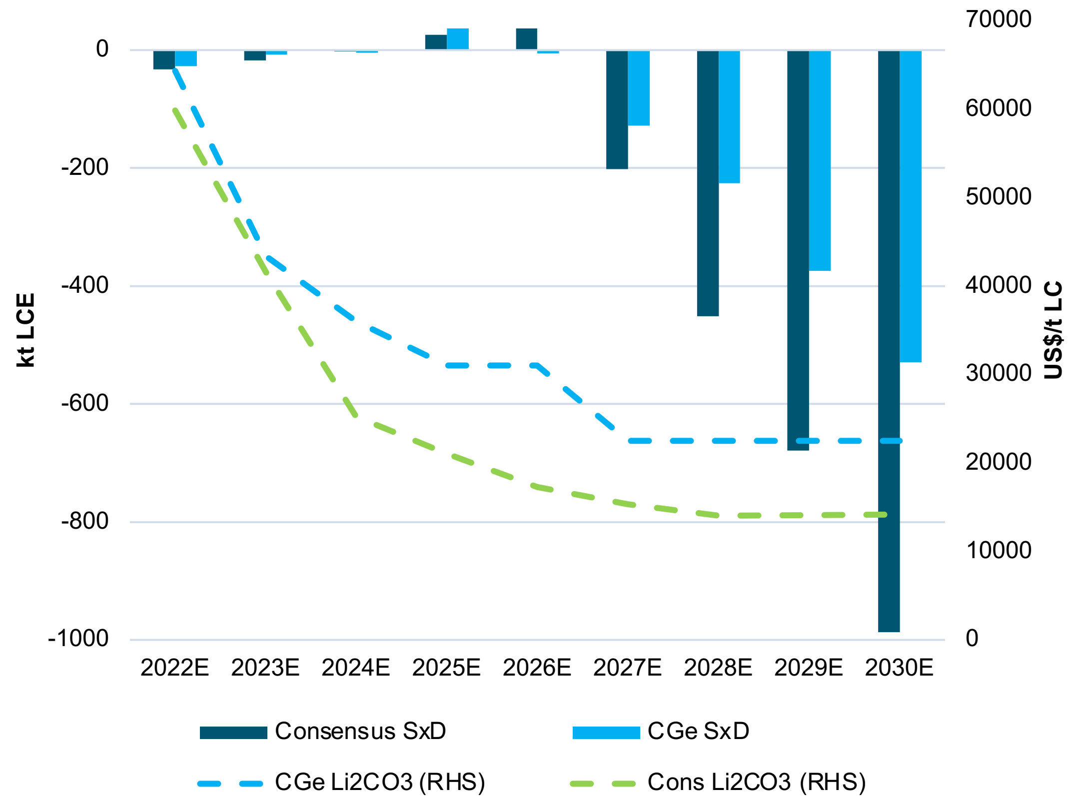


Source: Asian Metal, Canaccord Genuity estimates

/ Lithium | 2H'22 Recharge

Lithium prices – the case for higher longer-term pricing expectations

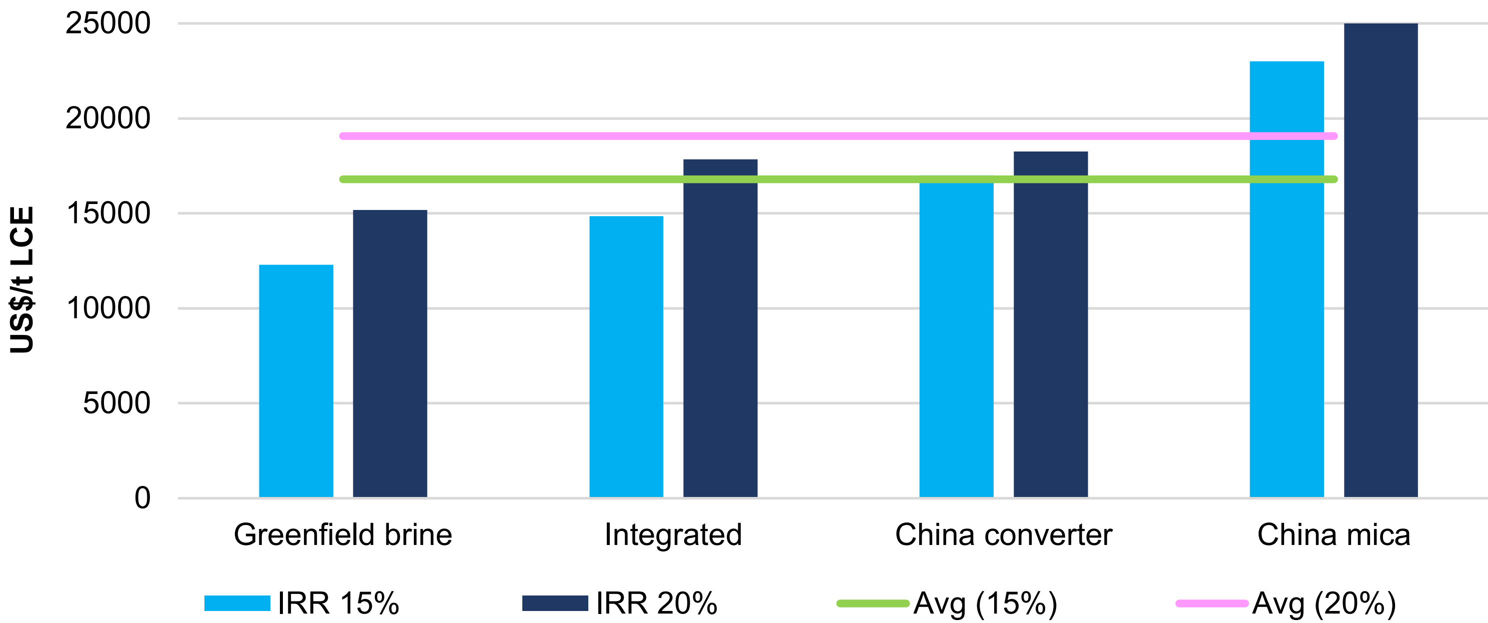
- Market consensus for LT lithium pricing remains too low in our view, especially considering market expectations for large deficits from mid-decade
- We have lifted our LT pricing forecasts by 30% for Li_2CO_3/LiOH to US$22,500/t, and 50% for SC6 to US$1,500/t
- We find support for higher LT pricing through:
  - Updates to our incentive pricing model
  - Marginal cost analysis
  - SxD analysis (forecast market deficits)



Source: Visible Alpha, Company reports, Canaccord Genuity estimates

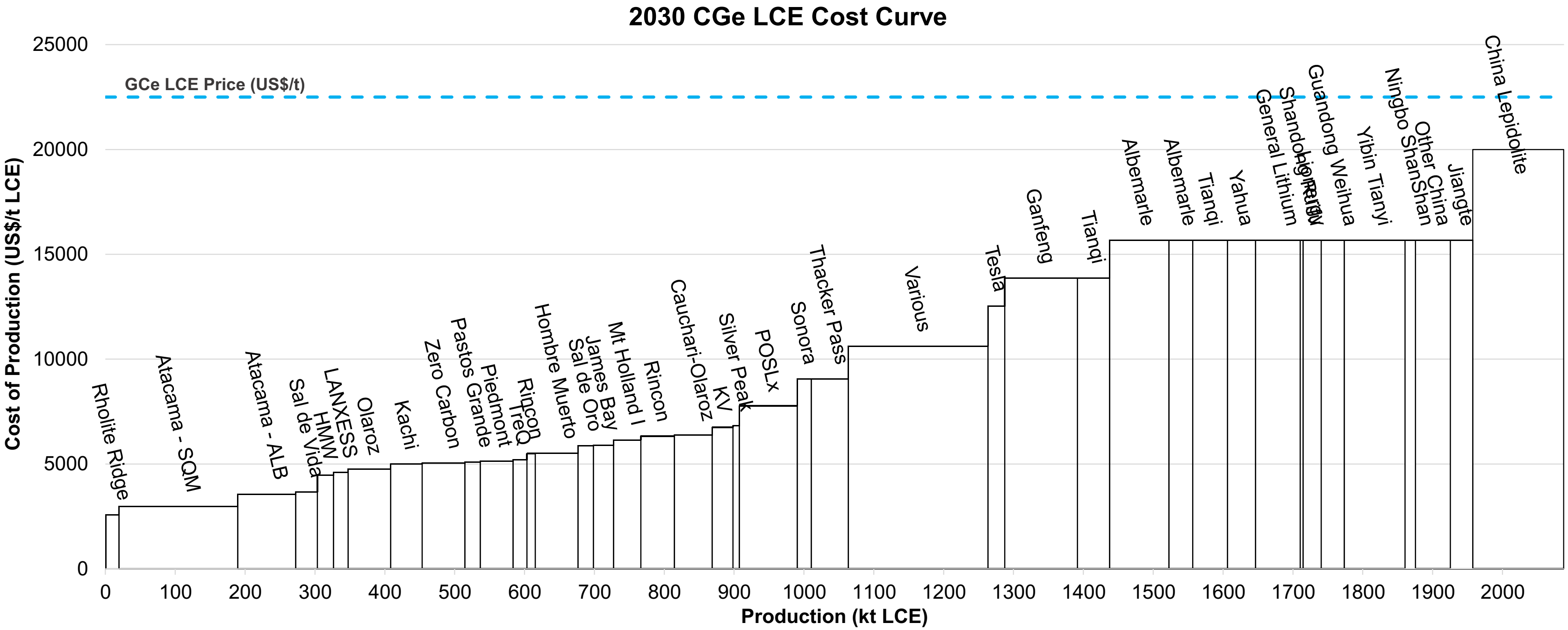
Lithium | 2H’22 Recharge

The case for higher LT pricing – capital intensities are rising so prices have to rise to deliver the same return



Source: Canaccord Genuity estimates

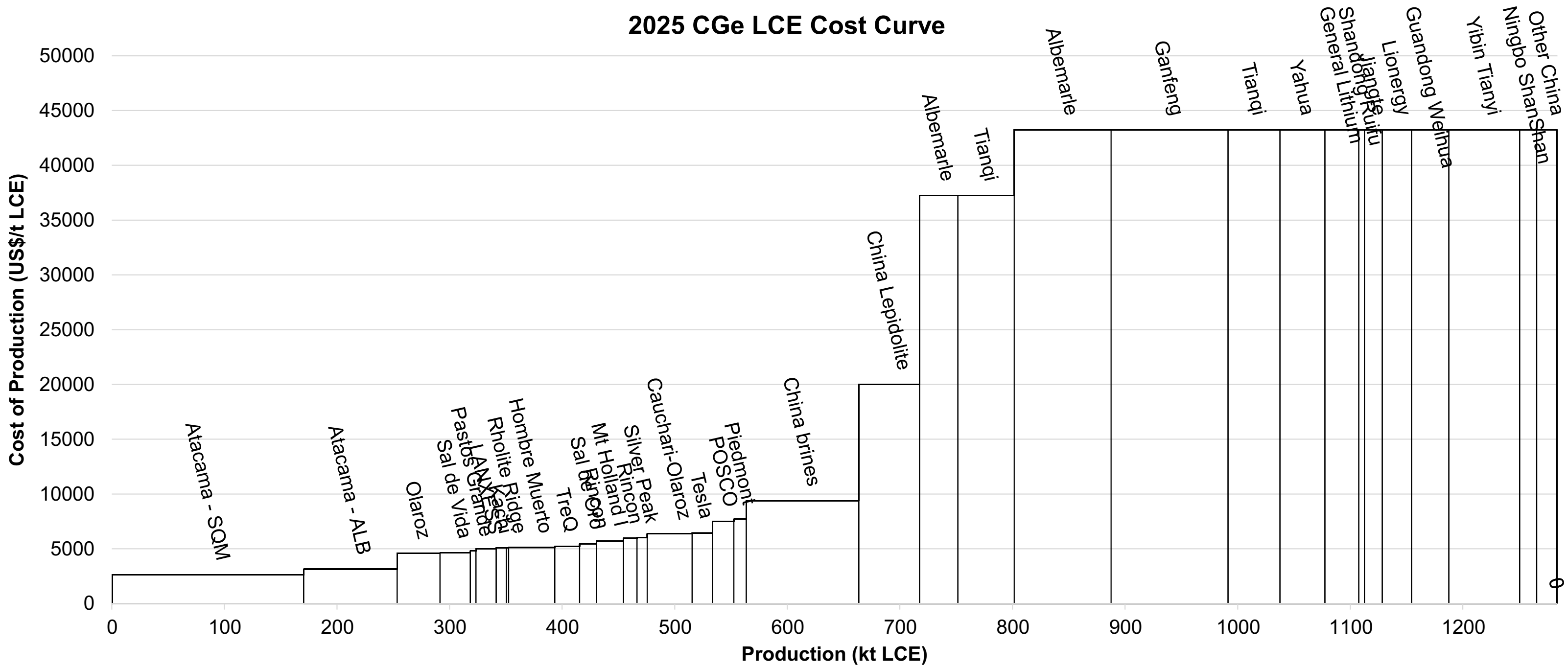
The case for higher LT pricing – the shape of the cost curve has changed



Source: Canaccord Genuity estimates

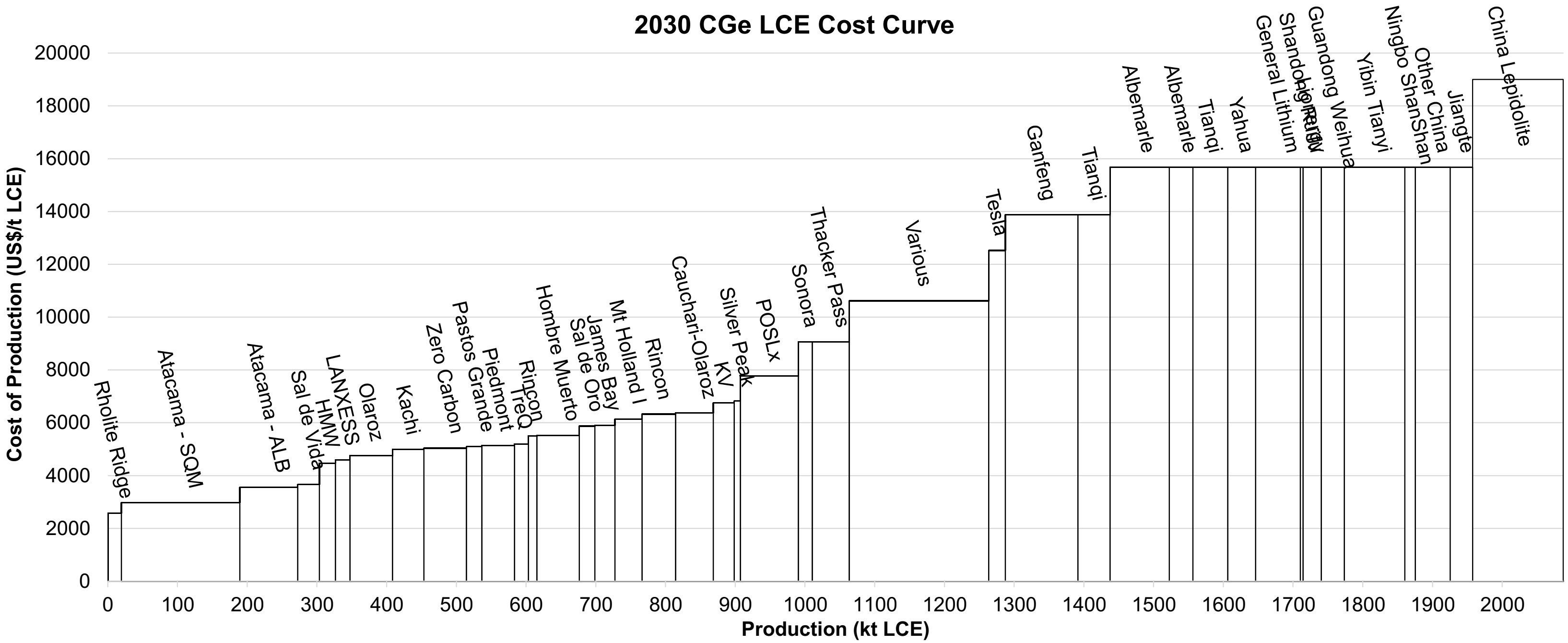
Lithium | 2H’22 Recharge

The case for higher LT pricing – the shape of the cost curve has changed



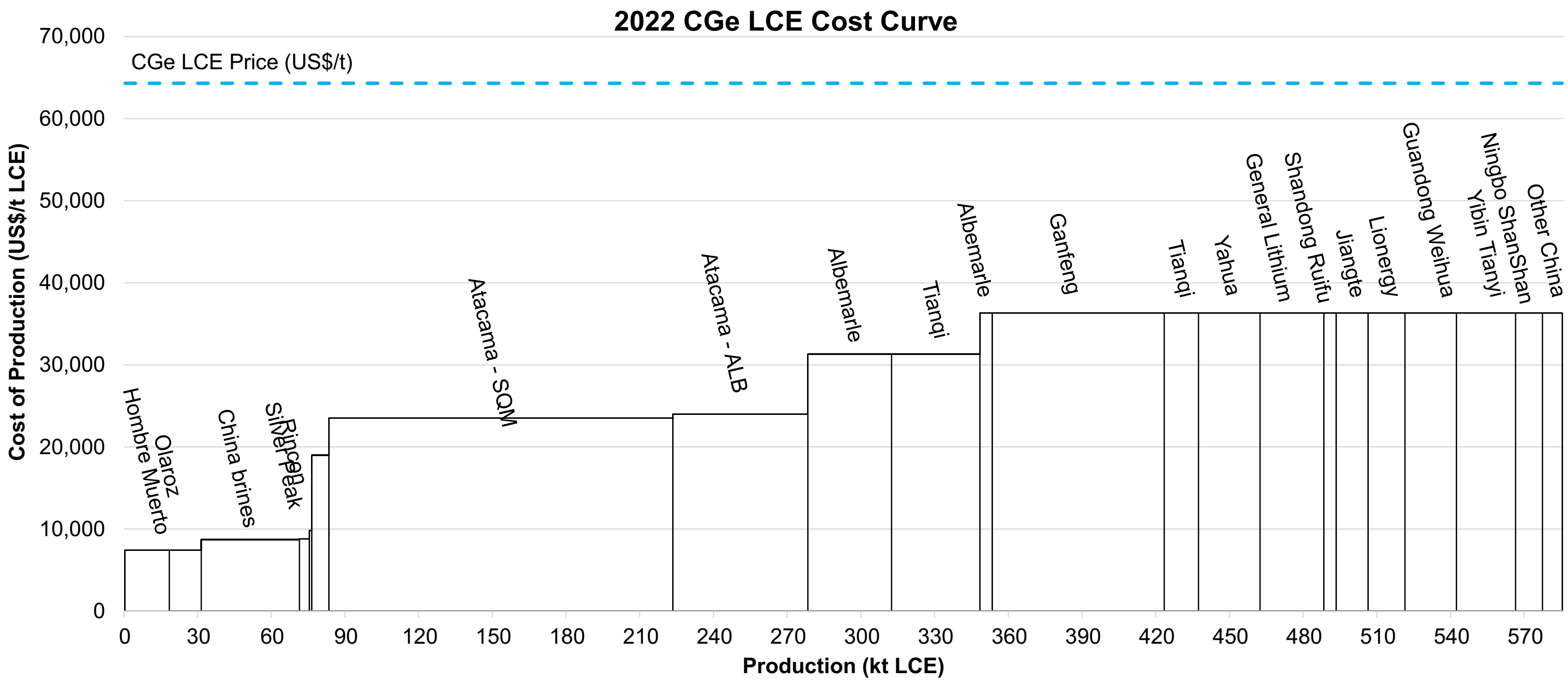
Source: Canaccord Genuity estimates

The case for higher LT pricing – the shape of the cost curve has changed



Source: Canaccord Genuity estimates

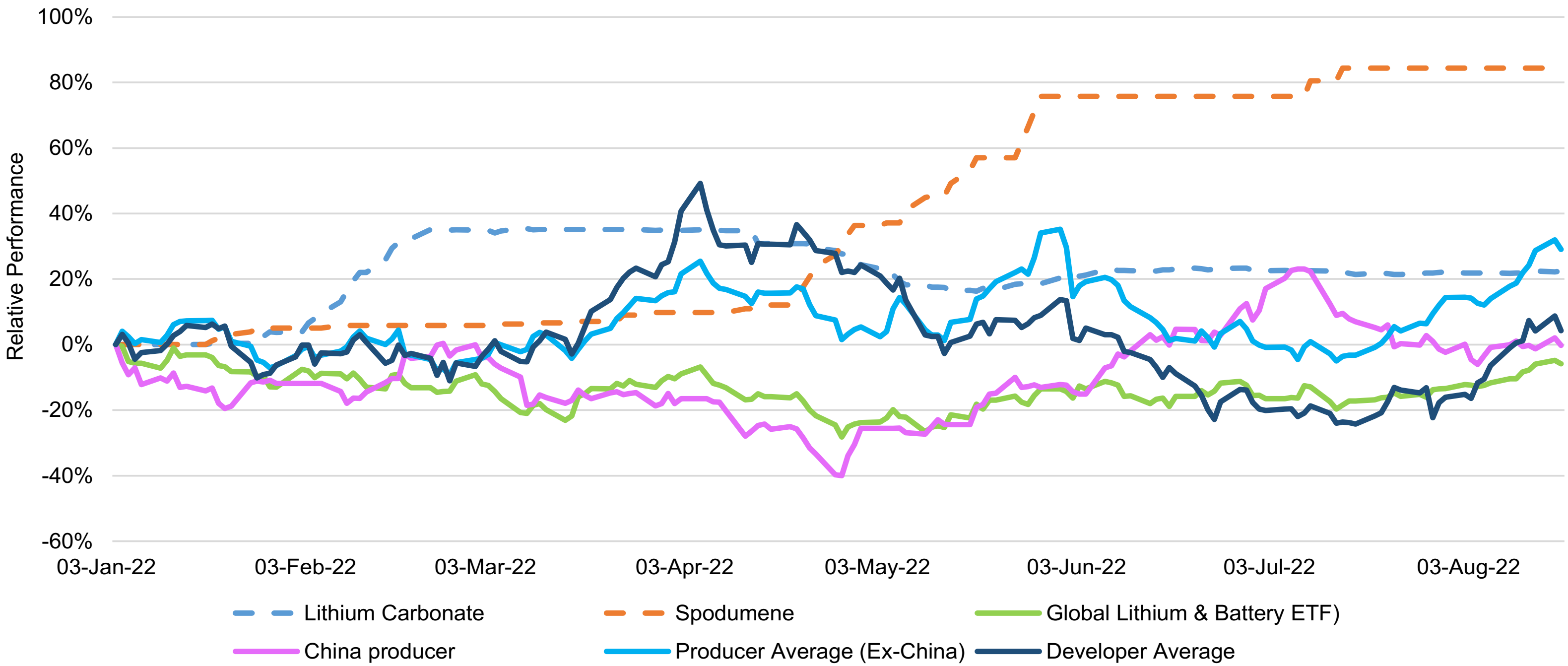
The case for higher LT pricing – the shape of the cost curve has changed



Source: Canaccord Genuity estimates

/ Lithium | 2H'22 Recharge

Lithium Equities

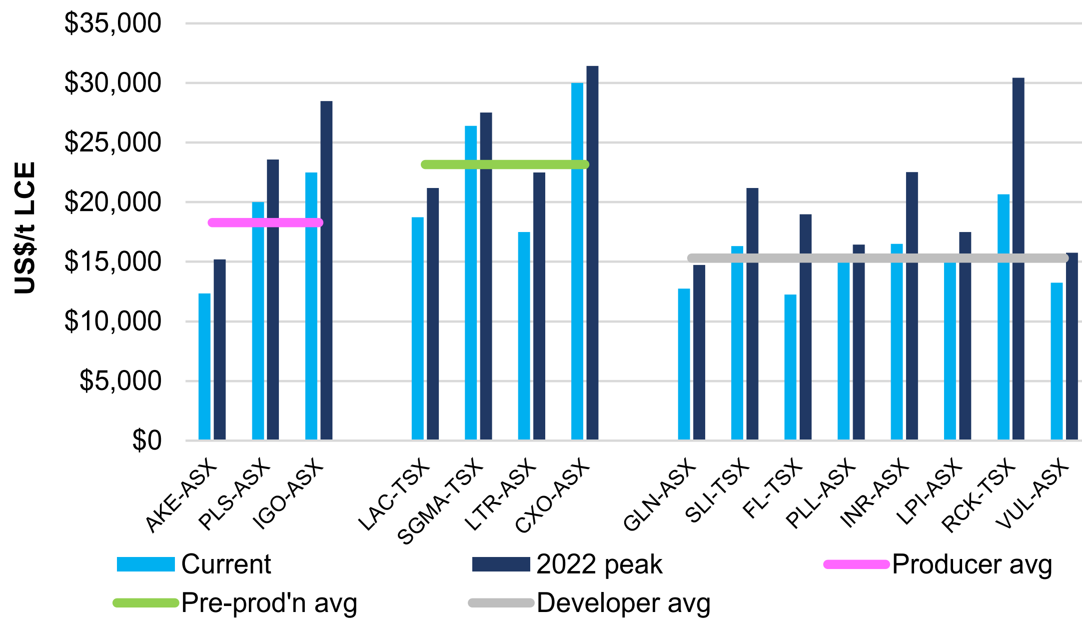


Source: FactSet, Canaccord Genuity estimates. Past performance does not predict future results.

Lithium | 2H’22 Recharge

Lithium Equities – Implied lithium prices and CG Top Sector Picks

- Average implied prices have increased over the last month, but continue to sit well below “spot” pricing
- Equity implications – we prefer producers over developers (with some exceptions)
- CG Top Sector Picks
  - AKE-ASX – sector leading LT production growth and product diversification
  - PLS-ASX – vol. growth, earnings/cashflow leverage to current pricing
  - SGMA-TSXV – fully funded, near-term SC producer, with medium-term production growth potential
  - LLL-ASX – top-tier spodumene development project in JV with Ganfeng; undervalued vs peers



Source: FactSet (as at 18th Aug 2022), Canaccord Genuity estimates

Lithium Equities – Global coverage

Lithium miners under CG coverage										
Ticker	**Name**	**Rating**	**Exchange**	**Analyst**	**Lithium type**	**Price**	**Market Cap ($m)**	**TP**	**NAVS**	**P/NAV**
PLS	Pilbara Minerals	BUY	ASX	TH	SC	A$3.58	10,662	A$4.30	A$3.56	1.01x
IGO	IGO Limited	HOLD	ASX	TH	Integrated	A$13.15	9,958	A$13.25	A$10.00	1.32x
AKE	Allkem Limited	BUY	ASX	RS	Integrated	A$14.01	8,934	A$21.30	A$21.41	0.65x
LAC	Lithium Americas	SPEC BUY	TSX	KL	Brine	A$37.45	5,037	C$50.50	C$66.00	0.57x
LTR	Liontown Resources	SPEC BUY	ASX	RS	SC	A$1.70	3,734	A$2.30	A$2.30	0.74x
SGML	Sigma Lithium	SPEC BUY	TSXV	KL	SC	A$29.98	3,018	C$45.00	C$34.00	0.88x
CXO	Core Lithium	HOLD	ASX	TH	SC	A$1.38	2,397	A$1.50	A$0.93	1.48x
LKE	Lake Resources	SPEC BUY	ASX	RS	Brine	A$1.12	1,557	A$1.65	A$1.65	0.68x
PLL	Piedmont Lithium	SPEC BUY	ASX	RS	Integrated	A$0.89	1,583	A$2.05	A$2.05	0.43x
INR	Ioneer Ltd	HOLD	ASX	TH	Integrated	A$0.66	1,385	A$0.75	A$0.75	0.88x
SLI	Standard Lithium	SPEC BUY	TSXV	KL	Brine	A$7.43	1,224	C$15.00	C$15.00	0.50x
VUL	Vulcan Energy	SPEC BUY	ASX	TH	Brine	A$7.99	1,145	A$19.00	A$19.00	0.42x
FL	Frontier Lithium	SPEC BUY	TSXV	KL	Integrated	A$2.38	505	C$4.75	C$4.75	0.50x
LLL	Leo Lithium	SPEC BUY	ASX	RS	SC	A$0.54	647	A$1.90	A$1.90	0.28x
GLN	Galan Lithium Ltd	SPEC BUY	ASX	RS	Brine	A$1.25	379	A$3.40	A$3.40	0.37x
RCK	Rock Tech Lithium	SPEC BUY	TSXV	KL	SC	A$3.47	254	C$4.50	C$4.50	0.77x
LPI	Lithium Power Int	SPEC BUY	ASX	RS	Brine	A$0.59	206	A$1.45	A$1.45	0.41x
PSC	Prospect Resources	HOLD	ASX	TH	SC	A$0.10	44	A$0.11	A$0.11	0.86x
ALL	Atlantic Lithium	R	AIM	AB	SC	R	R	R	R	R

Source: FactSet (prices as at 30/8/2022), Canaccord Genuity estimates; R – restricted; RS – Reg Spencer, TH – Tim Hoff, KL – Katie Lachapelle, AB – Alex Bedwany

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Investment Recommendation

Date and time of first dissemination: 30 August, 2022, 12:01 pm ET

Date and time of production: 30 August, 2022, 9:30 am ET

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Speculative Buy	158	16.56%	39.87%
	954*	100.0%	

*Total includes stocks that are Under Review

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