

NORTH AMERICA LITHIUM OUTLOOK

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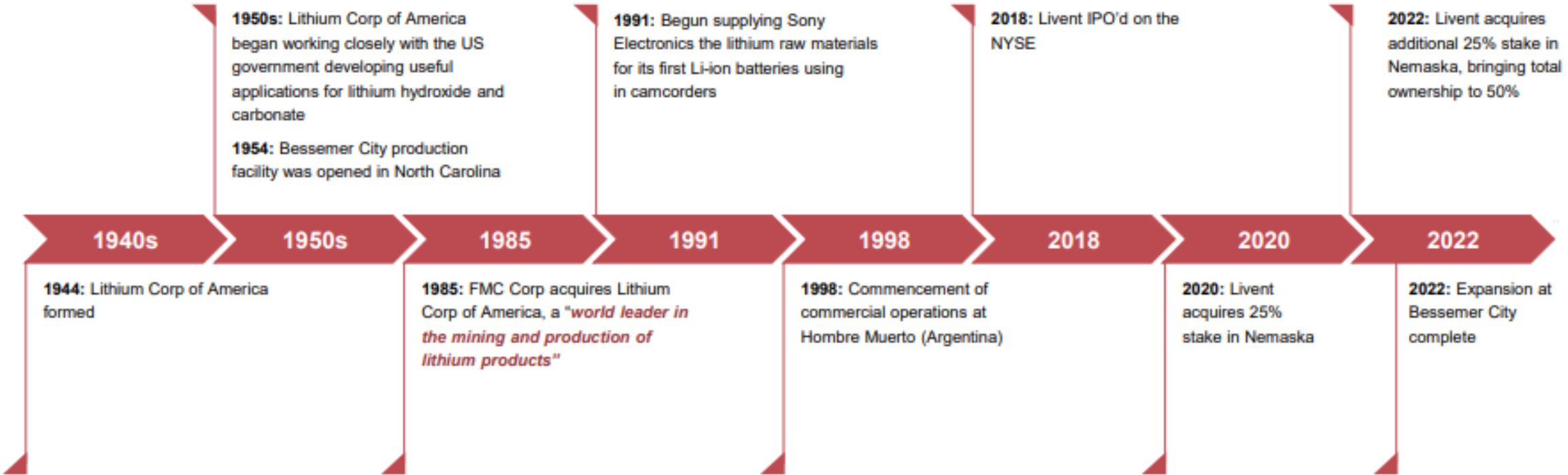
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Livent has been the largest lithium hydroxide producer in the US

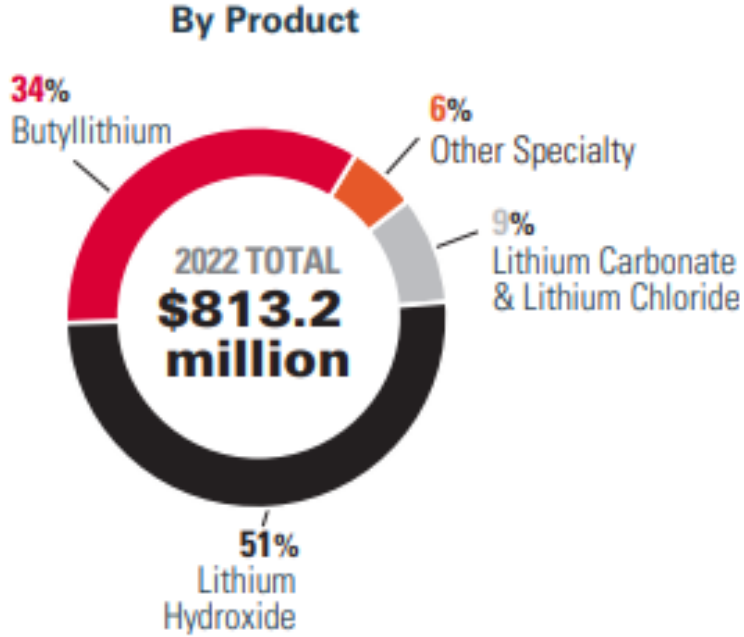


NC lithium hydroxide expansion dedication ceremony

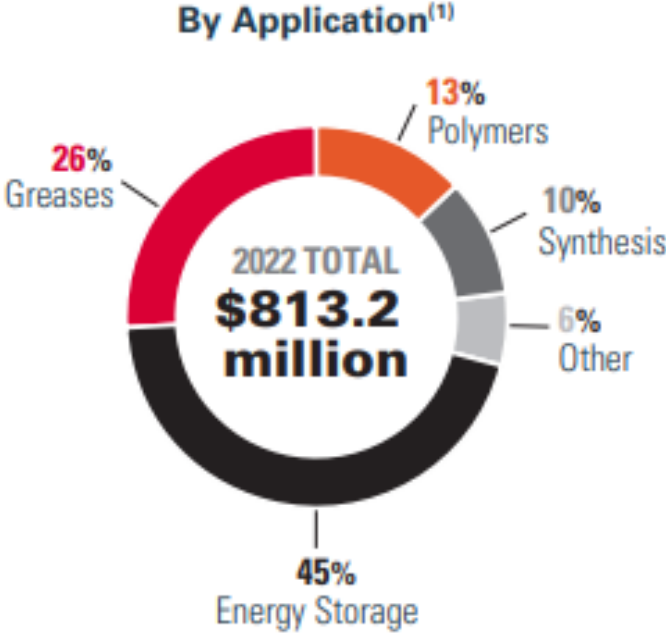


Lubricating greases comprise second largest revenue category

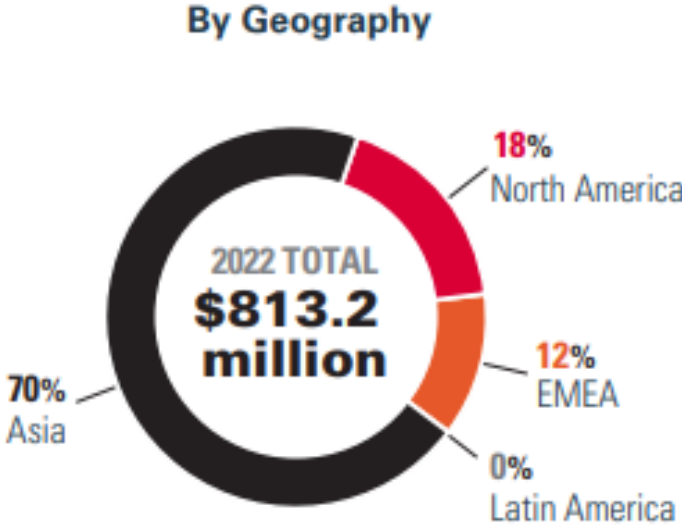
2022 REVENUE BREAKDOWN



(1) Company internal estimates



(1) Company internal estimates



Broad-based lithium-ion batteries' demand drives lithium demand growth



Segment	2023F share	2023/2022 Δ	2023/2022 Comments
Passenger EV ¹	~60%	25-50%	YTD: Growth in the US the strongest across major regions
Stationary Storage	~17%	60-80%	Stellar demand growth in China—provincial targets. US now second largest
Commercial EV ²	~5%	60-90%	China-centric, but Europe, US, South-Southeast Asia, S America growing rapidly
Recalls, Replacements, and Swaps ³	~4%	10-30%	Recalls—global; replacements—first China; swaps—China-, rest of Asia-centric
Gardening and Power Tools	~4%	~10%	US, Australia, Europe
Mobile Electronics	~3%	±5%	Global
Electric Two/Three-Wheelers	~3%	20-40%	China, India, Southeast Asia-centric. Europe, US growing rapidly
Industrial, Marine, Railway	~4%	???	Europe, US
Aerospace, defense		???	US, China and the other largest militaries
Drones, robots		> 50%	Global
Several other battery applications		> 50%	Global
TOTAL		40-60%	More upsides likely to demand

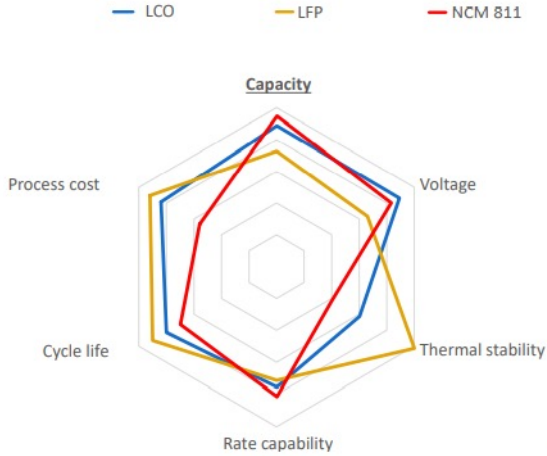
¹ BEVs, PHEVs, FCEVs, and LCVs

² Includes electric buses as well as Class 2-8 commercial EVs for construction, delivery, freight, mining, motorhome, refuse, shuttle, transit, etc.

³ Mostly battery demand from EV battery recalls, replacement, and swapping; recalls/replacement demand from stationary storage/electronics/others provide upside for the estimates above

Cathode active material chemistries determine form of lithium raw mat.

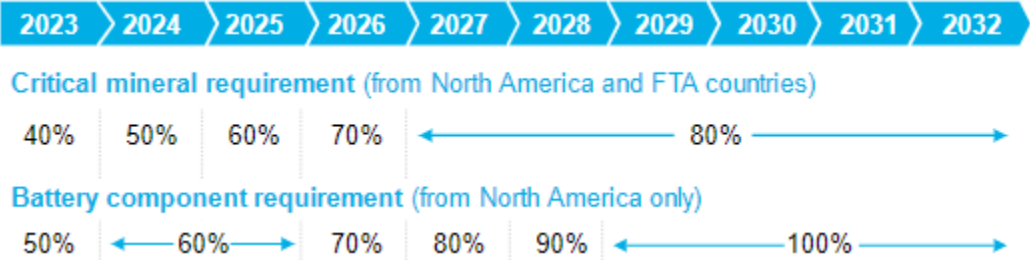
	Lithium Iron Phosphate (LFP)	Lithium Cobalt Oxide (LCO)	Lithium Manganese Oxide (LMO)	Lithium Nickel Cobalt Manganese Oxide				Lithium Nickel Cobalt Aluminum Oxide (NCA)
				NMC 111	NMC 532	NMC 622	NMC 811	
Cathode Energy Density (Wh/kg)	464	518	440	573	610	666	758	758
Amount of Lithium, g/kWh – Total Battery	950	1,180	910	1,110	1,080	1,000 – 1,100	1,020	1,000
Applications	ESS / stationary storage, passenger EVs, e-buses and e-bikes	Portable electronics	Blend with NMC/NCA for power tools	ESS/stationary storage, short – mid range EVs, e-buses, e-commercial vehicles and portable electronics	Long range EVs and power tools		Long range EVs and power tools	
								



Sources: BloombergNEF, Livent, Roskill, SMM

US Inflation Reduction Act is accelerating demand growth

- IRA: consumer, investment, production tax credits—EVs, stationary storage, and more (clean energy, climate)
 - Passenger EV consumer tax credits: lithium *extracted/processed* in US, Canada, Mexico, Chile, Australia, Korea, *recycled* in NA eligible

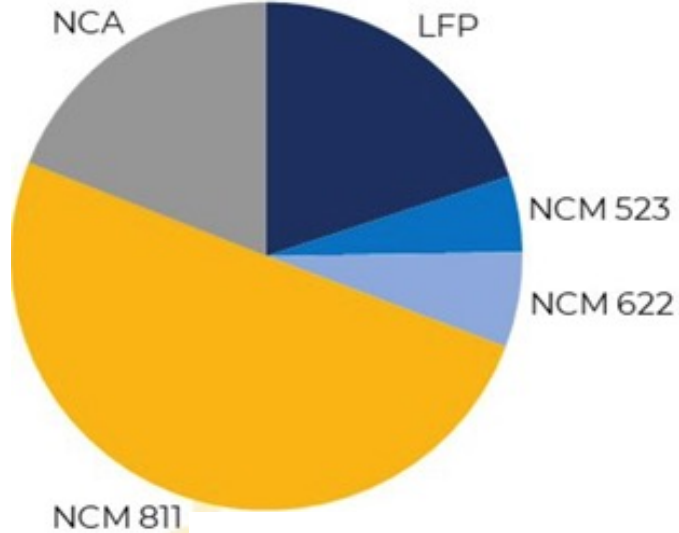


- Commercial EV consumer tax credits: less stringent requirement on origin and value than passenger EV. Likely more carbonate-based
- Awaiting specific details from Treasury/IRS by Dec 2022. Argentina attended recent Minerals Security Partnership meeting
- Production tax credits for US-based electrode active material, cells, modules manufacturing and lithium production
- Investment tax credits for stationary storage project capex, additional credit for domestic content
- Canada’s 2022 federal budget allocated ~\$3bn over eight years for its Critical Minerals Strategy
- France, Germany are incentivizing demand and investments in addition to European Critical Raw Materials Act. Japan, Korea, other nations in South, Southeast Asia are also rolling out credits and incentives

US, Canada cathode investments are high-Ni cathode content focused

Company	Status	Location	Chemistry	Cathode capacity (kt/year)				
				2023	2024	2025	2026	2027
Cathode producer 1	Operating	Michigan	High-Ni	3	3	3	3	3
Cathode producer 2	Commissioning soon	Texas	High-Ni	~25	~25	Expansion likely		
Cathode producer 3	Commissioning soon	Nevada	High-Ni	5	5	5	5	5
Cathode producer 4	Planning	Quebec	High-Ni	-	~60	~60	~60	~60
Cathode producer 5	Construction	Quebec	High-Ni	-	30	30	30	30
Cathode producer 6	Planning	Quebec	High-Ni	-	-	At least 30 likely		
Cathode producer 7	Planning	Tennessee	High-Ni	-	-	60	60	120
Cathode producer 8	Planning	Ontario	High-Ni	-	-	~30	~30	~60
Cathode producer 9	Planning	South Carolina	High-Ni	-	-	-	20	60
Cathode producer 10	Site selection	tbd	High-Ni	-	-	-	tbd	

North American 2030 Cathode Supply



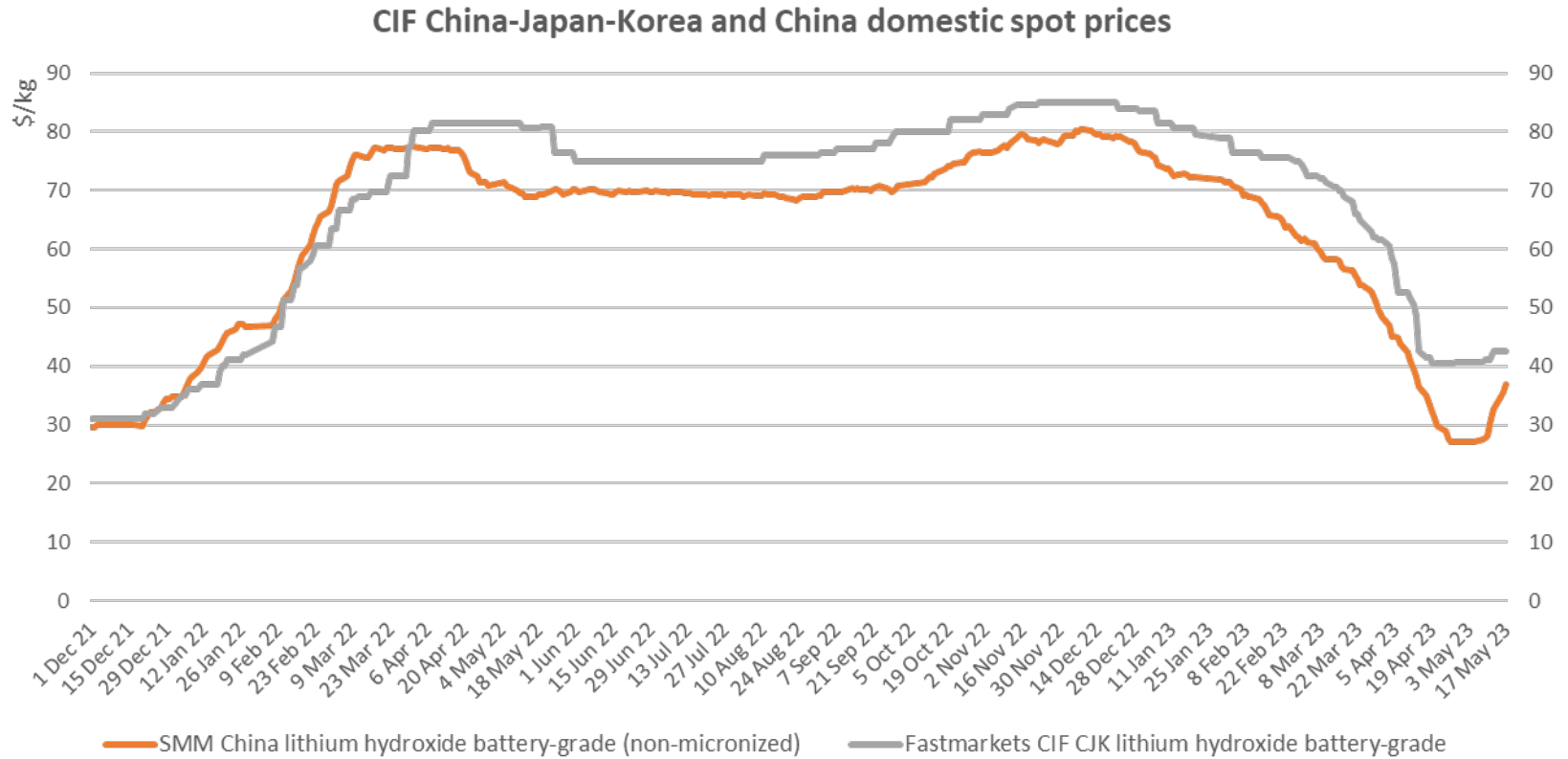
US, N America's lithium hydroxide consumption will grow exponentially

Country/region	LiOH (kt)					
	2021E		2022F		2023F	
	min	max	min	max	min	max
China	85	100	190	220	250	350
Europe						
Japan						
Korea	50	60	70	80	90	120
North America	4	6	4	6	4	8
RoW						
TOTAL						
AVERAGE	190		331		464	
Y-O-Y GROWTH	67%		74%		40%	

Likely downside

Likely upside

Lithium hydroxide prices are rebounding again



External factors impacted 2022 supply, and some may possibly recur

- **Weather**: Extreme drought in Sichuan impacted power supply in August 2022. Argentina, Chile, China brine operations are prone to lower evaporation rates during winter and rainy season. Increasing forecast for transition from La Niña to El Niño in 2023: less rain, higher temperatures and increased fire risk likely, especially during winter and spring in Australia; Argentina drought; extreme hot weather possible in China's provinces where lithium operations are located.
- **COVID**: Disruption across supply chains delayed many projects outside China. Impact on China port operations caused delays in shipments to Japan, Korea during Q2 2022. Western Australia operations were affected by labor shortages due to COVID lockdown at the beginning of the year. Aftereffects in the form of raw material, wage inflation have increased costs for incumbent and new producers.
- **Environmental**: A leading Chinese lepidolite producer suspended production in Q4 2022 due to environmental concerns that also impacted operations of other existing lepidolite producers and ongoing project approvals. Compliance costs are on the rise.
- **Energy**: Germany and other European countries experienced energy crises with no certainty that they will not repeat in H2 2023. Increased energy costs impacted Argentina operations. Rising electricity cost in Western Australia may impact 2023 costs.
- **Policy changes**: Canada ordered three Chinese firms to exit lithium mining in Canada. Zimbabwe's ban on raw lithium export may impact LCE supply to China. Congo suspended AVZ's mining license due to ongoing conflict between JV shareholders. Resumption of royalties in Australia since June quarter will increase costs for lithium converters. Similarly, costs for producers in Argentina will likely increase.

Australia spodumene prices are driving China conversion costs higher

Company	Project	Q4 2022		Q1 2023	
		Price ¹ \$/t	Conversion cost ² \$/kg	Price ¹ \$/t	Conversion cost ² \$/kg
Talison	Greenbushes	4,187	>40	5,957 (FOB)	>50
Min. Res	Mt. Marion	4,151		~5,300	
MARBL	Wodgina	4,208		5,444 (FOB)	
Pilbara	Pilgan, Ngungaju	6,273	~60	5,522 (CIF)	
Allkem	Mt. Cattlin	~6,000 (FOB)		~6,000 (FOB)	~60

¹Not all output reported as SC6.0; INCOTERMS inconsistent/unclear

²At least a quarter's and up to three quarters' lag