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Lithium - Hype or Substance?

A look at Lithium Demand and Supply



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Lithium has been a hot topic of discussion lately. The mineral is seeing increased interest primarily as the key element in next generation batteries that will power our cellphones, laptops, cameras, and other consumer electronics but especially interesting is its role in next generation automobiles!

Increasing demand for these products has brought lithium back into the limelight. As such, we thought this would be an opportune time to discuss some features of the lithium market and highlight some of the companies exposed to the space.

We take a multidisciplinary approach to looking at both the demand side (technology) and supply side (mining).

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EXECUTIVE SUMMARY

Yes more demand is coming, but supply should easily respond

Why look at Lithium? One reason: Li-Ion batteries in cars. Li-Ion batteries power your laptop, cell-phone, your iPod, your camera, your cordless drill – but imagine if they start to power your car! Batteries already represent 27% of lithium demand. Electric cars in the form of gas powered hybrids are already here, but soon plug-in hybrids will appear and eventually all-electric vehicles may arrive – each with bigger battery needs (4x and 10x respectively). It sounds like we will need much more lithium, doesn't it?

We thought it would be a good idea to take a multidisciplinary look at the lithium supply chain. We pulled together our geologists, mining engineers, renewable energy experts and technologists and asked them to look at the investment opportunities in this supply chain. As you might imagine it was a jargon-filled cage match with the chip-heads on one side vs. the rock-heads on the other.

Here's a quick summary of what the chip-heads found on the automotive demand side:

- A standard Prius-like hybrid electric vehicle (HEV) requires about 2.3 kg of lithium carbonate while a Plug-In Hybrid (PHEV) like the Chevy Volt will need more like 8.5 kg and a full electric car (EV) like the Telsa requires about 21 kg.
- If we make a slightly aggressive assumption that a combination of these electric type cars make up 35% of new vehicles by 2020 this would represent incremental lithium demand of about 150,000 metric tons (t, of tonnes). Given that the total market for lithium carbonate is currently about 100,000 t, this would represent a significant jump in demand.

But here is a quick summary of the supply side from the rock-heads:

- Economic lithium is relatively rare, with its supply concentrated in South America and Australia and dominated by four companies. China, however, is now becoming a supplier and total production has almost doubled in the last ten years.
- Lithium can be found in both brines and hard rock, but the brines have a significant cost advantage by a factor of about two or more. Brines represent roughly 75% of supply and have shown to be easily expandable.
- No near term shortages – lithium production was at 75% of capacity in 2008, and as mentioned we think production can easily be expanded further.
- Longer term (2020) we believe production could reach over 400,000 t, easily fulfilling our expectations of incremental demand from automotive along with growth in other markets.

Bottom Line: We do expect the lithium market to expand significantly, however we don't see any shortages or big price spikes as supply should be able to match demand for at least the next ten years. However, increases in production to significantly higher levels would likely require higher prices. We expect the processing of lower grade brines to be required to raise production levels almost four-fold from current levels, at commensurately higher costs.

Investment Conclusion: While this document is more designed to be a primer on the drivers of lithium demand and supply our findings do suggest the following:

- There will be increased volume opportunities for the lithium suppliers. Big price spikes are less likely.
- Brine based suppliers will have the cost advantage. We recognize however that North America and other parts of the world are likely to encourage development of domestic supply sources and thus support extraction by means of hard rock mining.
- Li Ion battery producers could see significant demand increases from the automotive market and Li shortages should not be a problem for them.

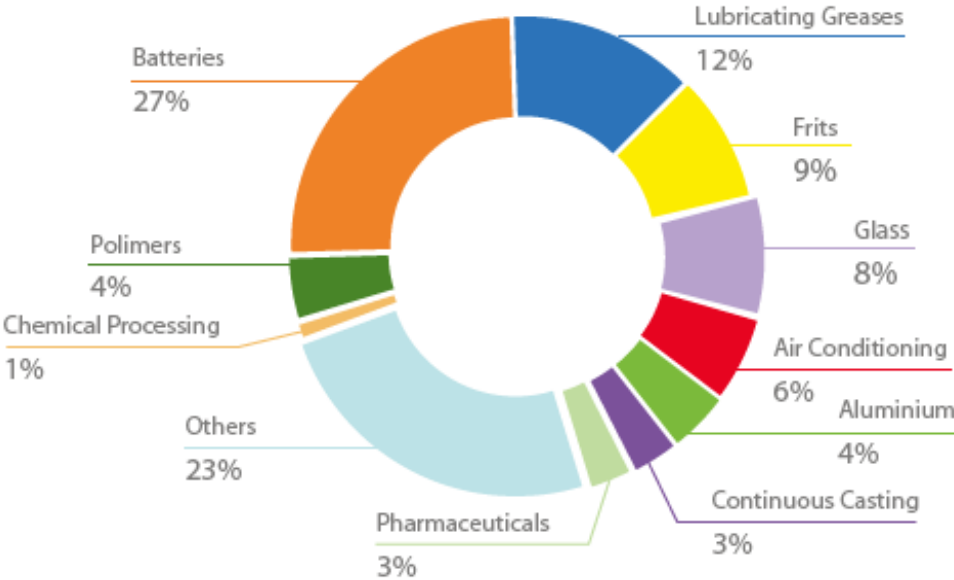
Tom Astle – Head of Research (more of a chip-head than a rock-head.)

LITHIUM DEMAND – MORE SOPHISTICATED USES OF LITHIUM EXPECTED TO DRIVE ITS DEMAND

Lithium demand is evolving toward more technologically-advanced uses. Historically lithium was confined to industrial use - an additive to glass, ceramics, and lubricating greases. This is quickly giving way to new uses in the pharmaceutical, electronics and automotive sectors (Exhibit 1). Historical uses have continued to increase in the past ten years due to GDP growth in emerging markets. Consumption of lithium increased by over 6% per year between 2000 and 2008, increasing from 13,375 t Li to 21,280 t Li (or 113,270 t of lithium carbonate equivalent).

Battery manufacturing is driving the sector's growth. The lithium-ion battery has become a common component of portable electronic equipment, and battery manufacturing totalled 27% of global lithium demand in 2008. Rechargeable lithium batteries are needed for use in cordless tools, laptops, cell phones, MP3 players and video cameras. More importantly many automobile companies are now pursuing the development of lithium batteries for use in hybrid electric vehicles and plug-in electric cars.

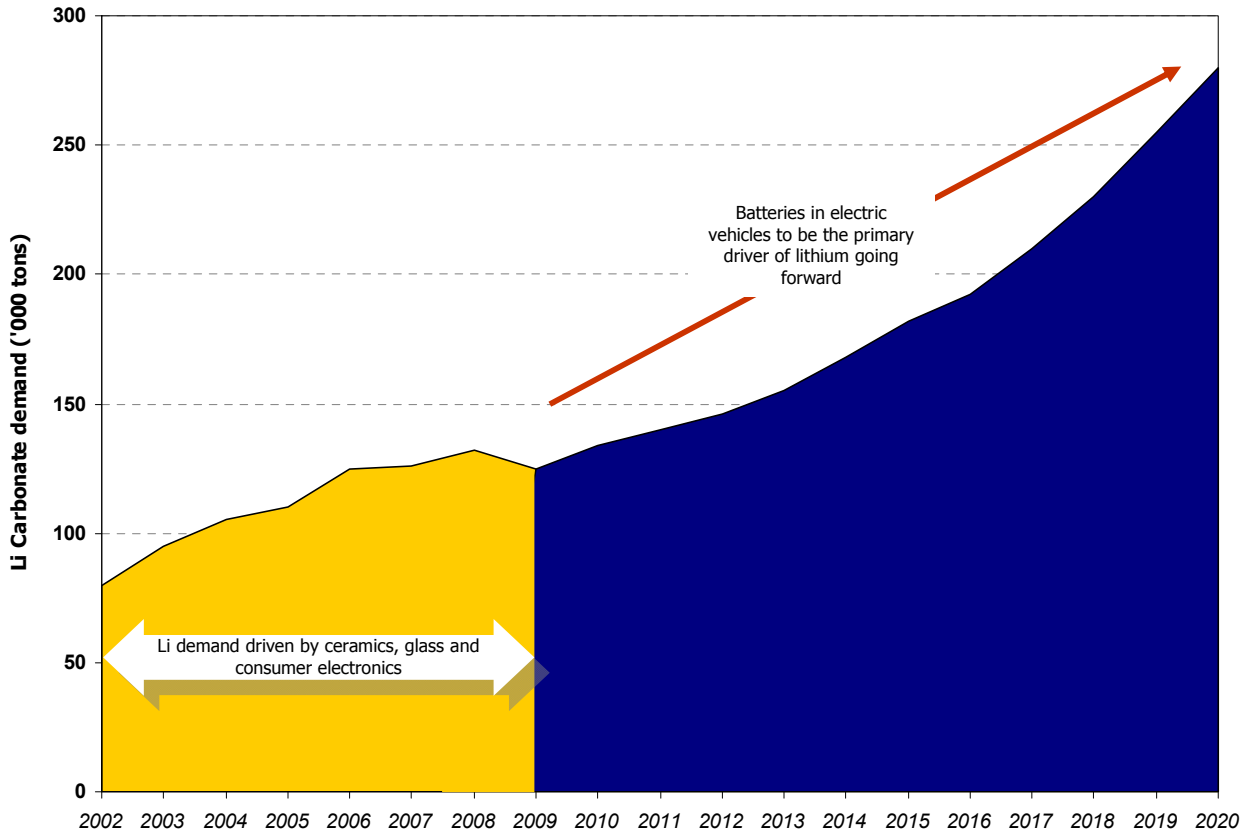
Exhibit 1: Main Uses of Lithium



Source: SQM Company Estimates as of December 31, 2008

As a result, overall lithium demand expected to expand almost three fold in 10 years. Going forward, the lithium outlook appears positive after encountering a brief dip in demand in 2009 due to the financial and economic crisis. TRU Group and Roskill show world lithium demand is expected to grow almost three fold in just over 10 years – mostly driven by increased demand for secondary (rechargeable) batteries and electric vehicle batteries. Current demand (measured as Lithium Carbonate Equivalent (LCE)) is below 115,000 t – mostly in ceramics, glass and Li-Ion batteries in consumer electronics. TRU Group estimates this to grow to close to 300,000 t by 2020 (Exhibit 2).

Exhibit 2: Lithium Carbonate forecasted demand

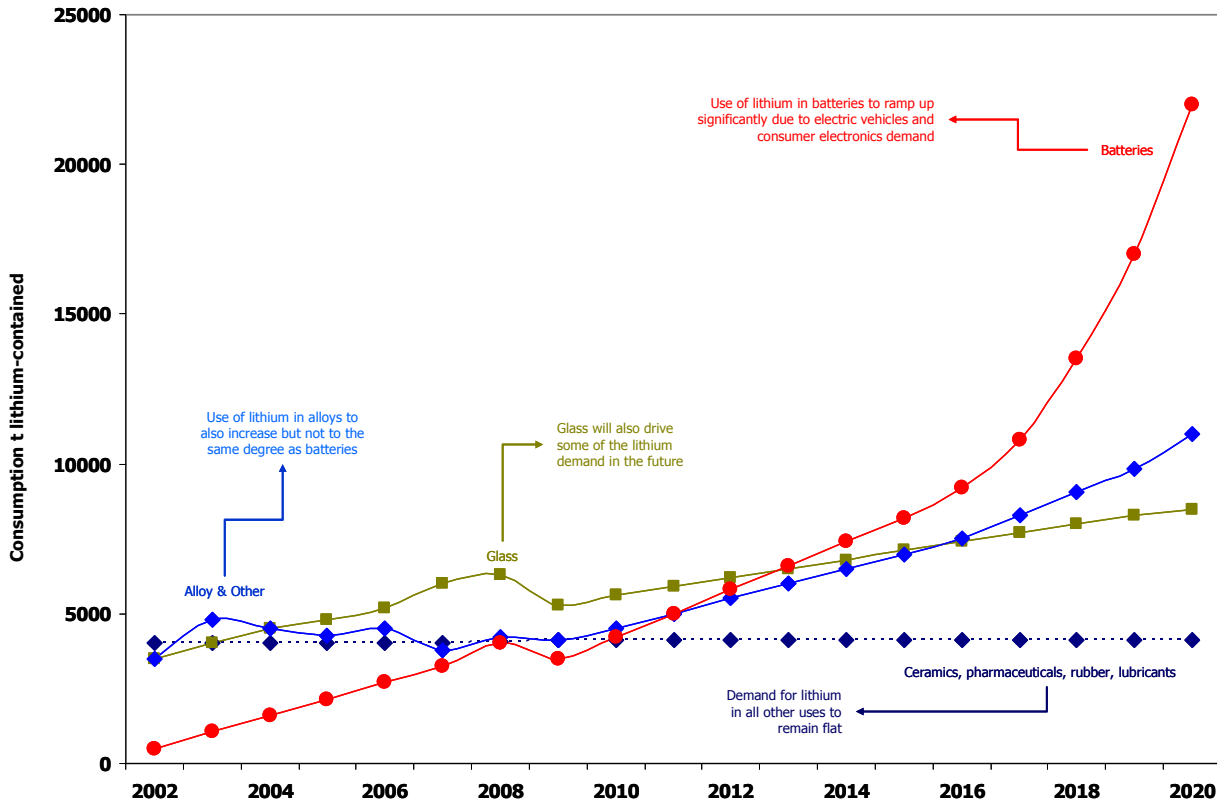


Source: TRU Group, Dundee Securities Corp.

Automotive Segment to be the Key Driver of Lithium Demand

As highlighted above, lithium is becoming an increasingly popular choice for rechargeable batteries for phones, laptops and other consumer electronic devices. In fact, batteries now make up one-fifth of the world's end-use market for the material – a share that we believe will continue to grow if automotive companies start adopting the technology in cars as is highly anticipated. Research by the TRU group supports this thesis as batteries are expected to be the fastest growing area of Li use (Exhibit 3).

Exhibit 3: Breakdown of Lithium-contained demand



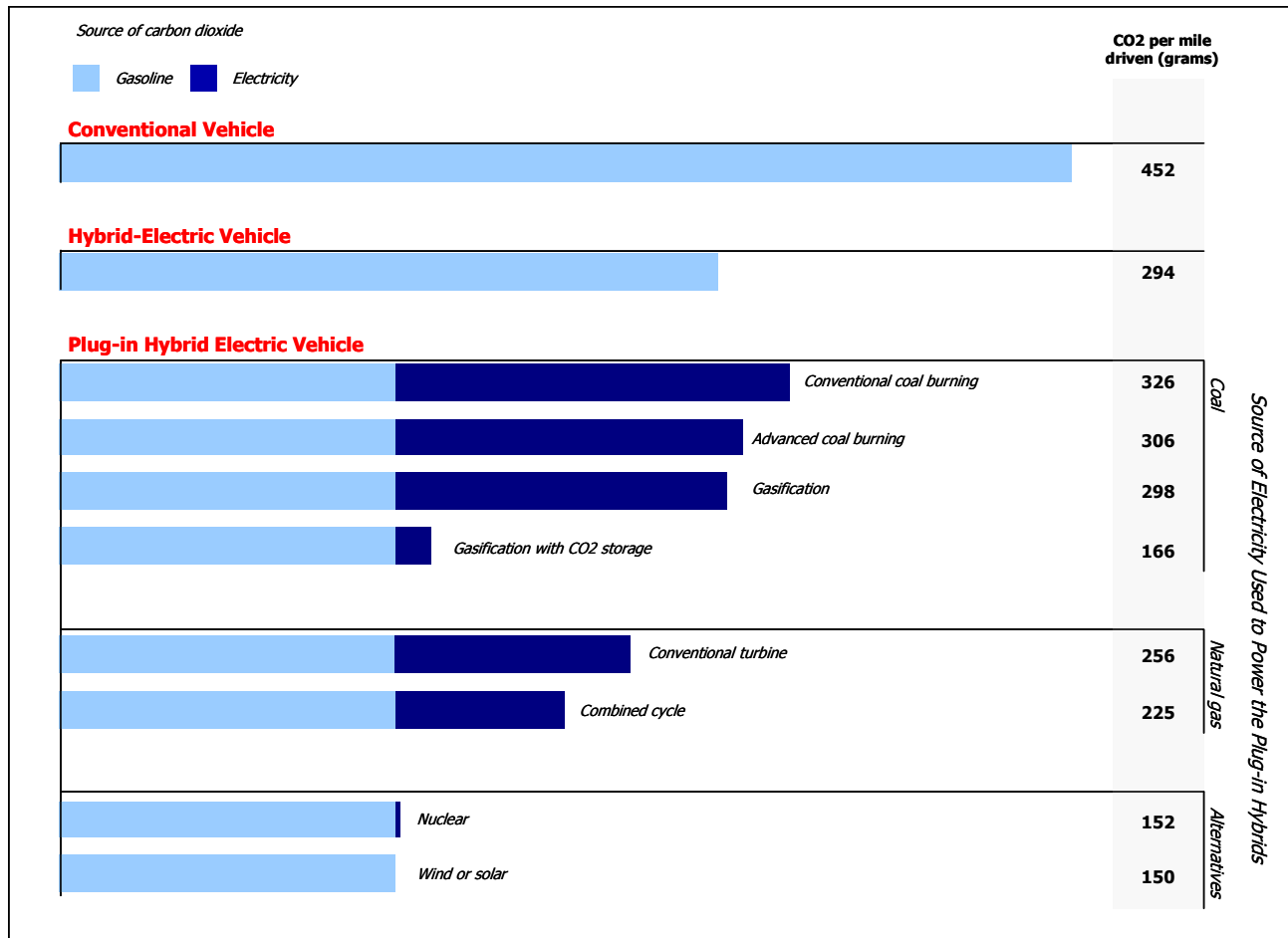
Source: TRU Group, Dundee Securities Corp.

We believe the bulk of the growth in lithium batteries will be driven by electric vehicles. We expect auto manufacturers to start bringing Li powered electric vehicles to the market next year and the popularity of these cars to drive Li demand in this category. There are a number of factors driving our optimistic outlook for the electric vehicle segment:

The market is attempting to comply with stringent new emission standards. New emissions standards adopted by the US and Europe are causing auto manufacturers to identify new ways to reduce dependence on fossil fuels. New rules in the US call for a limit on carbon-dioxide emissions to an average of 250 grams per mile by 2016. Currently, a conventional vehicle emits more than 400 grams per mile of CO₂ into the atmosphere, while today's hybrid electric vehicles (HEV) on average emit only 294 grams per mile (26% less) but still fall short of meeting the new guidelines. Future plug-in hybrids that get their power from nuclear or renewables would emit about 150 grams per mile. Coal powered electric cars are another issue...

On the other hand, Europe has adopted a phased approach for the reduction of greenhouse gas emissions from automobiles. They've specified a fleet-wide emissions standard of 130 grams per kilometre (g/km) with 65% of newly registered cars to comply with the standards in 2012, 75% in 2013, 80% in 2014 and 100% from 2015 onwards - pretty aggressive landmarks by any stretch of the imagination. We don't see these levels to be achievable unless auto manufacturers move away from petroleum-based engines into some form of electric vehicles.

Exhibit 4: Comparing hybrid electric vehicle emissions with those of conventional vehicles



Source: www.treehugger.com, Dundee Securities Corp.

Fuel economy improvements have also been mandated. Improving the average fuel economy of cars is one of the key challenges facing auto manufacturers today. In fact, the US has mandated corporate average fuel economy (CAFE) standards which require a fleet-wide average of 35.5 miles per gallon by 2016. While these levels can currently be achieved by a movement to smaller vehicles, it's the gas guzzling SUVs and light trucks that take the fleet-wide average higher. To reach these standards more automobile manufacturers are accelerating investment in hybrid vehicles, and lithium-based technologies are receiving increased attention.

Government subsidies are available. Electric vehicles are also seeing a spike in demand as government subsidies are making them more attractive for consumers. The American Recovery and Reinvestment Act (ARRA) of 2009 contains provisions which provide tax credits of 10% of the cost of the vehicle to a maximum credit of \$2,500 for purchases made between February 2009 and January 2012. These and other factors are driving sales growth in the electric vehicle segment – in the first six months of 2009 electric vehicle sales surpassed sales in all of 2008.

Why Lithium? Looks to be One of the Best Alternatives for Car Batteries and Continues to Gain Traction

Auto manufacturers are looking for alternative storage solutions for electric vehicles. They are looking for batteries that are light, inexpensive, and safe, but the key is high power and energy density. There are a number of batteries currently vying for dominance in the space including Nickel-Cadmium, Nickel Metal Hydride (NiMH), Lead Acid and others. To date, HEVs have almost exclusively been powered by NiMH batteries, even though they are typically larger and heavier than the available lithium options. We believe Li outperforms its current competitors by most metrics and is quickly becoming the metal of choice for a number of manufacturers.

Lithium compares exceptionally well against other alternatives on almost all metrics. We believe lithium performs better than other alternatives currently available on the market which makes it the best positioned mineral to be used in electric vehicles. We've performed some high level comparisons between lithium and the

existing alternatives including Nickel Cadmium (NiCad) and Nickel Metal Hydride (NiMH) based on key performance characteristics required for automotive applications. A higher star rating implies better battery performance for that particular metric compared to the others. Lithium batteries score the highest on almost all of the performance metrics, with improvements required in two important areas - lifecycle and cost.

Exhibit 5: Battery comparisons – Li-Ion stands out

Performance Criteria	Nickel Cadmium (NiCad)	Nickel Metal Hydride (NiMH)	Lithium Ion (LiIon)
Life Cycle	★★★	★	★★
Amp-Hour Rating	★	★★	★★★
Power-to-Weight Ratio	★	★★	★★★
Discharge Rate	★★	★	★★★
Recharge Time	★★	★	★★★
Cold Temp. Performance	★★	★	★★★
Toxicity	★	★★	★★★
Price	★★★	★★	★

Notes:

Life Cycle: Number of times the battery can be recharged during its lifetime, higher the better

Amp-Hour Rating: Amount of power a battery can store per unit volume, higher the better

Power-to-Weight Ratio: Amount of power stored per unit weight, higher is better

Discharge Rate: Rate at which battery loses power if left idle, slower the better

Recharge Time: Time to recharge from almost nil to full, lower is better

Toxicity: Cadmium is a carcinogenic element

Source: Dundee Securities Corp.

Many auto manufacturers have committed to the use of Lithium in their new electric vehicles. Auto manufacturers around the world are looking for new ways to reduce greenhouse emissions and improve fuel economy. Many of the major manufacturers have already launched hybrid electric vehicles but in all cases so far their electric batteries use a Nickel composite rather than lithium. However, many of these manufacturers have plans to launch plug-in hybrid electric vehicles (PHEVs) using lithium as the primary metal in the battery. Lithium is slated to be in GM’s Chevy Volt, Toyota’s plug-in Prius, Nissan’s hybrid Altima, China’s BYD automobile and electric versions of the Daimler Smart and BMW Mini. We believe the widespread support for lithium in PHEVs will continue to drive lithium demand.

Dundee’s Automotive Demand-side Model for Lithium

The increasing popularity of using lithium in electric car batteries will drive its demand in the future. However, since data on the use of lithium in automobiles is currently not readily available, we have developed a demand-side model to highlight this growing demand. We took a multi-step approach in getting to our numbers as highlighted below:

Step 1 – Forecast the global vehicle demand

To start with we projected the overall demand in automobile sales going out to 2020. We assumed nominal growth rates for the European and US regions (1% y/y growth – which fits favourably with historic trends) while being a bit more aggressive in the Asian markets (4%). Our assumptions include consumer vehicles as well as light commercial vehicles. Last year (2008) overall vehicle demand was 49MM units which we expect to increase to 56MM by 2015 (CAGR of 2%). By 2020 we expect vehicle demand to increase to 62MM (CAGR of 2.3%).

Exhibit 6: Automobile sales forecast

Global car sales - forecasts					
Region	US/Europe		Asia		
Car sales growth assumptions (%)	1.0%		4.0%		
	2009	2012	2015	2018	2020
Asian car sales ('000 units)	17,954.0	20,195.8	22,717.5	25,554.1	27,639.4
European car sales ('000 units)	16,285.1	16,778.6	17,287.0	17,810.8	18,168.8
US car sales ('000 units)	14,619.0	15,062.0	15,518.4	15,988.6	16,310.0
Total demand ('000 units)	48,858.1	52,036.3	55,522.9	59,353.5	62,118.1
CAGR (%)		2.1%	2.2%	2.2%	2.3%

Source: US DOT, European Automobile Manufacturers Associations, Japan Automobile Dealers

Step 2 – Forecast the global hybrid and electric vehicle penetration

The next step was to develop our assumptions around the penetration of hybrid electric, plug-in hybrid electric and fully electric vehicles. We identified four penetration scenarios – low, medium, high and aggressive. Within each scenario we arrived at our “best guess” estimates of hybrid, plug-in hybrid and fully electric vehicle market shares at the end of 2020.

Exhibit 7: Hybrid and electric vehicle sales scenarios

Penetration Scenario - Low					
	2020 Market Share				
Hybrid Electric Vehicles (HEV)	2.0%				
Plug-in Hybrid Electric Vehicles (PHEV)	1.0%				
Full Electric Vehicles (EV)	0.5%				
Electric Vehicle Demand					
	2009	2012	2015	2018	2020
Hybrid car sales ('000 units)	0.0	141.2	318.7	720.5	1,242.4
Plug-in electric vehicle car sales ('000 units)	0.0	67.2	154.5	355.8	621.2
Full electric vehicle car sales ('000 units)	0.0	0.0	87.9	187.4	310.6
Total electric vehicle demand ('000 units)	0.0	208.5	561.2	1,263.7	2,174.1
% of total vehicles		0.4%	1.0%	2.1%	3.5%
CAGR (%)			39.1%	31.1%	31.2%

Penetration Scenario - Medium					
	2020 Market Share				
Hybrid Electric Vehicles (HEV)	10.0%				
Plug-in Hybrid Electric Vehicles (PHEV)	5.0%				
Full Electric Vehicles (EV)	2.0%				
Electric Vehicle Demand					
	2009	2012	2015	2018	2020
Hybrid car sales ('000 units)	0.0	241.5	815.0	2,754.9	6,211.8
Plug-in electric vehicle car sales ('000 units)	0.0	80.4	315.9	1,244.1	3,105.9
Full electric vehicle car sales ('000 units)	0.0	0.0	130.7	504.4	1,242.4
Total electric vehicle demand ('000 units)	0.0	321.9	1,261.6	4,503.5	10,560.1
% of total vehicles		0.6%	2.3%	7.6%	17.0%
CAGR (%)			57.7%	52.8%	53.1%

<i>Penetration Scenario - High</i>					
	<u>2020 Market Share</u>				
Hybrid Electric Vehicles (HEV)	20.0%				
Plug-in Hybrid Electric Vehicles (PHEV)	10.0%				
Full Electric Vehicles (EV)	5.0%				
<i>Electric Vehicle Demand</i>					
	2009	2012	2015	2018	2020
Hybrid car sales ('000 units)	0.0	304.3	1,221.1	4,908.8	12,423.6
Plug-in electric vehicle car sales ('000 units)	0.0	86.8	429.9	2,133.1	6,211.8
Full electric vehicle car sales ('000 units)	0.0	0.0	169.8	970.5	3,105.9
Total electric vehicle demand ('000 units)	0.0	391.1	1,820.7	8,012.3	21,741.3
% of total vehicles		0.8%	3.3%	13.5%	35.0%
CAGR (%)			67.0%	63.9%	64.7%

<i>Penetration Scenario - Aggressive</i>					
	<u>2020 Market Share</u>				
Hybrid Electric Vehicles (HEV)	25.0%				
Plug-in Hybrid Electric Vehicles (PHEV)	15.0%				
Full Electric Vehicles (EV)	8.0%				
<i>Electric Vehicle Demand</i>					
	2009	2012	2015	2018	2020
Hybrid car sales ('000 units)	0.0	327.8	1,390.8	5,911.9	15,529.5
Plug-in electric vehicle car sales ('000 units)	0.0	90.8	514.8	2,923.9	9,317.7
Full electric vehicle car sales ('000 units)	0.0	0.0	194.2	1,357.7	4,969.4
Total electric vehicle demand ('000 units)	0.0	418.6	2,099.8	10,193.5	29,816.7
% of total vehicles		0.8%	3.8%	17.2%	48.0%
CAGR (%)			71.2%	69.3%	71.0%

Source: Dundee Securities Corp estimates

Step 3 – Assumptions around the use of LCE in electric batteries and the battery capacities in each type of electric vehicle

In the third step, we went on to understand electric battery composition and the amount of LCE used in car batteries. Our LCE assumptions estimate 425 grams of LCE required for every KWh of battery capacity. Then using current standards we estimated the battery capacity in a hybrid electric vehicle (5.3 KWh), plug-in hybrid electric vehicle (20 KWh) and a full electric vehicle (50 KWh) to calculate the amount of LCE required per car – 2,300 grams, 8,500 grams and 21,300 grams respectively. Compare these amounts to a 50 Whr laptop battery - 21 grams and you get a sense of the increase in lithium required to supply the automotive sector.

Exhibit 8: Use of LCE in electric vehicles - assumptions

LCE Assumptions			
Lithium Carbonate equivalent required per KWh of battery capacity (grams)	425		
Electric Vehicle Type	Hybrid	PHEV	EV
Battery Capacity (kWh)	5.3	20	50
Lithium Carbonate Required Per Car (kg)	2.3	8.5	21.3

Source: Roskill report, Dundee Securities Corp. estimates

Step 4 – Applying LCE assumptions to our four growth scenarios to calculate LCE demand for each instance

Finally, we applied our LCE assumptions to our four different growth scenarios to deliver the LCE demand model. Our estimates show that demand could range from the low spectrum of 14,700 mt to 293,000 mt in 2020.

Exhibit 9: LCE demand based on our four different growth scenarios

<i>LCE Demand</i>	<i>Penetration Scenario -</i>	Low				
Lithium demand in:		2009	2012	2015	2018	2020
Hybrid cars ('000 t)		0.0	0.3	0.7	1.6	2.8
Plug-in electric vehicles ('000 t)		0.0	0.6	1.3	3.0	5.3
Electric vehicles ('000 t)		0.0	0.0	1.9	4.0	6.6
Total Lithium demand ('000 t)		0.0	0.9	3.9	8.6	14.7

<i>LCE Demand</i>	<i>Penetration Scenario -</i>	Medium				
Lithium demand in:		2009	2012	2015	2018	2020
Hybrid cars ('000 t)		0.0	0.5	1.8	6.2	14.0
Plug-in electric vehicles ('000 t)		0.0	0.7	2.7	10.6	26.4
Electric vehicles ('000 t)		0.0	0.0	2.8	10.7	26.4
Total Lithium demand ('000 t)		0.0	1.2	7.3	27.5	66.8

<i>LCE Demand</i>	<i>Penetration Scenario -</i>	High				
Lithium demand in:		2009	2012	2015	2018	2020
Hybrid cars ('000 t)		0.0	0.7	2.8	11.1	28.0
Plug-in electric vehicles ('000 t)		0.0	0.7	3.7	18.1	52.8
Electric vehicles ('000 t)		0.0	0.0	3.6	20.6	66.0
Total Lithium demand ('000 t)		0.0	1.4	10.0	49.8	146.8

<i>LCE Demand</i>	<i>Penetration Scenario -</i>	Aggressive				
Lithium demand in:		2009	2012	2015	2018	2020
Hybrid cars ('000 t)		0.0	0.7	3.1	13.3	35.0
Plug-in electric vehicles ('000 t)		0.0	0.8	4.4	24.9	79.2
Electric vehicles ('000 t)		0.0	0.0	4.1	28.9	105.6
Total Lithium demand ('000 t)		0.0	1.5	11.6	67.0	219.8

Source: Dundee Securities Corp. estimates

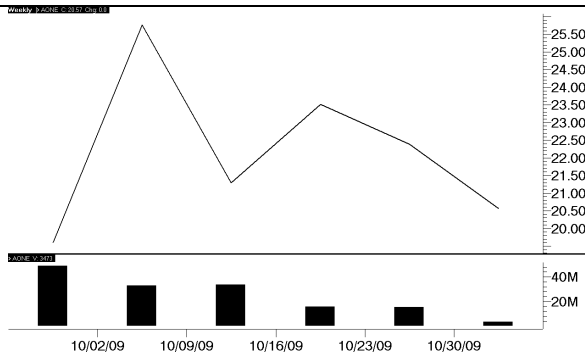
Lithium Still Faces Some Challenges in the Electric Battery Segment

While lithium remains in the pole position to be the metal of choice in car batteries, there are key challenges that the mineral has to overcome. We highlight some of these challenges below.

Substitute technologies are available. Apart from Li, other minerals including Zinc, Lead and Nickel are vying for a piece of the electric car market. These metals remain a valid threat to Li as the metal of choice and any new technological advances in batteries using other minerals could at minimum delay the acceptance of lithium, if not erode its competitive positioning.

Increasing reliance on electric vehicles may not translate into reduced emissions. One of the key advantages of electric vehicles is that they will help improve the environment through reduced greenhouse gas emissions. While this may be the case in countries like Canada where a lower percentage of power is produced by large emissions-intensive coal plants, there is a school of thought that believes places like the US might not enjoy the same level of improvement. Given the US dependence on coal plants for generating electricity, the thought is any benefits from the reduction in greenhouse emissions through the use of more electric vehicles could be more than offset by the burning of more coal to generate that electricity. This could put a damper on electric vehicle sales, undermine legislative support, and potentially slow the adoption of Li in electric batteries. One practical way to mitigate this issue is to have electric cars charge at night when excess nuclear or renewable energy may be available. Increased focus on this off-peak power use would accelerate the move toward “time of day billing” and this is a big part of our smart grid research – see [Grid Modernization 101](#).

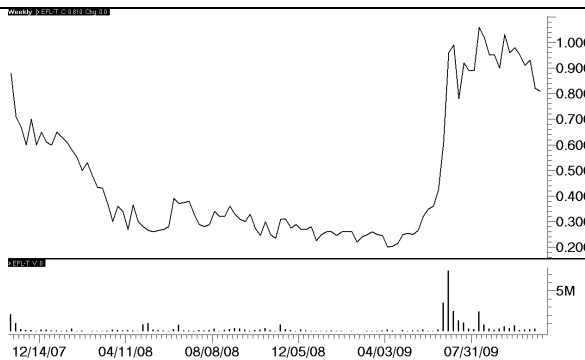
COMPANIES TO WATCH OUT FOR IN THE ELECTRIC BATTERY SEGMENT



Source: See Note 1

A123Systems (AONE-Q; Not Rated)

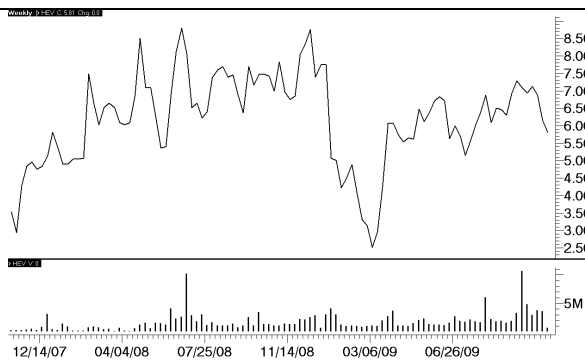
Founded in 2001, A123Systems uses its proprietary Nanophosphate technology to design, develop, manufacture and sell advanced, rechargeable lithium-ion batteries and battery systems. Its family of products are used in many different segments including transportation, electric grid services and consumer markets for next-generation energy storage solutions. The company recently did a much-anticipated IPO on the NASDAQ and is already up more than 70% over its IPO price.



Source: See Note 1

Electrovaya (EFL-T; Not Rated)

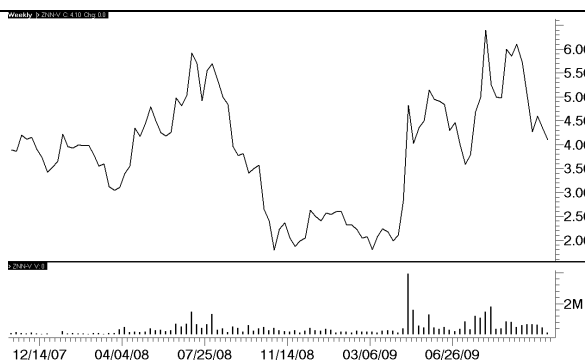
With more than 150 patents issued and pending in SuperPolymer battery technology, Electrovaya provides clean battery technology for transportation, mobile computing, portable power and aerospace. Its SuperPolymer technology uses nanostructured lithium ion polymer technology that enables more energy storage in a smaller space allowing for smaller, lighter and more powerful applications.



Source: See Note 1

Ener1 Inc. (HEV-Q; Not Rated)

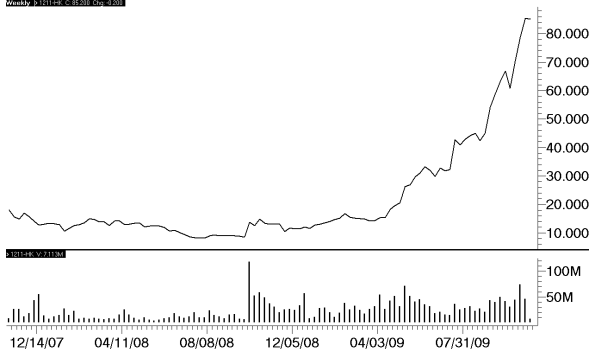
The company develops products related to fuel and solar cells for the consumer, industrial, and military markets. The company has several subsidiaries operating in different areas including NanoEner (developing nanotechnology-based products) and EnerFuel (developing fuel cell components). However, it's the ownership of EnerDel that is most relevant in the lithium space. EnerDel develops lithium power technologies and products for stored energy and battery power – primary cells (non-rechargeable), rechargeable cells, battery packs etc. EnerDel is providing the batteries for Volvo's prototype electric vehicle.



Source: See Note 1

ZENN Motor Company (ZNN-V; Not Rated)

ZENN (short for Zero Emission No Noise) Motor Company is an innovative manufacturer of electric vehicles. The company was founded in 2000, shipped its first electric vehicle in 2006 and went public in 2007 on the Toronto Venture Exchange. The company supplies its cars to more than 30 retailers in 20 states in the US and Canada. The ZENN car uses a technology which competes with lithium to power its battery – the EESor's Electrical Energy Storage Unit (EESU) which is an ultra-capacitor based storage device used to power batteries for transportation and other applications.



BYD Company Ltd. (1211-HK; Not Rated)

BYD is a Chinese manufacturer based in Shenzhen with established branches and offices in the US, Europe, Japan, South Korea, India, Taiwan and other regions. The company is organized in two groups – IT industry and auto industry. Its IT products include rechargeable batteries, chargers, electro acoustic components, connectors, micro electronics etc. The company entered the auto industry through its acquisition of Tsinchun Automobile Company Ltd. and now manufactures small, medium and high-end fuel, hybrid and all electric vehicles.

Source: See Note 1

Bottom Line on Demand

Our “high penetration” scenario for electric car growth would add about 150,000 metric tons of LCE demand by converting 35% of new cars sold to some form of electric car. We’ve assumed this will happen in 2020 but you can make your own assumptions. This new demand is larger than the current market for lithium (about 125,000 metric tons). Sounds good for lithium producers? Ah but the devil is in the details:

- How fast will this demand come on?
- How easily can production be ramped?
- And at what price do these new supplies become available?

With these questions in mind, let’s turn our discussion over to the rock heads...

LITHIUM SUPPLY - INTRICACIES OF THE TIGHT LITHIUM MARKET

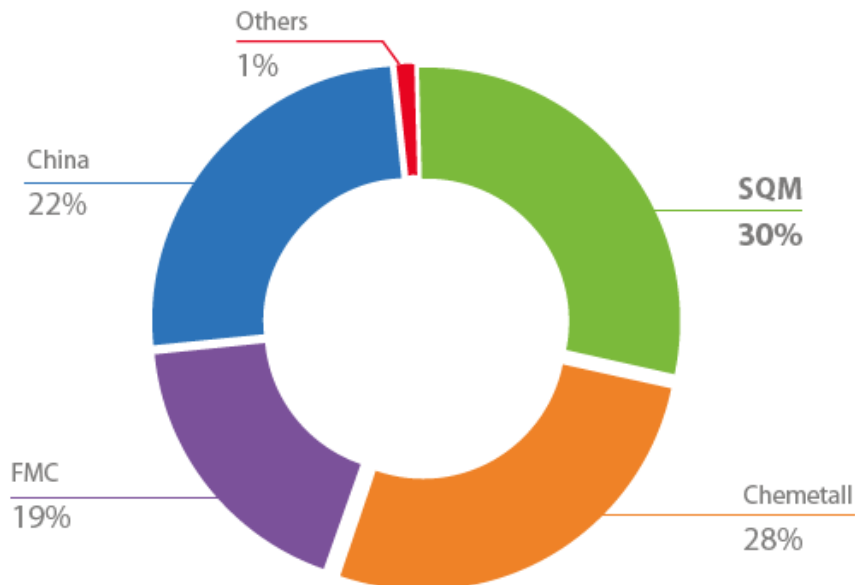
Lithium (Li) is a relatively rare element. It is a soft silver-grey metal and the lightest of all metals. Lithium can be found in several different environments around the world including supersaturated brines, hard rock pegmatites, and lithium-rich clays; however, most deposits are small and low grade and not amenable to economic extraction. Lithium is sold as brines, compounds, metal or mineral concentrates depending on end use.

Lithium is most commonly sold as compounds or minerals. Lithium compounds include lithium carbonates, hydroxides, and chlorides and accounted for 76% of total consumption in 2008. Lithium minerals such as spodumene are typically consumed directly in glass, ceramics and continuous casting and comprised the remaining 24% of the market. Lithium carbonates make up approximately three quarters of lithium compound consumption, typically as Li-ion rechargeable batteries, while lithium hydroxides are used in the manufacture of lubrications.

Lithium production highly concentrated. Only four companies dominate the entire market - SQM, Chemetall, and FMC Lithium produce lithium from brine deposits in the Americas (typically located in the high desert areas of South America such as the Atacama Desert), whereas Talison Minerals is an Australian lithium mineral producer. Production rose to 22,800 t of lithium in 2008 from 13,100 t in 2000. Most of the growth in output has come from Argentina, Australia, and Chile, which together accounted for 82% of total lithium production in 2008. Chile and Argentina accounted for approximately 90% of the world's lithium production from brines, while Australia produced almost 70% of the world's lithium minerals. While still trailing the Americas and Australia, China is increasing lithium carbonate production from both brines and minerals.

Lithium carbonate production has more than doubled over last twelve years. Global lithium carbonate production has increased to 92,000 t in 2008 from 45,000 t in 1997. Three companies are responsible for 77% of global production of lithium carbonate (Exhibit 10). SQM of Chile is the world's leading lithium carbonate producer with a 30% market share, followed by Germany's Chemetall and FMC of the United States. China has become a leading producer of lithium compounds through the conversion of Chinese and Australian spodumene. Talison Minerals, a private Australian firm, is the largest spodumene producer and accounts for about 23% of global contained lithium. However, only 15% of this production is sold into the lithium chemical markets via Chinese lithium carbonate converters.

Exhibit 10: Lithium carbonate production market share

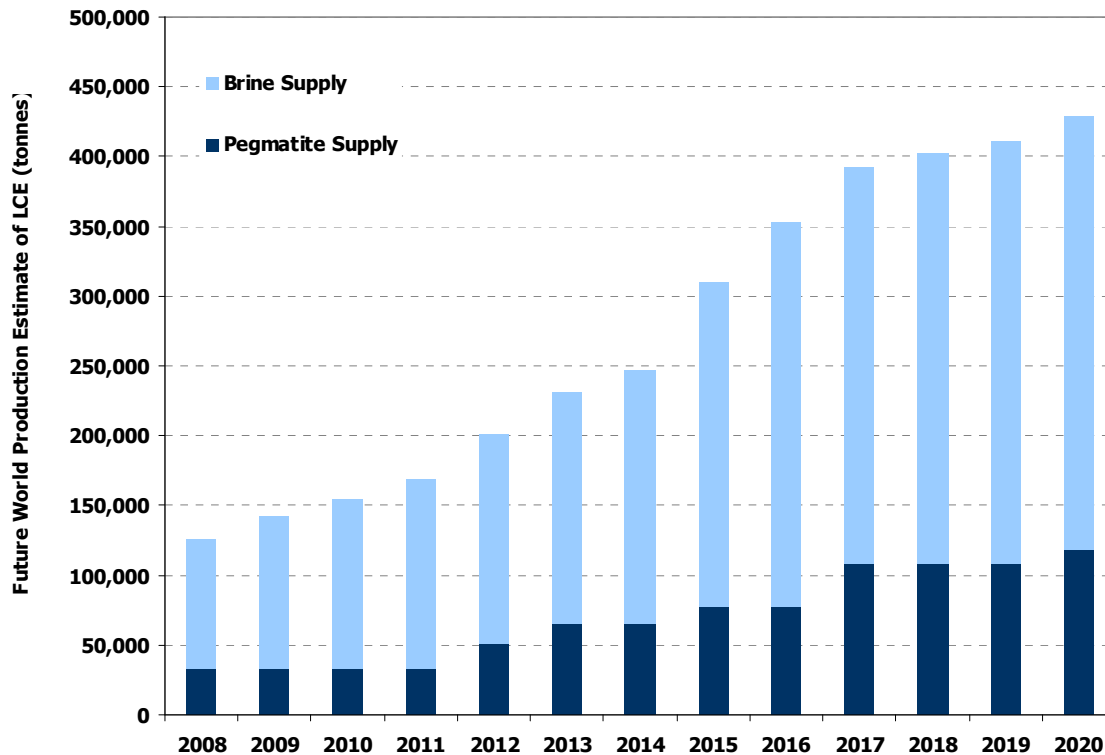


Source: SQM Company Estimates as of December 31, 2008

Brine Operations Maintain a Cost Advantage

Subsurface brines are much cheaper to mine and process than are hard rock mines, and the cost of producing lithium compounds from brines is lower than from lithium mineral deposits. An oversupply of lithium carbonate in the mid 1990's following the start of production by SQM in Chile led to lower prices and the closure of several hard rock operations. Brine production has become the dominant source of the element and we expect this trend to continue (Exhibit 11).

Exhibit 11: Dundee's projected share of lithium carbonate production from brine and pegmatite sources



Source: Company Reports, Dundee Securities Estimates

Cost estimates are tightly held by the industry. A report by Roskill Information Services Ltd.¹ estimates lithium carbonate production costs from Chilean brine deposits are now around US\$1,400/tonne to US\$1,800/tonne. Production costs for FMC's Argentinean brine operation are estimated at around US\$2,300/tonne to US\$2,600/tonne due largely to higher energy costs associated with pre-concentration of the brine using selective absorption.

The cost to convert spodumene ($\text{LiAl}(\text{SiO}_3)_2$) into lithium carbonate (Li_2CO_3) is estimated to be around US\$2,500/tonne to US\$3,000/tonne of finished product. China is the major source for lithium carbonate converted from spodumene. The cost of raw materials accounts for around 40% of the cost of conversion, with eight tonnes of five percent lithia (Li_2O) concentrate required to produce one tonne of lithium carbonate.

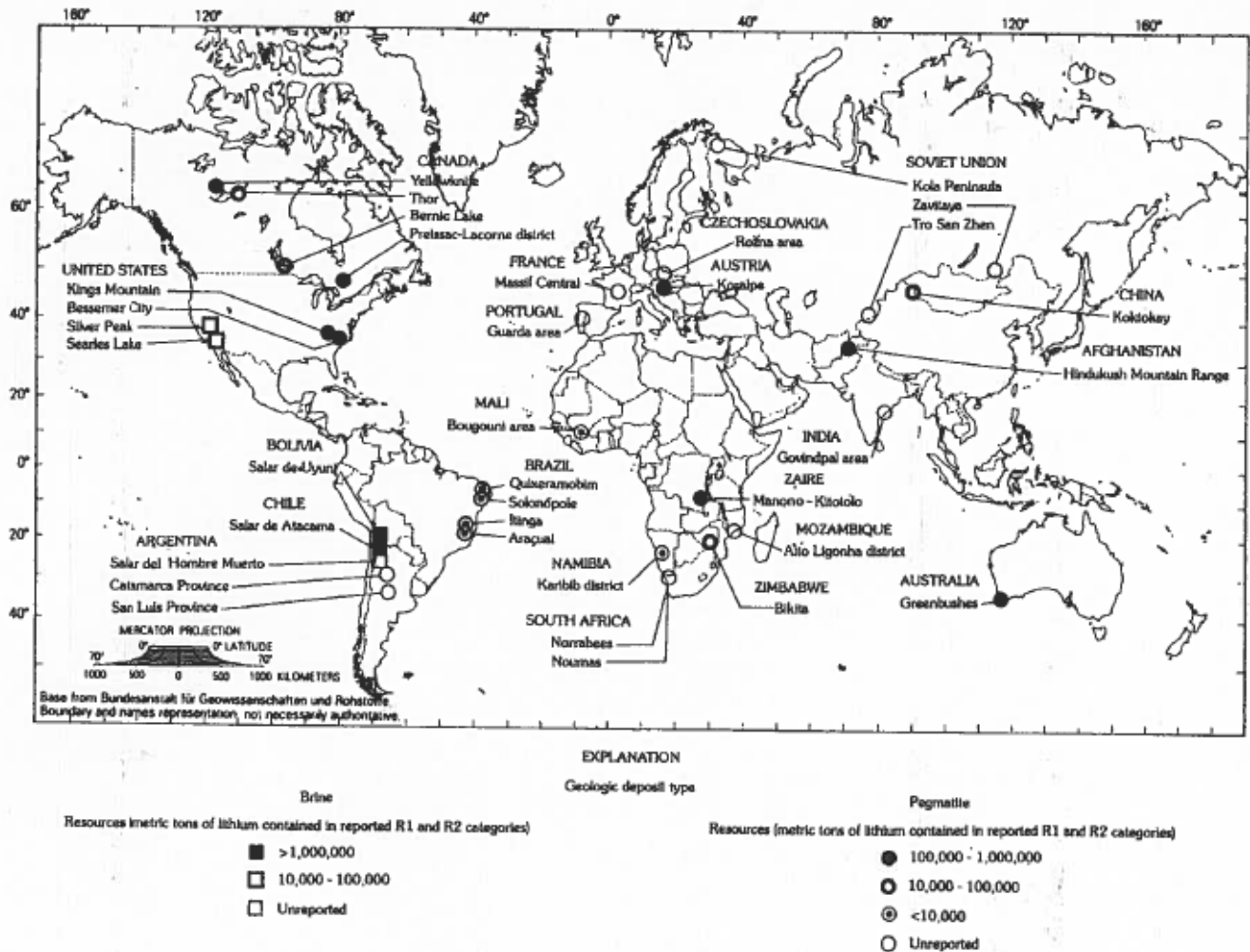
Chinese spodumene producers have been shown to operate profitably using lithia grades as low as one percent; however, western mining and processing cost structures suggest that developing a one percent lithia resource at current prices would be economically challenging. Future production of lithium compounds from lithium minerals will ultimately be dependent on continued high prices for lithium carbonate, that is, greater than US\$5,000/tonne, allowing economically viable conversion.

¹ The Economics of Lithium, Eleventh Edition, 2009, Roskill Information Services Ltd.

Limited Distribution of Lithium Deposits

Lithium is found in minerals, clays, and brines located in various parts of the world. High-grade spodumene deposits or brines currently host all commercial lithium operations. Brines are found in several locations in the Andes Mountains of South America, as well as China and the United States. Pegmatite deposits are widely distributed throughout the world's continental shield regions (Exhibit 12).

Exhibit 12: Location and size of reserves for some of the world's best known lithium deposits



Source: Donald E. Garrett (2004), *Handbook of Lithium and Natural Calcium Chloride*

It has been estimated that there are 17.1 million tonnes of contained Li in reserves worldwide (Exhibit 13). Approximately 90% of the reserves are hosted in brine based deposits while the remaining 10% are hosted in pegmatite deposits.

Exhibit 13: Estimated lithium reserves of various lithium deposits

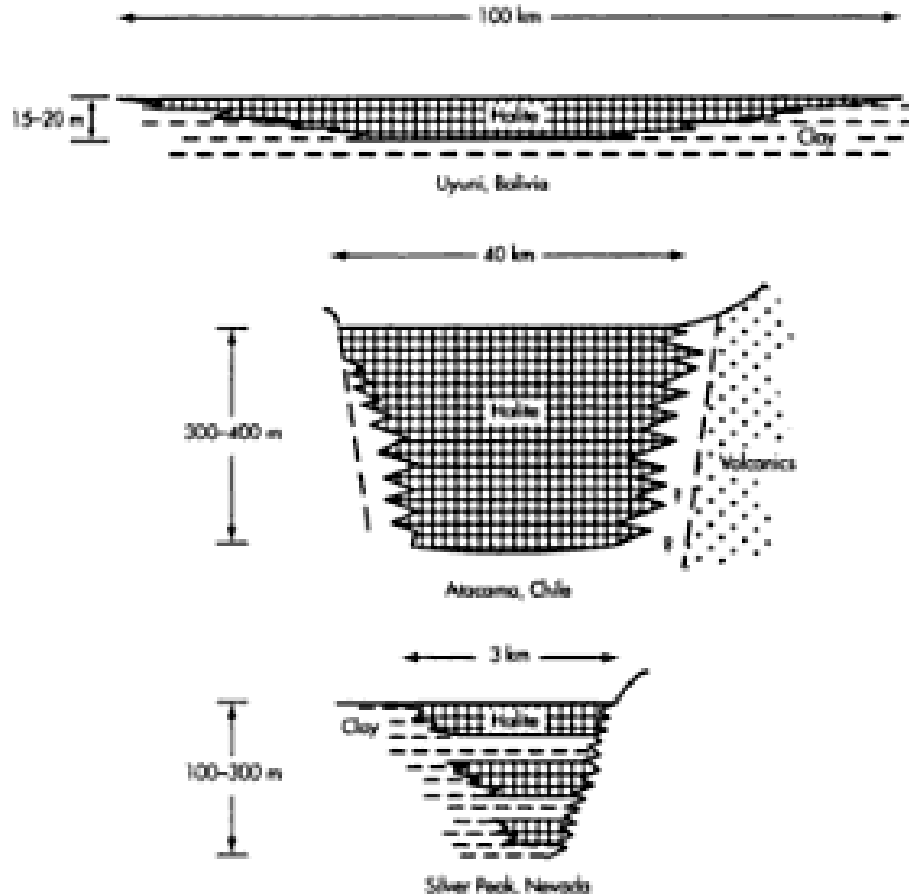
Country	Source: USGS		Source: Garrett, 2004	
	Reserves (000s tonne Li)	Reserves Base (000s tonne Li)		Reserves (000's tonne Li)
			Brines	
United States	38	410	Salar de Uyuni, Bolivia	5,000
Argentina	2,000 (est.)	2,000 (est.)	Salar de Atacama, Chile	3,000
Australia	170	220	Salar de Hombre Muerto, Argentina	800
Bolivia	-	5,400	Clayton Valley, USA	30.4
Brazil	190	910	Zabuye Salt Lake, China	1,000
Canada	180	360	Qinghai Lake, China	1,000
Chile	3,000	3,000	Smackover oilfield brine, USA	1,000
China	540	1,100	Great Salt Lake< USA	526
Portugal	NA	NA	Searles Lake, USA	31.6
Zimbabwe	23	27	Salton Sea, USA	1,000
			Dead Sea, Israel	2,000
			Total	15,388.0
			Ore deposits	
			Africa (other)	0.3
			Bikita, Zimbabwe	23
			Mali	26
			Manono-Kitotolo, Zaire	309
			Namibia	9.8
			Argentina	0.2
			Australia (Greenbushes)	150
			Austria	10
			Brazil	3.3
			Canada (total)	240.5
			Bernic Lake, Manitoba	73
			Ontario, Quebec	139
			China	500
			Portugal	10
			Russia	130
			United States (other)	44.3
			North Carolina	71
			Total	1,739
Global Total	6,100	13,400	Global Total	17,127

Source: USGS; MIR for US and Argentine estimates; – Donald E. Garrett (2004), Handbook of Lithium and Natural Calcium Chloride

Brine Deposits are the Main Source of Lithium Carbonate

Lithium rich brines are formed in salt lakes. The most significant deposits are found in Chile, Argentina and China (Tibet). Brines are concentrated in salt pans (salars) or large, dry lake beds. Evaporite minerals (halides, sulphates, nitrates, carbonates, etc.) form a crusty surface (caliche) on the deposits whereas lithium-rich salt brines are contained in the underlying porous rocks (Exhibit 14). Lithium concentrations typically range from 200 to 4,000 parts per million (ppm).

Exhibit 14: Cross sections of various salt lakes

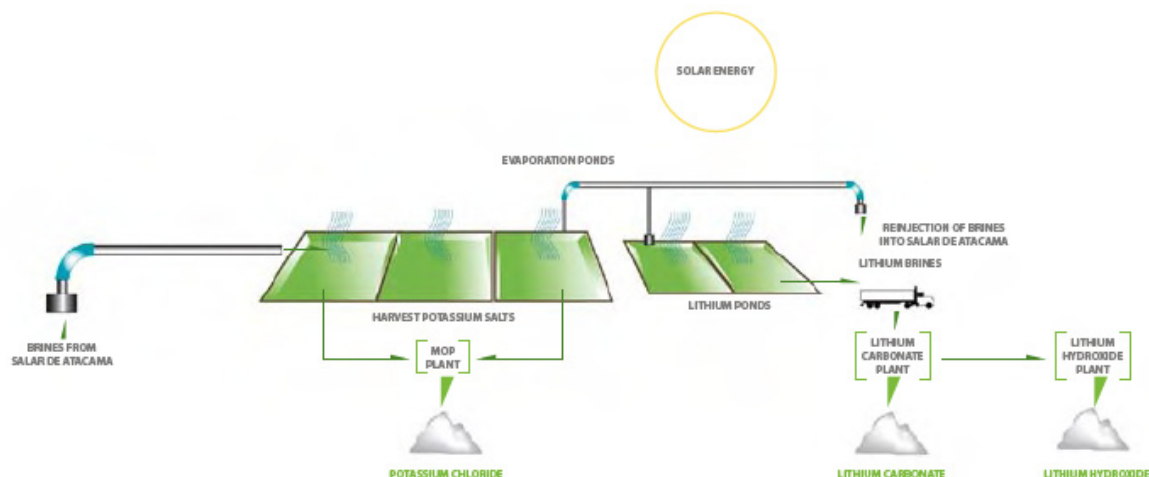


Source: Jessica Elzea Kogel, Society for Mining, Metallurgy, and Exploration, *Industrial Minerals & Rocks: Commodities, Markets and Uses*

Lithium extraction from brines is a relatively simple process. Brines are pumped to surface where the solution is stored in holding areas, typically large plastic lined ponds (Exhibits 15 and 16). The concentration (evaporative) process is aided in high desert areas of South America by low rainfall and humidity, high winds, and relatively warm days. Porosity and permeability of the host rocks of the brine reservoir can impact flow rates, which further determine the pumping rate and/or the number of wells required for extraction.

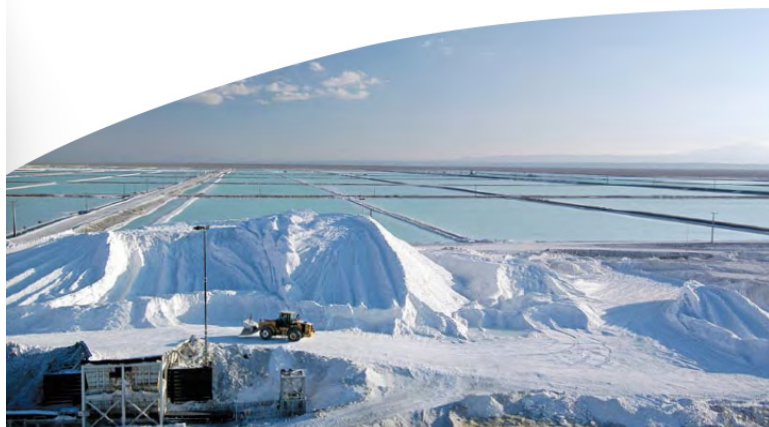
Evaporation not only aids in the concentration of the solution, but helps to separate the elements. Ponds containing fresh brine are tinged a brilliant turquoise; others, nearly ready for harvest, are yellow around the edges. The magnesium content of the initial brine is important - high magnesium concentrations prevent the formation of lithium chloride (LiCl). Removal of the magnesium requires the addition of reagents (calcium hydroxide) during processing and adds to the operating costs. Brines generally reach lithium concentrations of about six percent within a year; thereafter the solutions are shipped to processing plants where they are purified and dried to form crystals of lithium carbonate.

Exhibit 15: SQM's lithium carbonate processing flowchart for its Salar de Atacama operation



Source: SQM Reports

Exhibit 16: Brine evaporation ponds at Salar de Atacama, Chile



Source: SQM Annual Report

The World Class Brine Deposits. Salar de Atacama, Chile is the second largest brine deposit in the world and home to the largest lithium operation. With annual production capacity of 40,000 tonnes of lithium carbonate, it is the source of 30% of the world's lithium carbonate equivalent production. Salar de Atacama is owned and operated by SQM, not surprisingly the world's largest producer. The deposit is considered to produce the best quality lithium, with the highest grades of lithium and potassium and the lowest magnesium concentration. Salar de Atacama has a surface area of 3,500 square kilometres. The USGS (United States Geological Survey) estimates a lithium reserve containing three million tonnes, with concentrations varying from 1,000 to 4,000 ppm.

Salar de Hombre Muerto, Argentina was the second lithium salt deposit to be put into production in South America after Salar de Atacama. The USGS estimates reserves hosting one million tonnes of lithium at an average grade of 600 ppm. Owner and operator FMC produces 12,000 tonnes of lithium carbonate and 6,000 tonnes of lithium chloride per year. The company uses a proprietary alumina adsorption system to directly extract lithium from the brine rather than solar evaporation, a higher cost process requiring fresh water.

Salar de Uyuni, Bolivar is the single largest lithium deposit in the world with a whopping 40% share of global lithium brine resources. The salt flat is the largest in the world and measures 10,000 square kilometres. The USGS estimates reserves containing 5.4 million tonnes of lithium with a concentration of 321 ppm; however, lithium grades can reach over 3000 ppm within the central 50 square kilometre portion of the flat. The major

stumbling block for the development of this large deposit is the presence of high magnesium concentrations. The Bolivian Government is currently reviewing development options for this deposit.

Pegmatite – the Only Source for Mineral Lithium

Granitic pegmatites supply the three main lithium minerals, including spodumene, petalite, and lepidolite. Pegmatites are coarse-grained, intrusive rocks comprised primarily of quartz, feldspar and mica. The deposits are mined using open cut and underground methods with the largest producers located in Australia, China, Zimbabwe, and Canada. Resource grades are normally reported as a percentage of contained lithia. Spodumene is the most important of the lithium-bearing minerals due to its higher Lithia (Li₂O) content and the fact that it tends to be found in larger deposits. Typical spodumene operations grade from 1.0% to 1.5% Li₂O.

As noted above, pegmatite deposits are usually exploited by open pit or underground mining techniques. While open pit methods often allow for economies of scale, underground methods can be the preferred mining choice due to the typically narrow size of the intrusive dykes that comprise the ore. There are a number of processing techniques to remove gangue to upgrade the ore to a higher Lithia (Li₂O) grade final product, but all essentially rely on the density differential to separate the mineral from the waste rock. The process usually involves crushing and grinding, followed by separation carried out either through spirals, flotation or heavy media.

Greenbush's Pegmatite Deposit, Australia is one of the largest and highest grade (3.31% Li₂O) lithium mineral deposits in the world. Owner Talison Minerals Pty Ltd is the world's largest spodumene producer. The mine has a capacity of 250,000 tonnes per annum (tpa) or 28,500 tpa of lithium carbonate equivalent. Resources are estimated to contain 35.5 million tonnes at a lithia grade of 3.31% Li₂O and 89 g/t tantalum (Ta₂O₅). The lithia grades within the enriched lithium zones are anomalously high compared to other global resources and ore selected for processing contains up to 4% lithia (50% spodumene). Delineated reserves are scheduled to last for over 20 years and the ore body remains open both along strike and at depth. High grade concentrate is sold into ceramic and glass markets and low grade material is exported to China and processed into lithium carbonate. Talison spodumene accounts for about 15% of the global lithium carbonate supply.

Evolving Price Environment

Prices for lithium concentrates are based on lithia content. Spodumene concentrate produced from pegmatite deposits often grades between 6.0% and 7.5% Li₂O, and was priced at US\$715/tonne in 2008 (Exhibit 17). Glass grade spodumene typically grades from 4.8% to 5.0%, and sold for US\$375/tonne last year. Lithium carbonate from brine or conversion of spodumene normally has Li₂O grade of 40.4% and thus is priced accordingly.

Exhibit 17: Lithium ore concentrate prices (US\$/tonne)

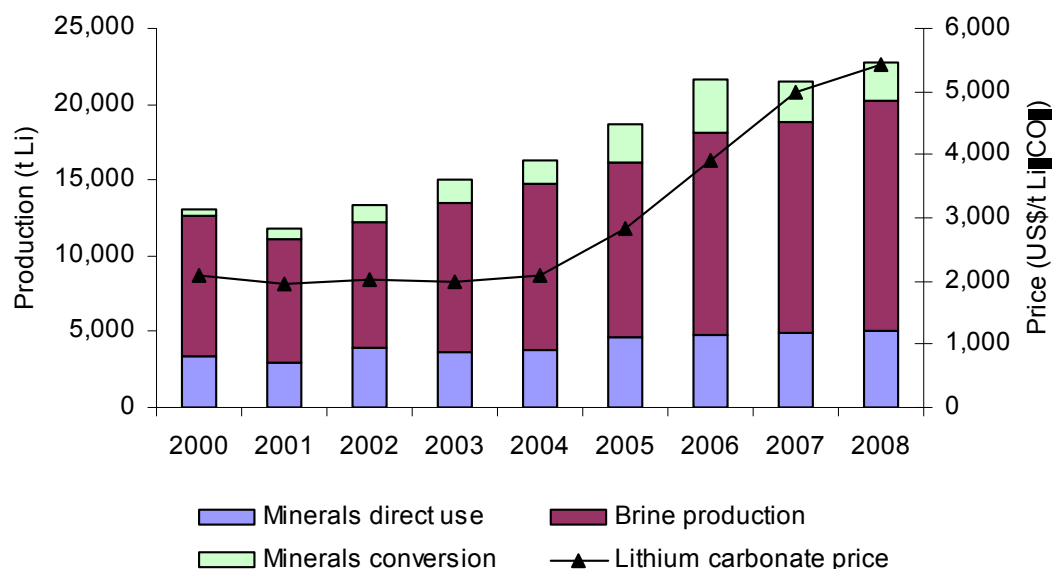
	Li ₂ O (%)	1988	1992	1998	2000	2008
Spodumene concentrates	7.5	\$340	\$385	\$330	\$395	\$715
Glass grade spodumene	5.0	\$160	\$175	\$215	\$230	\$375
Lithium carbonate	40.4	\$3,410	\$4,320	\$2,068	\$2,600	\$5,500

Sources: Donald E. Garrett (2004) *Handbook of Lithium and Natural Calcium Chloride*; *The Economics of Lithium 2009*, Roskill Report

Spodumene deposits located in North Carolina were historically the world's dominant source of lithium with lesser production from brine operations in California and Nevada. Chile's SQM entered the market in 1996 and within two years overtook the US with production from its brine operations. The introduction of brine-based operations with their lower cost structure fundamentally changed the entire industry, and mining operations in the US, China and Russia were forced to close. Once costs fell, prices soon followed, and lithium carbonate prices plunged from US\$4,300/tonne to a low of US\$1,600/tonne between 1995 and 1999.

Growth in battery-grade lithium carbonate for use rechargeable batteries and a shortage in supply from South American brine producers resulted in increased conversion of lithium minerals to compounds in China in the mid-2000s. The shortage in product resulted in increased prices, allowing mineral producers to once again become economically viable. The increased demand and cost pressure resulted in an increase in lithium carbonate prices from US\$2,600/tonne in 2000 to about US\$5,500/tonne in 2008 (Exhibit 18).

Exhibit 18: Historical price and source of lithium carbonate production



Source: *The Economics of Lithium 2009, Roskill Report*

Adequate Lithium Supply and Production Elasticity

We expect no supply shortages in the near term. Lithium production was estimated at about 75% of capacity in 2008. The industry produced approximately 92,000 tonnes of lithium carbonate equivalent (LCE) during 2008; however, lithium operations have the capacity to produce upwards of 125,000 tonnes of LCE. We expect that supply could rise further with increased utilization and capacity expansions at current lithium operations. The leading lithium brine producers (SQM, Chemetall and FMC) continue to expand capacity to meet the demand and maintain market share. SQM alone increased its plant capacity last year by 30% or 10,000 tonnes to its current capacity of 40,000 tonnes per annum of lithium carbonate.

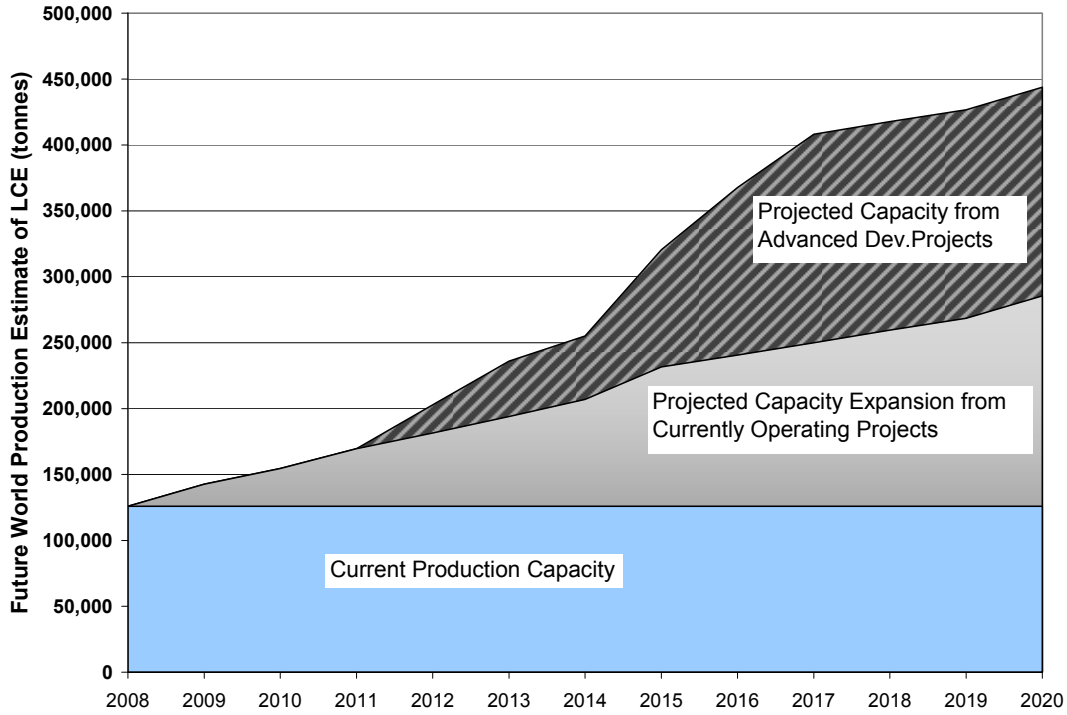
Our lithium supply estimate forecasts may be understated. We estimate that current producers could ramp-up production capacity from 125,000 tonnes per year LCE to 170,000 tonnes per year by 2011 and to upwards of 450,000 tonnes per year by 2020 (Exhibit 19). Dundee derives its estimates from only new and advanced projects where companies have provided production guidance (Exhibit 20). We anticipate the first new generation of operations could begin as early as 2012. The most significant development projects are the Salar de Uyuni (brine) in Bolivia and Jadar Lithium (pegmatite) in Serbia. These projects are not anticipated until the 2015 and 2017, respectively. Due to a meagre availability of development information, we are likely understating future production from China.

It is important to note that an increase in production to levels beyond 400,000 tonnes per year would likely require higher prices. We expect existing and future projects may have to process lower grade brines to raise production levels almost four-fold from current levels, at commensurately higher costs.

Chinese brine projects are another largely untapped source. Expansions to existing brine projects in China have the potential to increase available lithium production capacity by around 44,700 tonnes LCE by 2010.

New exploration and development projects abound, due in part to rising lithium prices that have spawned increased interest in the development of new or reactivation of previously known lithium minerals deposits. Advanced projects include Canada Lithium's Quebec Lithium project, Nordic Mining's Keliber project in Finland and Galaxy Resources' Mt Cattlin project in Australia. Higher prices are also enticing explorers to dust off alternative sources of lithium such as Rio Tinto's jadarite project in Serbia and Western Lithium's hectorite clay project in the United States.

Exhibit 19: Dundee estimates of lithium carbonate equivalent supply through 2020



Source: Company Reports, Dundee Securities Estimates

Exhibit 20: Dundee's supply projections for lithium carbonate equivalent production through 2020

All values in metric tonnes of lithium carbonate equivalent

Project	Company	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Salar de Atacama	SQM	40,000	40,000	40,000	44,000	48,000	52,000	56,000	60,000	60,000	60,000	60,000	60,000	60,000
Salar de Atacama	Chemetall	22,500	26,900	31,300	34,300	37,300	40,300	43,300	46,300	49,300	52,300	55,300	58,300	61,300
Salar de Hombre Muerte	FMC	16,600	18,100	19,600	21,100	22,600	24,100	25,600	27,100	28,600	30,100	31,600	33,100	34,600
Salar de Rincon	The Sentient Group	0	9,000	12,500	16,000	16,000	16,000	16,000	16,000	16,000	16,000	16,000	16,000	16,000
Clayton Valley	Chemetall	3,700	3,700	3,700	3,700	3,700	3,700	3,700	3,700	3,700	3,700	3,700	3,700	3,700
Zhabuye	China	5,000	5,500	6,000	7,000	8,000	9,500	11,000	12,500	14,000	16,000	18,000	20,000	20,000
Quaidan Basin	China	4,900	6,000	8,000	10,000	12,500	15,000	18,000	21,000	24,000	27,000	30,000	32,500	35,000
Greenbushes	Talison	28,200	28,500	28,500	28,500	28,500	28,500	28,500	40,000	40,000	40,000	40,000	40,000	50,000
Bikita	Zimbabwe	4,946	4,946	4,946	4,946	4,946	4,946	4,946	4,946	4,946	4,946	4,946	4,946	4,946
Total Producing		125,846	142,646	154,546	169,546	181,546	194,046	207,046	231,546	240,546	250,046	259,546	268,546	285,546
Salar de Olaroz	Orocobre					2,000	5,000	8,000	11,000	15,000	15,000	15,000	15,000	15,000
Other Brine						2,000	5,000	8,000	11,000	15,000	15,000	15,000	15,000	15,000
Cauchari-Olaroz	Lithium Am.													
Salar de Uyuni	Comibol								30,000	60,000	60,000	60,000	60,000	60,000
Salar de Copaisa														
DXC Salt Lake	Sterling								5,000	5,000	5,000	5,000	5,000	5,000
Mt. Cattlin	Galaxy					17,311	17,311	17,311	17,311	17,311	17,311	17,311	17,311	17,311
Quebec Lithium	Canada Lithium						14,714	14,714	14,714	14,714	14,714	14,714	14,714	14,714
James Bay	Lithium One													
Kings Valley	Western Lithium													
Lac des Montagnes	Nemaska													
Hallman Bean/Foote	North Arrow													
Godslith	First Lithium													
Jadar lithium project	Rio Tinto										15,561	31,122	31,122	31,122
Total Development		0	0	0	0	21,311	42,025	48,025	89,025	127,025	142,586	158,147	158,147	158,147
Total Brine		92,700	109,200	121,100	136,100	150,100	165,600	181,600	232,600	275,600	285,100	294,600	303,600	310,600
Total Spodumene		33,146	33,446	33,446	33,446	50,757	65,471	65,471	76,971	76,971	92,532	108,093	108,093	118,093
Total Producing+Development		125,846	142,646	154,546	169,546	202,857	236,071	255,071	320,571	367,571	392,632	417,693	426,693	443,693

Source: Company reports, Dundee Securities Estimates

Recycling and Substitution May Impact Demand

Unlike most other metals, not all lithium can be recycled. Lithium consumed in glass, ceramic and lubricating grease is spent and impossible to recycle, and thus large-scale lithium recycling is likely far off. Material consumed within batteries can be recycled but the amount of recycling is currently very small (perhaps <1% of total lithium demand). We expect lithium recycling to increase as its use in EV and HEV batteries accelerates; however, with an estimated lifetime of 10 to 15 years for a typical car battery the impact of recycling in the supply demand balance will likely not be felt until 2020.

There are alternatives to lithium in the manufacture of many products, including batteries, ceramics, greases, and manufactured glass. Calcium and aluminum soaps substitute for lithium stearates in greases; calcium, magnesium, mercury, and zinc can be used as anode material in primary batteries; and sodic and potassic fluxes are utilized the manufacture of ceramics and glass. Substitutes for aluminum-lithium alloys used as structural materials include composite materials consisting of boron, glass, or polymer fibres in engineering resins. However, we note that the electrochemical and metallurgical characteristics of lithium continue to make it a better choice for the manufacturing of many higher quality products.

Exploration and Market Activity Accelerating

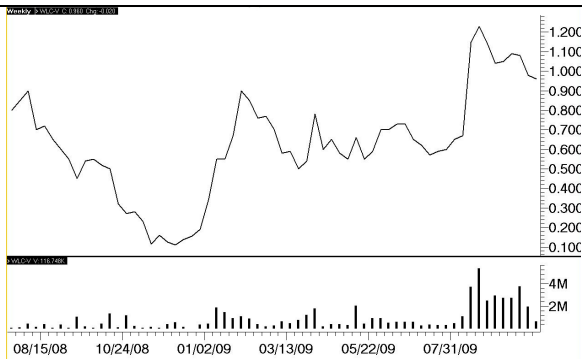
Lithium exploration is in vogue, at least for the time being, and the stock price performance of lithium companies has been exceptional as investors flock into the space. Despite the attention recently garnered by the industry we believe that many investors and companies themselves are still on a fairly steep learning curve when it comes to both the industry and its potential.

Domestic exploration is limited to lithium mineral deposits, a sector of the industry that faces high conversion costs and whose end products are most often used in materials (glass, ceramics) unlikely to share in the exciting growth potential of batteries. Brine deposits, however, should see increased demand, resulting in considerable project acquisition in South America and the southwest US. Below we provide a list of companies ranging from early stage exploration to near term development stories, and we outline deposit location and type (Exhibit 21). Most of the companies now active in the space are either developers or explorers, and several are listed or plan to list on the TSX or TSX-V exchanges.

Exhibit 21: Selected list of lithium companies listed on Canadian stock exchanges

Ticker	Company Name	Project Name	Location	Deposit Type C=Clay P=Pegmatite B=Brine	Market Cap C\$MM	Performance			
						1 mo %	3mo %	6mo %	1yr %
WLC	WESTERN LITHIUM CANADA CORP	Kings Valley	Nevada	C	90	25.9	126.7	134.5	403.7
CLQ	CANADA LITHIUM CORP	Quebec Lithium	Quebec	P,B	67	-2.1	31.9	206.5	578.6
LI	LITHIUM ONE INC	James Bay, Sale de Vida	Quebec, Argentina	P,B	33	-20.2	-39.3	106.8	810.0
TNR	TNR GOLD CORP	8 Projects	Argentina, NA, Ireland	P,B	25	5.4	47.5	156.5	210.5
LAT	LATIN AMERICAN MINERALS INC	Salares	Argentina	B	16	-2.0	104.2	81.5	276.9
RM	RODINIA MINERALS INC	Clayton Valley	Wyoming	B	10	-23.2	32.3	53.6	473.3
CAJ	CANASIA IND CORP	unnamed	Alberta	B	11	-40.0	140.0	80.0	260.0
HAO	HABANERO RESOURCES INC	unnamed	Alberta	B	8	-28.6	25.0	150.0	233.3
NAR	NORTH ARROW MINERALS INC	Phoenix, Torp	NWT/Nunavut	P,B	8	-25.4	42.9	78.6	354.5
NW	NEW WORLD RESOURCES CORP	Pastos Grandes	Bolivia, Nevada	B	7	-13.8	38.9	400.0	108.3
ULI	ULTRA LITHIUM INC	Berland River	Alberta	B	6	0.0	17.6	25.0	81.8
CHU	CHANNEL RESOURCES LTD	Fox Creek	Alberta	B	5	26.7	18.8	171.4	533.3
MCI	FIRST LITHIUM RES INC	Valeyview, Godslith	Alberta, Manitoba	P,B	5	-11.4	72.2	72.2	181.8
ABN	CONS ABADDON RESOURCES INC	Gammon Lake, Raleigh Lake	Ontario	P	4	-33.3	63.6	38.5	80.0
LMR	LOMIKO METALS INC	Salar de Aguas Calientes	Chile	B	4	-14.3	118.2	700.0	140.0
WER	WESTSTAR RESOURCES CORP	Silver Creek, Simonette	Alberta	B	4	-19.0	-5.6	-15.0	-29.2
EFG	FIRST GOLD EXPL INC	Lake pivert, Rose	Quebec	P	3	-37.0	-5.6	-52.8	
ABR	ASHBURTON VENTURES INC	HY Claims	Nevada	B	2	-10.0	-10.0		
GSM	GOLD SUMMIT CORP	Paymaster	Nevada	B	2	-9.1	-2.4	73.9	33.3
MHI	MINERAL HILL INDUSTRIES LTD	Chubb	Quebec	P	2	-29.0	-8.3		37.5
AVERAGE						-13.0	40.4	136.7	264.9

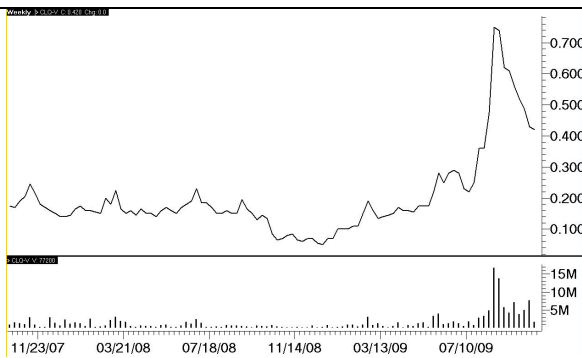
Source: Thomson One, Company Reports, Dundee Securities Corporation



Western Lithium Canada Corp.

Western Lithium (WLC) is focused on its Kings Valley hectorite project in Nevada. The deposit hosts an historic 11 million tonne lithium carbonate equivalent resource (estimated by Chevron in the 1980's) contained in five lenses. WLC has an updated compliant resource on one of the lenses. The Stage I (PCD) lens contains 1.3 million tonnes with a grade of 0.27% Li (1.44% lithium carbonate). This near surface deposit is hosted by hectorite clay - hectorite clay deposits are not currently exploited for lithium on a commercial scale.

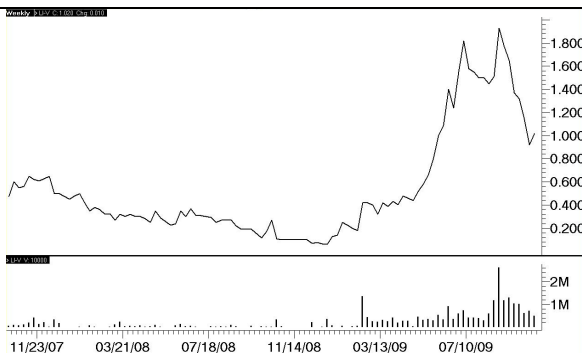
Source: See Note 1



Canada Lithium Corp.

Canada Lithium's (CLQ) primary focus is its past-producing Quebec Lithium Project. CLQ is also looking at other spodumene pegmatite deposits in Canada and has a 75% interest in a joint venture exploring for lithium brine deposits in Nevada. CLQ has commenced a pre-feasibility study on Quebec Lithium and is aiming for a completed feasibility study in 2010. CLQ suggested in March 2009 that it had materially advanced its lithium carbonate metallurgical process and could ultimately produce battery quality lithium carbonate. Quebec Lithium is located 60 km north of Val d'Or and produced for ten years in the 1950's and 60's. Spodumene rich dikes were extracted from an underground operation. An historic resource of 15.6 million tonnes with a grade of 1.14% Li₂O remained following a ten year operation.

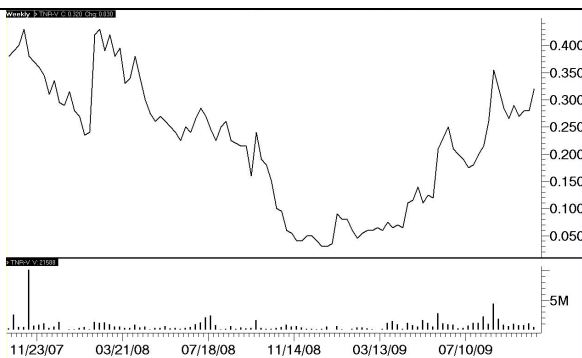
Source: See Note 1



Lithium One Inc.

Lithium One's primary focus is the 1,700 hectare James Bay project in northern Quebec. Several pegmatite dyke swarms have been identified by surface mapping. Drilling and trenching was undertaken in 2009 and most reported intercepts and channel samples have been in the 1.3% to 1.7% Li₂O range. Lithium One estimates that true widths of the dykes are up to 30m wide. The company has also recently acquired over 25,000 hectares of land in Argentina with surface brine samples containing high levels of lithium and potash (averaging of 640 ppm Li).

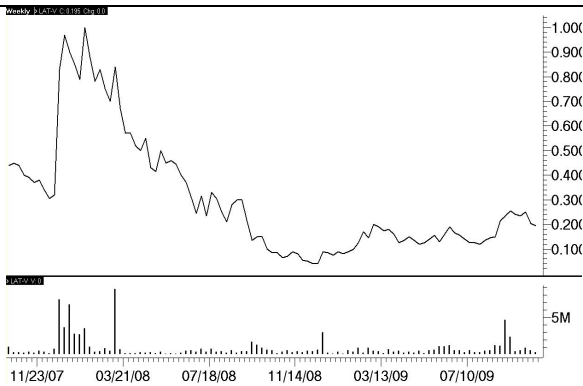
Source: See Note 1



TNR Gold Corp.

TNR Gold was an early mover in acquiring lithium properties and has assembled a package of eight properties that continues to grow. The projects are located in diverse geographical locations with pegmatites in Canada and Ireland and brine projects in Nevada and Argentina. TNR Gold plans a spin out of its lithium and rare earth element assets into International Lithium Corp. in the first quarter of 2010. The company will also be looking for joint venture partners to move their extensive property portfolio forward.

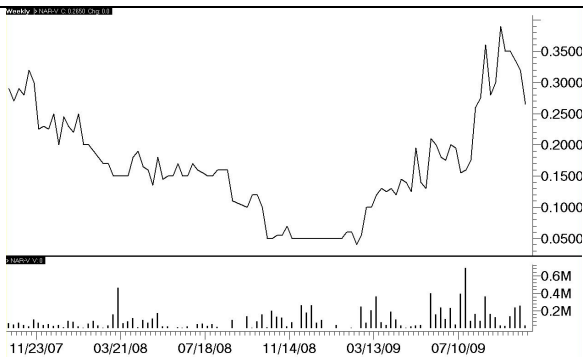
Source: See Note 1



Source: See Note 1

Latin American Minerals Inc.

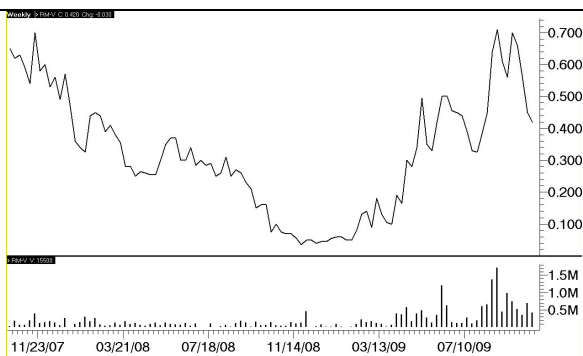
Latin American Minerals has a 31% equity interest in Lithium Americas, a private company focused on the exploration and development of lithium, potash, and borax deposits. Lithium Americas projects are located on the highly prospective Puna Plateau in Argentina. The company has acquired over 100,000 hectares of lithium- and potash-bearing lakes including Cauchari and Olaroz – both areas have shown indications of high grade lithium brines. A total of 37 of 55 brine samples have returned an average of 800 ppm lithium, 0.5% potassium, and 1,500 ppm boron with favourable 3.6:1 magnesium to lithium ratios.



Source: See Note 1

North Arrow Minerals Inc.

North Arrow Minerals' flagship project is its Phoenix property located northeast of Yellowknife. The Big Bird pegmatite strikes for 1,100m with widths of up to 80m. Mineralization consists of spodumene associated with feldspar and quartz. Previous assay results range from 0.57% Li₂O to 3.13% Li₂O. Magnetic surveys indicate additional pegmatite targets are located on the property. The 100%-owned Torp Lake project, located on the Arctic coast, hosts a pegmatite dike that contains spodumene crystals that are up to 1.5m in length – assays as high as 3.5% Li₂O have been reported from the project.



Source: See Note 1

Rodinia Minerals Inc.

Rodinia Minerals flagship property, the Clayton Valley property in Nevada, was acquired in February 2009. The project is located adjacent to the only lithium producing facility in the US, the Silver Peak brine operation (Chemetall-Foote Corp.), which currently produces 1.2 million kg of lithium per annum. Rodinia is the main landholder in the area. The company's second project, the Strider Lithium property in Manitoba, was acquired in May 2009.

LITHIUM SUPPLY AND DEMAND – CAN DEMAND BE MET WITH CURRENT PRODUCTION CAPACITY?

Based on Dundee's electric vehicle demand and lithium supply forecasts we've estimated the amount of lithium reserves that will be used for different levels of electric vehicle demand. Given some of our estimates it appears lithium supply will be sufficient to meet demand from electric vehicle, however this does not take into account the demand for Li in other batteries and storage devices used in consumer electronics as well as other applications.

You need significant growth in Hybrid Electric Vehicles (HEVs) to move the needle. We are making the same assumptions as in our demand model – 435 grams of lithium carbonate used per KWh of battery capacity. As a result, if 440,000 HEV's were sold this year and they all used Li-ion batteries, we estimate that they would require 600-1,400 tonnes of Li carbonate or roughly 0.4% to 0.9% of the global capacity in 2009 depending on the battery size. If this was to increase with HEV production ramping to 3MM units, the total requirement jumps to 4,300 to 9,500 tonnes of Li carbonate or 3% to 6.6% of overall capacity.

Exhibit 22: Hybrid Electric Vehicle (HEV) demand impact on supply

Hybrid	DEMAND OF LITHIUM IN ELECTRIC VEHICLES ('000 TONS)						
	Hybrid Electric Vehicle (HEV) Demand (in '000)						
	440	879	1,099	1,221	1,709	3,077	9,231
<i>Battery Cap (KWh)</i>							
3.3	0.6	1.2	1.5	1.7	2.4	4.3	12.9
4.3	0.8	1.6	2.0	2.2	3.1	5.6	16.9
5.3	1.0	2.0	2.5	2.8	3.9	6.9	20.8
6.3	1.2	2.4	2.9	3.3	4.6	8.2	24.7
7.3	1.4	2.7	3.4	3.8	5.3	9.5	28.6
	% OF 2009 LITHIUM PRODUCTION CAPACITY						
3.3	0.4%	0.9%	1.1%	1.2%	1.7%	3.0%	9.0%
4.3	0.6%	1.1%	1.4%	1.6%	2.2%	3.9%	11.7%
5.3	0.7%	1.4%	1.7%	1.9%	2.7%	4.8%	14.5%
6.3	0.8%	1.6%	2.0%	2.3%	3.2%	5.7%	17.2%
7.3	0.9%	1.9%	2.4%	2.6%	3.7%	6.6%	19.9%

Source: Dundee Securities Corp.

Plug-In Hybrids (PHEVs) are an interim step and could further accelerate demand. If PHEV production were to increase to 430,000 units, we forecast 3,300 to 4,000 tonnes of Li carbonate demand or 2.3% to 2.8% of the total supply in 2009. If proven successful lithium could be used in more PHEVs; if demand increases to approximately 3MM units, 25,000 to 30,000 tonnes of Li carbonate will be needed or 17.3% to 21.2% of overall supply.

Exhibit 23: Plug-in Hybrid Electric Vehicle (PHEV) demand impact on supply

PHEV	DEMAND OF LITHIUM IN ELECTRIC VEHICLES ('000 TONS)						
	Plug-in Hybrid Electric Vehicle (PHEV) Demand (in '000)						
	155	310	387	430	602	1,083	3,250
<i>Battery Cap (KWh)</i>							
18	1.2	2.4	3.0	3.3	4.6	8.3	24.9
19	1.2	2.5	3.1	3.5	4.9	8.7	26.2
20	1.3	2.6	3.3	3.7	5.1	9.2	27.6
21	1.4	2.8	3.5	3.8	5.4	9.7	29.0
22	1.4	2.9	3.6	4.0	5.6	10.1	30.4
	% OF 2009 LITHIUM PRODUCTION CAPACITY						
18	0.8%	1.6%	2.1%	2.3%	3.2%	5.8%	17.3%
19	0.9%	1.7%	2.2%	2.4%	3.4%	6.1%	18.3%
20	0.9%	1.8%	2.3%	2.5%	3.6%	6.4%	19.2%
21	1.0%	1.9%	2.4%	2.7%	3.7%	6.7%	20.2%
22	1.0%	2.0%	2.5%	2.8%	3.9%	7.1%	21.2%

Source: Dundee Securities Corp.

All-Electric vehicles need more lithium, but substantial growth is needed to impact the lithium market. Finally, electric vehicles (without an internal combustion engine) will utilize larger amounts of Li to power their batteries and provide the required horsepower. In this case, modest demand of 61,000 units of EV will utilize 3,200 to 3,400 tonnes of Li carbonate or 2.2% to 2.4% of global supply. However, if EV demand increases to over 1MM units, 66,000 to 72,000 tonnes of Li carbonate will be required which translates into 46% to 50% of 2009 global supply.

Exhibit 24: Electric Vehicle (EV) demand impact on supply

EV	DEMAND OF LITHIUM IN ELECTRIC VEHICLES ('000 TONS)						
	<i>Electric Vehicle (EV) Demand (in '000)</i>						
	61	122	153	170	238	428	1,284
<i>Battery Cap (KWh)</i>							
48	3.2	6.3	7.9	8.8	12.3	22.1	66.3
49	3.2	6.4	8.1	9.0	12.5	22.6	67.7
50	3.3	6.6	8.2	9.1	12.8	23.0	69.1
51	3.4	6.7	8.4	9.3	13.0	23.5	70.4
52	3.4	6.8	8.6	9.5	13.3	23.9	71.8
	% OF 2009 LITHIUM PRODUCTION CAPACITY						
48	2.2%	4.4%	5.5%	6.1%	8.5%	15.4%	46.2%
49	2.2%	4.5%	5.6%	6.2%	8.7%	15.7%	47.1%
50	2.3%	4.6%	5.7%	6.4%	8.9%	16.0%	48.1%
51	2.3%	4.7%	5.8%	6.5%	9.1%	16.3%	49.0%
52	2.4%	4.8%	6.0%	6.6%	9.3%	16.7%	50.0%

Source: Dundee Securities Corp.

Our conclusion – lithium supply is sufficient to meet most realistic projections for growth in battery-powered automobiles. Given our assumptions and estimates, we believe there remains significant runway for current Li supply to meet the expected increase in demand in the automotive sector. We submit that we have only taken into consideration one segment of the market that is driving lithium demand – it is the one however that is expected to be its biggest driver. As the technologies and products that draw on this resource gain acceptance, other segments will increase their influence on the demand for lithium and in turn create opportunities for suppliers to increase their production capacities.

APPENDIX A: CONVERSION FACTORS FOR VARIOUS LITHIUM COMPOUNDS

To convert from	to Li x	to Li ₂ O x	to Li ₂ CO ₃ x
Lithium Li (100%Li)	1.000	2.153	5.323
Lithium oxide (lithia) Li ₂ O (46.4%)	0.464	1.000	2.473
Lithium bromide LiBr (8.0%Li)	0.080	0.172	0.425
Lithium carbonate Li ₂ CO ₃ (18.8%Li)	0.188	0.404	1.000
Lithium hydroxide monohydrate LiOH.H ₂ O (16.5% Li)	0.165	0.356	0.880
Lithium chloride LiCl (16.3% Li)	0.163	0.362	0.871
Lithium fluoride LiF (26.8% Li)	0.268	0.576	1.420
Lithium hypochlorite LiOCl (11.89% Li)	0.119	0.256	0.633
Butyllithium C ₄ H ₉ Li (10.83% Li)	0.108	0.233	0.576

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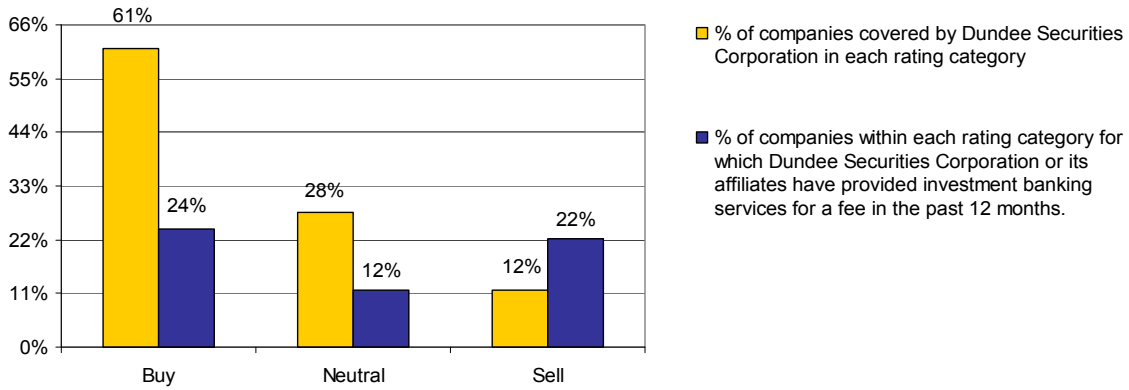
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