NEMASKA LITHIUM INC.
//Lithium

STORMCROW

Sept 1, 2015 TSXV-NMX

Target C$0.54

INITIATING COVERAGE
The New Wave of Battery Lithium Production

- **Lithium and the Electric Car:** The headline story behind expectations for growth in battery demand is the electric car, but even with pessimistic electric vehicle demand growth and the usual rate of electronic device uptake, lithium demand will likely outstrip supply by the end of this decade.
- **New Sources Required:** In many commodity markets, the incumbent suppliers can ramp up output to meet new demand. This is likely not the case in lithium, where brine projects are finding it difficult to obtain permission from governments to harvest more, and where hard-rock mines are depleting. New sources of lithium will be required.
- **The Right Stuff:** Not only will the world likely need more lithium, but to keep the costs of batteries down, it must be in the correct chemical form. The latest and greatest lithium batteries are most inexpensively produced from lithium hydroxide as a feedstock, instead of the lithium carbonate that has long been a mainstay product from brine and hard-rock mines alike.
- **Time for Nemaska:** Nemaska's Whabouchi Project will use a well-trodden technology, membrane electrolysis, to convert hard-rock lithium ore to lithium hydroxide. This technology has already been proven in pilot-scale work in Canada, but the company plans to reduce time-to-market even further by building a Phase I commercial demonstration plant that will reduce commissioning time for the full commercial plant while providing qualification samples for customers. For the price, our analysis suggests this strategy is undeniably the right one.
- **The New Wave:** Lithium has long been the province of solar evaporation. But the price of lithium is likely to be driven higher with increasing demand, since the price of lithium is not the driving factor in battery cost. This is opening the field to new ways of producing lithium, and the industry is now abuzz with discussion of processing technology developed by Tenova-Bateman, POSCO and Nemaska. Nemaska is the cutting edge of this New Wave, and we are initiating coverage on Nemaska with a Positive recommendation.

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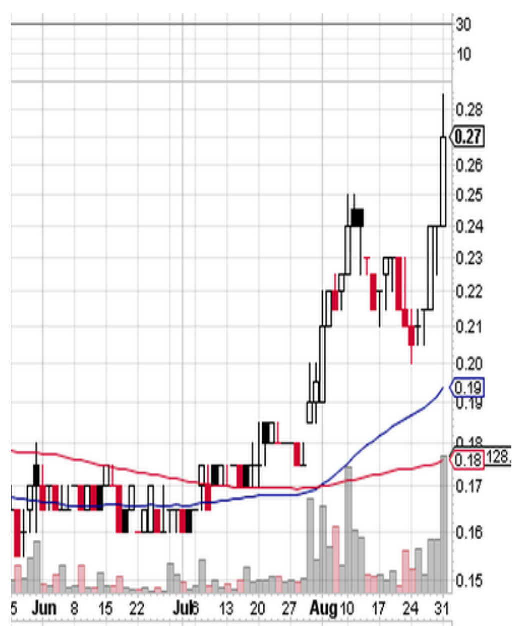
	New	Old
Recommendation	Positive	N/A
Target	C$0.54	N/A

Recent Px:	**C$0.27**
Shares O/S:	**191M**
Shares O/S FD	**242M**
Market Cap	**C$51M**
Cash	**C$1.2M**



See the end of report for important disclosures

Introduction

Nemaska represents the New Wave of lithium production. With batteries consuming a larger and larger slice of lithium demand, regardless of expectations regarding electric vehicles or large-scale energy storage but based almost entirely on continuing growth in 3C products (consumer, computing and communications), lithium supplies are expected to become tight by the end of the decade. Our recent lithium industry report (*Lithium-Strong Gets Stronger*, May 29, 2015) suggests meaningful shortages could occur by 2021, even with very pessimistic expectations for automotive and grid storage growth for lithium battery demand.

Nemaska plans to make lithium hydroxide from spodumene using a new process, one that has been successfully demonstrated at pilot scale and that is already being used in a number of other hydrometallurgical arenas. Membrane electrolysis may not be familiar to the lithium industry, but extensive testing by the company has shown it to be a safe and low-cost approach for making lithium hydroxide.

To de-risk the use of these new technologies in the production of lithium, the company plans to build a small Phase I demonstration plant, in parallel with the financing and construction of their full commercial facility. This Phase I plant will produce roughly 500 tpa of lithium hydroxide monohydrate, and cost some $25 million to build. In addition to providing customer evaluation samples, we expect that operating the Phase I plant will allow for a significant reduction in ramping the company's first full-scale commercial plant to production. By advancing revenues by as much as 12 months, company value would be significantly enhanced. There is no substitute for operational knowledge, and a Phase I plant will produce knowledge about the process that nothing else can, at comparable cost.

We have examined the market and the company's prospects, and can establish a value of $0.54 per share on the company's fully diluted share count, using a 19% discount rate. We believe the 19% discount rate adequately encompasses the remaining technical and financial risk to the company. Based on this, we are initiating coverage on Nemaska Lithium with a Positive recommendation.

The Short Story Regarding Lithium - Introduction

No one in the modern world should be unfamiliar with a basic argument as to why lithium is a critical material. Lithium batteries are the de facto standard for electrical energy storage in any portable device, from cell phones to fully-electric vehicles like the Tesla Model S. Where electricity is required for a device that will necessarily have to be moved, lithium in some chemical form will be present.

We recently had the same question asked of us in various ways. That question was whether lithium batteries were here to stay. The answer is more complicated than many would think, because there are many battery technologies that are attempting to carve out their own niche in various industries, and there are even non-battery electrical energy storage technologies that might, one day, make an interesting play for market share. But there are two overwhelming reasons to believe that we will be living with lithium batteries for decades, perhaps longer.

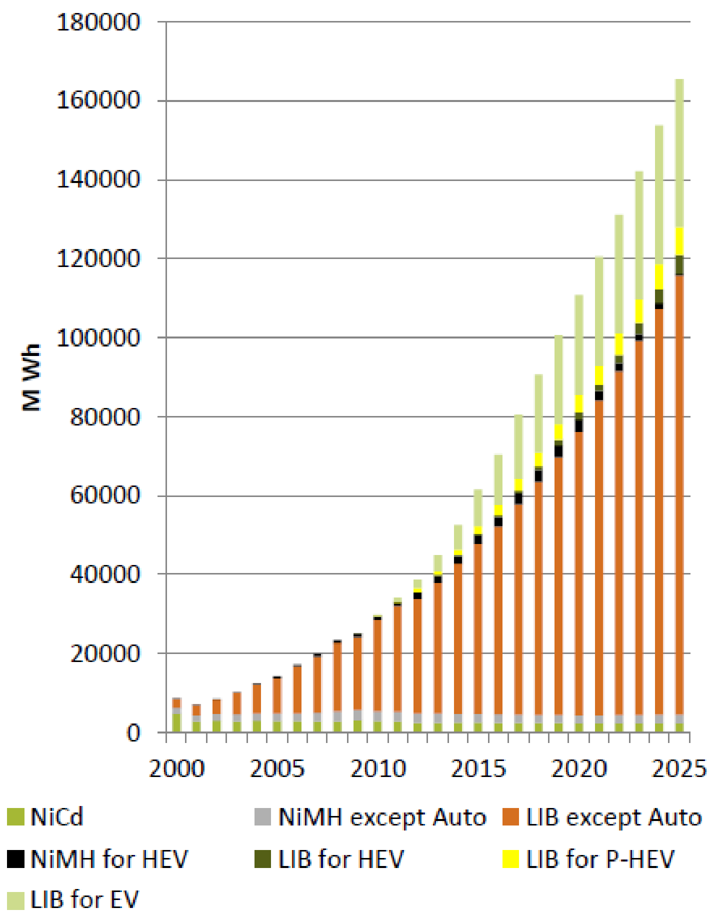
The first reason is simply that major corporations using lithium batteries in 3C (consumer devices, communication and computing) applications require a battery that has a long history and strong safety profile. Lithium batteries have undergone a long period of development, during which there were some well-publicized issues with fires and the like. With better data, enhanced manufacturing and inherently safer chemistries, lithium batteries have shown they are safe enough for modern use. But even with an overwhelming need for lithium battery performance as compared to, say, the nickel metal-hydride batteries that lithium has largely replaced, it has taken a very long time for lithium batteries to become ubiquitous. Lithium batteries were invented in the 1970s, they did not become ubiquitous for 30-40 years. New technology would likely face similar scrutiny, and would also have to contend with replacing a technology that is regarded as both adequate and safe.

The second reason, however, is one that reflects the realities of technology. An example is perhaps illustrative. In the very early part of this century, two major Japanese corporations announced a joint venture that would manufacture a new display screen, one that had the potential to displace LCD. This display would be thinner than LCD, provide superior image quality and better readability in sunlight, and also consume less electricity. But just a year later, they announced that the JV would be dissolved, and that display is now a technological curiosity. The reason for the dissolution of the JV was not the expected technical issues. The corporations behind the JV realized that to compete on price with LCD technology, which had already benefited from enormous scale effects, they would need to subsidize the price of the new screens to a point they simply could not afford. Yes, the new technology could ultimately overtake LCD on a cost per display basis, but both large corporations could not afford to carry the technology to that point. Any new battery technology wishing to supplant lithium ion will have to contend with massive production capability and a mature cost curve, as well.

Finally, we must realize that there are no substitutes for lithium in a number of the industries in which it is used. Lithium is an alkaline metal in the periodic table, and there are others. But trying to use, say, sodium in a lithium battery results in something that would not garner sales. Lithium batteries require lithium, nothing else. There are obviously other fundamental battery chemistries available, but who among us would want to return to plugging rechargeable nickel metal-hydride batteries into our cell phones and cameras? Or to the days of primary alkaline batteries?

Other areas of lithium use will contend with technological or material substitutes, as lithium prices continue to rise. And obviously there will be pressure on lithium producers to keep their prices down, even from battery manufacturers where it is relatively easy to show, as we have done, that rising lithium raw material prices should not be a major impediment to continued growth in battery use. All that said however, the following projections from Avicenne regarding lithium battery use to 2025 have been published:

Exhibit 1 – Rechargeable Battery Projections (excluding lead acid)



Source: Avicenne (2014)

We have used the above projections, plus our own analysis of the likely growth rates (or lack thereof) in other relevant industries, and derived the following projections for lithium demand to 2025:

Exhibit 2 – Lithium Demand Projections

	2013	% (2013)	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	% (2025)
Rechargeable Batteries	48,169	29%	57,822	68,705	79,588	91,606	104,287	116,211	129,271	142,425	155,674	169,869	184,254	49%
Ceramics	23,254	14%	24,859	26,574	28,407	30,367	32,463	34,703	37,097	39,657	42,393	45,318	48,445	13%
Glass-Ceramics	19,932	12%	21,307	22,778	24,349	26,029	27,825	29,745	31,798	33,992	36,337	38,844	41,525	11%
Greases	13,288	8%	13,633	14,042	14,506	14,970	15,419	15,882	16,358	16,849	17,354	17,875	18,411	5%
Glass	14,949	9%	15,338	15,798	16,319	16,841	17,347	17,867	18,403	18,955	19,524	20,109	20,713	5%
Metallurgical Powders	9,966	6%	10,654	11,389	12,175	13,015	13,913	14,873	15,899	16,996	18,169	19,422	20,762	5%
Polymer	8,305	5%	8,562	8,862	9,199	9,539	9,873	10,219	10,576	10,947	11,330	11,726	12,137	3%
Air Treatment	8,305	5%	8,562	8,862	9,199	9,539	9,873	10,219	10,576	10,947	11,330	11,726	12,137	3%
Non-rechargeable Batteries	3,322	2%	3,392	3,477	3,574	3,670	3,762	3,856	3,953	4,051	4,153	4,257	4,363	1%
Aluminum	1,661	1%	1,329	1,063	850	680	544	435	348	279	223	178	143	0%
Other	14,949	9%	15,338	15,798	16,319	16,841	17,347	17,867	18,403	18,955	19,524	20,109	20,713	5%
Total	166,100		180,796	197,347	214,485	233,100	252,653	271,877	292,682	314,052	**336,010**	**359,435**	**383,601**	
Available Supply	207,705		235,223	239,223	243,723	260,723	285,739	325,739	335,739	335,739	**339,358**	**339,358**	**384,358**	
Gap	41,605		54,428	41,876	29,238	27,624	33,086	53,862	43,056	21,687	**3,348**	**(20,078)**	**756**	

Source: Stormcrow (2015)

Those readers wishing for deeper insight into these projections are encouraged to find our lithium industry report, *Lithium-Strong Gets Stronger*, on our website (www.stormcrow.ca). The key point for our purposes here, however, is that even with supply remaining steady from the incumbent producers in Chile and Argentina, which may be an optimistic projection given a lack of momentum toward allowing expanded production by these firms in South America, steady output from the Greenbushes Mine in Australia, the new production from Orocobre and, in the future, production from Lithium Americas, Galaxy Resources and RB Energy (or whatever form RB takes following its CCAA process in Canada), there is simply not going to be enough production to satisfy all industries by the end of the period we have studied. The world requires more lithium.

That is not an insurmountable hurdle. Lithium is fairly common in the Earth's crust, but most of that lithium is fairly dilute. And most new uses of lithium require lithium in specific chemical forms, for cost-effective production. New types of battery cathode chemicals, as, for example, the lithium nickel aluminum cobalt oxide (NAC) batteries used by Tesla in their automobiles, are most cost-effectively manufactured using lithium hydroxide as a feedstock. Lithium hydroxide can be very expensive to produce from conventional brine operations, because those operations precipitate lithium carbonate as a final product, and the carbonate must then be chemically converted to hydroxide. It seems clear that new lithium production, targeting relatively inexpensive lithium hydroxide output, would be welcome in the marketplace.

However, this new lithium supply must become available within a reasonable time. We have only studied the period through to 2025, but it is clear that well before this end date, even with what we believe to be fairly conservative estimates regarding future demand from rechargeable batteries, the world will experience supply shortages. A new mining project can take 10 years to come to production, entering the market well after supply shortages have been experienced.

Fortunately, Nemaska announced the awarding of a positive federal environmental assessment decision by the Minister of the Environment on 30 July of this year. This is the most important permit in the development of a new mine, and the permit with the longest required lead time. The company expects that the matching Quebec Certificate of Acceptance will be issued near the end of August 2015. The only remaining major hurdle to construction is financing, so we will now turn our attention to why Nemaska merits financing and can become a profitable, major supplier of lithium hydroxide.

The New and the Old – Nemaska's Proposed Flow Sheet

Nemaska's Whabouchi Project is located in northern Quebec, about 300 km NNW of Chibougamau and perhaps 30 km east of the village of Nemaska. The project is divided by the Route du Nord, an all-weather gravel road connecting Chibougamau and Nemaska. The Nemiscau Airport is roughly 18 km west of the project site. We have traveled the Route du Nord and used the Nemiscau Airport, and are pleased to report that both greatly exceeded expectations. The Route du Nord highway may be a gravel road, but it is extremely well maintained and very wide, and the Nemiskau Airport handled our single-engine flight with ease, along with a large number of smaller and larger flights during the day.

Whabouchi represents a sizeable spodumene deposit. Nemaska's 43-101 DFS published in June 2014 provides the relevant details:

Exhibit 3 – Whabouchi Reserves (using 0.43% Li2O cutoff grade)

Measured	12.998 Mt @ 1.60%
Indicated	14.993 Mt @ 1.54%
Measured + Indicated	27.991 Mt @ 1.55%
Inferred	4.686 Mt @ 1.51%

Source: Nemaska Lithium

Globally, Talison's Greenbushes Mine in Australia represented the pinnacle of spodumene deposits. In 2011, Talison management revealed that the average grade they would mine in the next five years would be higher than 3.3%. Most other known deposits have an average grade clustering around 1%. While grade is not the only consideration in evaluating the potential economics of a spodumene deposit, in having a sizeable amount of material at nearly 1.6%, Nemaska's deposit is very impressive and worthy of further consideration.

Unfortunately, Whabouchi spodumene contains too large an amount of iron. Excessive iron in the spodumene means that the material cannot be upgraded and directly used as a technical grade concentrate by glass- and ceramic-makers. This is a shame, because there is significant current concern in the lithiated glass community regarding the timing of possible shortages of technical grade spodumene concentrates.

Exhibit 4 – Whabouchi Spodumene (the greenish crystals are spodumene)

Source: Stormcrow

However, the Whabouchi spodumene does occur in reasonably large crystals, which suggests strong potential for beneficiation. A good concentrate can then be leached and processed, to create a good chemical product.

Nemaska Lithium staff have developed a method to produce a very pure lithium hydroxide product. The process is a fairly straightforward one, given all aspects of the process are already used somewhere in the mining and hydrometallurgy industries:

1. Mining of spodumene ore
2. Physical beneficiation to generate mineral concentrate
3. Roasting of concentrate to 1,050 ^{0}C followed by flash cooling, to convert the concentrate
4. Mixiing the converted concentrate with sulfuric acid and baking at a temperature between 175 ^{0}C and 300 ^{0}C, producing lithium sulfate
5. Leaching with water to extract lithium sulfate
6. Primary cleaning to remove iron, aluminum, silicates, manganese and magnesium
7. Secondary removal of calcium, manganese and magnesium
8. Ion exchange to remove last traces of calcium and magnesium
9. Membrane electrolysis to convert lithium sulfate to lithium hydroxide
10. Extraction of lithium hydroxide by evaporation and crystallization of lithium hydroxide
11. Recovery of additional lithium from waste liquor in the form of lithium carbonate

We will discuss each step of the process below. It should be noted that from 2010 to 2012, the complete Nemaska process has been pilot tested at SGS Minerals in Lakefield, Ontario. SGS started with a 50 tonne representative sample of Whabouchi ore, and has run the entire process through to the synthesis of pure lithium hydroxide and pure lithium carbonate. Nemaska started to build its own technical team in 2013, and engineers are working full-time for Nemaska, at present. Over the past 24 months, the Nemaska technical team has conducted optimization work on every step of the process. This work has provided Nemaska with a significant body of knowledge that serves to de-risk the process. This has included validation of potential commercial-scale equipment, and the development of process parameters that should reduce the time required to ramp the Phase I plant.

1) Mining

The Whabouchi Mine will be operated for 50 weeks of every year, on an around-the-clock basis (two daily 12-hour shifts). As is necessary in the north, the two-week annual maintenance shut down will occur during goose hunting season, in the spring. The mining goal is to produce 1.1 million tonnes of ore per year, so the total of waste and ore moved annually can range up to 5.3 million tonnes in year 10. The mining is conventional open pit for the first 20 years of mine operation. Significant of the spodumene deposit outcrop at surface. It is only for the last six years of mine life that underground mining will be conducted.

Exhibit 5 – Whabouchi Outcrop (a small portion of exposed ore)

Source: Stormcrow

2) Physical beneficiation

Significant study has gone into the best method for generating a spodumene mineral concentrate. The chosen methodology is conventional by mining industry standards, benefiting from the relatively large spodumene crystals found in the deposit (as compared to other deposits, globally). Naturally, mineral beneficiation will occur at the mine site.

Nemaska originally tested flotation, which yielded strong results. The pilot tests disclosed in the company's DFS demonstrated that a concentrate grading 6.0% Li2O or better, with at least 77% lithium recovery in only 22% of the original mass, could be generated consistently. The flowsheet for flotation incorporates milling and screening, desliming, mica removal (which turns out to be very important in terms of generating the best concentrates), at least three stages of flotation and magnetic separation (to remove iron-bearing minerals and upgrade the concentrate).

In parallel, the company evaluated dense media separation (DMS) as a method to potentially reduce costs. DMS uses a suspension of very fine ferrosilicon powder in water, in which the lighter gangue minerals will float while the heavier spodumene sinks. The results of pilot testing were strong. A 3-stage DMS process was used, and recovery on the feed material, crushed and screened to 9.5mm by 0,5 mm, with all fines sent to the flotation circuit, was high.

The results of combining the two processes are that 54% of lithium is recovered by DMS, resulting in a 5.83% Li_2O concentrate after magnetic separation. Another 36% of lithium is sent to the flotation circuit, where 80% can be recovered. The final concentrate contains roughly 84% of all the lithium sent into the beneficiation circuit, with a grade of 6.0% Li_2O. With this hybrid approach, costs are minimized. The spodumene concentrate produced at the mine site will then be sent by rail to the hydrometallurgical plant, currently planned for Salaberry-de-Valleyfield, QC, just outside Montreal.

3) Roasting of concentrate

At the hydrometallurgical facility, the mineral concentrate is first roasted to 1,050 ^{o}C, which converts the natural crystalline form known as α spodumene to more reactive β spodumene. The hot mineral concentrate is then cooled quickly using air, reduced to a working temperature of less than 100 ^{o}C.

4) Mixing with H_2SO_4

The cooled mineral concentrate is then sprayed and mixed with 93% sulfuric acid. The β spodumene reacts with the H_2SO_4 and forms lithium sulfate, Li_2SO_4. Lithium sulfate is soluble in water, so leaching with water removes the lithium from the treated mineral concentrate. Pure aluminum silicate is also produced as an insoluble residue during this process, and is being investigated as a possible saleable byproduct by the company.

5) Water leaching

Leaching with water puts lithium sulfate in the treated mineral concentrate into solution. Unfortunately, sulfuric acid also reacts with, and allows liberation of, a variety of other metal contaminants such as iron, aluminum, silicon, manganese, calcium and magnesium. The critical step of membrane electrolysis is especially sensitive to a number of these contaminants, so to produce a very pure lithium final product, contaminants must be carefully removed from the leach liquor.

6) Primary Cleaning

The primary cleaning circuit introduces lime and air to the leach liquor, and precipitates virtually all the iron, aluminum and other metals, other than lithium, in solution. The precipitates are removed using a thickener and filter presses. The filter cake is disposed of in tailings while the cleaned leach liquor is sent to a second stage of purification.

7) Secondary Cleaning

Secondary cleaning involves a further increase in pH and additional precipitation of contaminants. Contaminants, primarily calcium and magnesium, will precipitate as carbonates, and will be removed using candle filters. The cleaned leach liquor, containing lithium and remaining small quantities of calcium and magnesium, is then sent to final cleaning by ion exchange.

8) Ion Exchange

A standard and widely available ion exchange (IX) resin, highly attractive to multivalent ions, will be employed to remove essentially all remaining traces of magnesium and calcium from the leach liquor. The technique used involves a standard 3-column circuit, in which one column is stripped and cleaned while two other columns are used as primary and backup cleaners. When the primary column is saturated, it is switched out of the circuit. The backup column now becomes the primary, and the previously cleaned column becomes the backup. Thus, the IX circuit can run continuously, and will produce an extremely pure lithium sulfate solution, suitable for membrane electrolysis.

9) Membrane electrolysis of lithium sulfate

Membrane electrolysis is a well-established industrial process. It is used widely in material processing globally. For example, very significant amounts of sodium hypochlorite, used for water disinfection, are made using membrane electrolysis. Membrane electrolysis is also used to produce ozone, hypochlorous acid and even chlorine dioxide, deployed in a number of industries. But the bread and butter of membrane electrolysis is the production of chlorine gas and caustic soda, or sodium hydroxide. Roughly 30% of the 48 million tonnes of chlorine produced annually around the world are made from the membrane electrolysis of salt (sodium chloride) solutions.

A modified version of the above is employed to produce lithium hydroxide from lithium sulfate, rather than from lithium chloride. Given that the process, designed by leading experts in membrane electrolysis, has passed extensive testing at pilot scale, we believe that the markets are significantly overestimating remaining technical risk.

10) Crystallization of lithium hydroxide

$LiOH \bullet H_2O$ crystals are now precipitated out of the post-electrolysis solution using, first, a mechanical vapor recompression falling film evaporator. This is a particularly technically involved way to describe a machine that evaporates water from a film of the solution, and uses a compressor to re-condense the liquid as it is drawn out of a low-pressure area. Heat from the condensing steam is used to either drive up the temperature of the film of solution, thus improving evaporation, or to heat up other process streams elsewhere in the process.

Once the solution is at higher density, it passes through two forced circulation crystallizers, a crude and pure unit. The crystals of lithium hydroxide monohydrate are separated from the liquor in a centrifuge, and are then dried in a rotary tray dryer before being bagged for shipment.

11) Production of lithium carbonate

The crystallization of lithium hydroxide does leave some lithium in solution. This lithium is largely removed using one of the best known chemical processes in the lithium industry, completed in a slightly different fashion than is normal, however. Normally, in the solar evaporation method to produce lithium, soda ash (sodium carbonate, Na_2CO_3) is added to concentrated brine and a chemical reaction occurs between the carbonate and lithium ions in solution to make lithium carbonate (Li_2CO_3). The resulting lithium carbonate is less soluble in water, and so it falls out of solution as a precipitate and can be removed by filtering.

In the Nemaska process, the same relative insolubility of lithium carbonate will be used, but the carbonate is produced by adding carbon dioxide gas from air to the liquor, along with heat from the crystallization of lithium hydroxide. The resulting lithium carbonate will then be filtered and removed, as normal.

Technically Driven – Management

The management team at Nemaska is clearly driven by a desire to see this project in production as soon as possible. Combining this drive with support from various levels of government within Quebec provides serious momentum for the Whabouchi Project.

Guy Bourassa (Director, President and CEO)

Mr. Bourassa earned a law degree from Université Laval in 1983, and was a member of the Quebec Bar from 1983 to October 2011. During his career as an attorney, he worked mainly with Quebec mining exploration firms. He has been Director and President of Radisson Mining Resources Inc. (November 1988 to June 1991), President and Director of Dufresnoy Industrial Minerals Inc. (May 1994 to November 1996), Corporate Secretary of Mazarin Mining Corporation (September 1991 to June 1994). Mr. Bourassa has served as Secretary and Director of Monarques Resources Inc., a mining exploration corporation, since February 2011, and was the President and CEO of Monarques from March 2011 to October 2012. From June 2004 to October 2007, he was President and CEO of T-Rex Vehicles Inc., a corporation specialized in the construction of three-wheeled vehicles. Mr. Bourassa has been President and CEO of Nemaska since inception in 2008, and was instrumental in identifying and acquiring the Whabouchi claims.

Steve Nadeau (CFO)

Mr. Steve Nadeau has held the CPA/CGA designations since October 1998. He was awarded a bachelor's degree in business administration from Moncton University in May 1991. Mr. Nadeau brings more than 20 years of experience in management, accounting and finance. Prior to joining Nemaska, he held several senior positions for companies which were either extracting or manufacturing products related to the granite industry, electronics and automotive field. Since 2011, Mr. Nadeau is also Chief Financial Officer of Monarques Gold Corporation, a junior mining company now focused on gold exploration projects in the Province of Quebec. He joined Nemaska and became CFO in 2008.

Jean-Francois Magnan (Technical Manager)

Mr. Magnan is a professional engineer with more than 20 years of experience in the metallurgical industry. During his career, he has held several positions within the lithium battery industry including those of R&D Advisor, R&D Project Manager, Consultant and Quality Control Metallurgist. Mr. Magnan was previously the Project Manager for Phostech Lithium Inc. (2000 to 2001). Mr. Magnan is the author/inventor of several patents in the rechargeable lithium battery field. He was awarded a Master's Degree in materials engineering from Laval University in 2000.

Michel Baril (Chairman)

Mr. Baril has been a member of the Ordre des Ingénieurs du Québec since June 1976. Since 2003, he has served on a number of boards of directors, including those of The Hockey Co. (June 2003 to June 2004), Groupe Laperrière & Verreault Inc., a corporation specializing in the fields of pulp and paper and water treatment (September 2004 to August 2007), Raymor Industries Inc., a corporation specializing in the production of metallic powder and carbon nanotubes (January 2005 to February 2009 and June 2009 to February 2010), and Komet Manufacturers Inc., a corporation specializing in the manufacturing of vanities and kitchen cabinets (June 2007 to September 2011). Mr. Baril is currently a Director of Imaflex Inc., a specialist in the manufacturing of polymer-based films (since April 2008) and of Monarques, a mining exploration corporation (since February 2011). He was appointed Chair of the Board of Directors of Monarques in March 2011. From June 1979 to November 2003, he held various administrative and senior positions with Bombardier Inc.

Money to be Made – Financial Analysis

There is a significant and growing demand for lithium (see Exhibit 2, above). More specifically, it is currently understood that lithium hydroxide is the feedstock of the future for battery cathode chemicals. Lithium hydroxide itself has a higher proportion of its mass in the form of lithium metal compared to lithium carbonate. However, lithium hydroxide is generally chemically combined with water, and ships in the form of lithium hydroxide monohydrate, $LiOH \bullet H_2O$.

We have previously published our price projections for technical and battery grade lithium carbonate, and lithium hydroxide monohydrate. These projections are based on historical pricing data from the Chinese market. Obviously, these prices include tariffs and taxes applicable to the Chinese market, but the Chinese market has historically been a sizeable portion of the global lithium industry, and we do not see that changing over the time period of our study, Gigafactories and similar discussions notwithstanding.

Exhibit 6 – Projected Lithium Prices

Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Price (USD/kg 99% Li_2CO_3)	\$ 5.89	\$ 6.22	\$ 6.26	\$ 6.12	\$ 5.57	\$ 5.86	\$ 6.42	\$ 6.90	\$ 7.52	\$ 6.97	\$ 7.53
Price (USD/kg 99.5% Li_2CO_3)	\$ 7.08	\$ 7.39	\$ 7.69	\$ 7.97	\$ 8.20	\$ 8.43	\$ 8.64	\$ 8.83	\$ 9.02	\$ 9.20	\$ 9.39
Price (USD/kg 56.5% $LiOH{\cdot}H_2O$)	\$ 7.08	\$ 7.39	\$ 7.68	\$ 7.96	\$ 8.19	\$ 8.42	\$ 8.63	\$ 8.83	\$ 9.02	\$ 9.20	\$ 9.38

Source: Stormcrow

We have previously determined that technical grade lithium carbonate prices depend most heavily on the gap between supply and demand for lithium, but battery grade materials depend most heavily on battery demand. Hence, we see volatility in the pricing for 99% lithium carbonate, as new producers enter the market. We see a more direct upward trend for the pricing of battery materials due to an almost inexorable upward trend in demand over the coming years.

We can therefore build a financial model for Nemaska that incorporates these projections. We incorporate the remaining 2% NSR payable to the discoverers of the relevant claims purchased by Nemaska, and the required $1 million payout to reduce the NSR from 3%. We also incorporate a 33% tax rate, but take into account an estimated $40 million in tax incentives that are relevant to the project.

We have also incorporated the impact of the building of a Phase I or Demonstration Plant into our model. Without a Phase I Plant, we would suggest that the company could commence building of its mine and beneficiation facility at Whabouchi in September of 2016, and the hydrometallurgical plant in Q3 of 2016. The hydrometallurgical plant would begin commissioning in Q1 of 2018, and we would estimate would take perhaps 24 months to reach nameplate production. With a Phase I Plant, the same production schedules would hold, except that $25 million would be required to build the Demonstration unit perhaps a full year ahead of the remaining capex requirement. However, while the hydrometallurgical plant would begin commissioning in Q1 of 2018, the experience gained in operating the Phase I Plant should result in a dramatically shorter ramp to nameplate production levels. The result is that at 19% discount rates, which we feel are appropriate to the project's remaining perceived technical risk as well as financial risk, the project without a Phase I Plant would be worth CDN$0.37 per share, while the project incorporating the Phase I Plant would be worth CDN$0.54 per share. Obviously, the construction of the Phase I Plant is preferred.

We have not taken into account the effective lower level of dilution suffered by the project post technology validation by the Phase I Plant. However, this is a further positive effect that suggests building the Phase I Plant is financially preferred.

The results from our analysis are shown below:

Exhibit 7 – Nemaska Lithium Financial Analysis (without Phase I Plant)

Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Capital Budget												
Equity			$ 208,500,000									
Debt			$54,292,605	$54,292,605	$54,292,605	$54,292,605	$54,292,605	$54,292,605	$54,292,605	$54,292,605		
Maintenance				$ 10,410,000	$ 10,618,200	$ 10,830,564	$ 11,047,175	$ 11,268,119	$ 11,493,481	$ 11,723,351	$ 11,957,818	
NSR Buy-Back				$ 1,000,000								
Revenue												
Annual Production LiOH (t)	-	-	-	8,000	15,000	28,000	28,000	28,000	28,000	28,000	28,000	
Market Price (USD/t)	$ 7,080	$ 7,390	$ 7,680	$ 7,960	$ 8,190	$ 8,420	$ 8,630	$ 8,830	$ 9,020	$ 9,200	$ 9,380	
Annual Production Li2CO3 (t)	-	-	-	900	1,600	3,200	3,200	3,200	3,200	3,200	3,200	
Market Price (USD/t)	$ 7,080	$ 7,390	$ 7,690	$ 7,970	$ 8,200	$ 8,430	$ 8,640	$ 8,830	$ 9,020	$ 9,200	$ 9,390	
Revenue (CAD)	$ -	$ -	$ -	$ 86,406,098	$ 165,817,073	$ 320,409,756	$ 328,400,000	$ 335,970,732	$ 343,200,000	$ 350,048,780	$ 356,936,585	
Revenue less NSR (CAD)	$ -	$ -	$ -	$ 84,677,976	$ 162,500,732	$ 314,001,561	$ 321,832,000	$ 329,251,317	$ 336,336,000	$ 343,047,805	$ 349,797,854	
Cost of Goods Sold												
Cost LiOH (CAD/t)	$ 3,450	$ 3,519	$ 3,589	$ 3,661	$ 3,734	$ 3,809	$ 3,885	$ 3,963	$ 4,042	$ 4,123	$ 4,206	
Cost Li2CO3 (CAD/t)	$ 4,190	$ 4,274	$ 4,359	$ 4,446	$ 4,535	$ 4,626	$ 4,719	$ 4,813	$ 4,909	$ 5,007	$ 5,108	
COGS	$ -	$ -	$ -	$ 33,291,156	$ 63,272,489	$ 121,457,721	$ 123,886,875	$ 126,364,613	$ 128,891,905	$ 131,469,743	$ 134,099,138	
Gross Margin	$ -	$ -	$ -	$ 53,114,941	$ 102,544,584	$ 198,952,035	$ 204,513,125	$ 209,606,119	$ 214,308,095	$ 218,579,037	$ 222,837,447	
Admin Expenses	$ 2,000,000	$ 3,000,000	$ 6,000,000	$ 6,120,000	$ 6,242,400	$ 6,367,248	$ 6,494,593	$ 6,624,485	$ 6,756,975	$ 6,892,114	$ 7,029,956	
Cash Flow Before Tax	$ (2,000,000)	$ (3,000,000)	$ (268,792,605)	$ (18,707,664)	$ 31,391,378	$ 127,461,618	$ 132,678,751	$ 137,420,910	$ 141,765,034	$ 145,670,967	$ 203,849,673	
Tax								$ 43,348,900	$ 44,782,461	$ 46,071,419	$ 65,270,392	
Cash Flow After Tax	$ (2,000,000)	$ (3,000,000)	$ (268,792,605)	$ (18,707,664)	$ 31,391,378	$ 127,461,618	$ 132,678,751	$ 94,072,010	$ 96,982,573	$ 99,599,548	$ 138,579,281	$ 415,737,843
Discount Rate	19%											
DCF	$ (2,000,000)	$ (2,521,008)	$ (189,811,881)	$ (11,101,424)	$ 15,653,899	$ 53,412,711	$ 46,721,804	$ 27,837,594	$ 24,116,707	$ 20,813,001	$ 24,334,851	$ 61,348,364
NPV	$ 68,804,618											
Cash	$ 2,500,000											
Debt	$ -											
FD Share Count	191,596,104											
Target	$ 0.37											

Source: Stormcrow

Exhibit 8 – Nemaska Lithium Valuation Model (with Phase I Plant)

Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Capital Budget												
Equity		$ 25,000,000	$ 208,500,000									
Debt			$54,292,605	$54,292,605	$54,292,605	$54,292,605	$54,292,605	$54,292,605	$54,292,605	$54,292,605		
Maintenance				$ 10,410,000	$ 10,618,200	$ 10,830,564	$ 11,047,175	$ 11,268,119	$ 11,493,481	$ 11,723,351	$ 11,957,818	
NSR Buy-Back				$ 1,000,000								
Revenue												
Annual Production LiOH (t)	-	-	-	14,000	28,000	28,000	28,000	28,000	28,000	28,000	28,000	
Market Price (USD/t)	$ 7,080	$ 7,390	$ 7,680	$ 7,960	$ 8,190	$ 8,420	$ 8,630	$ 8,830	$ 9,020	$ 9,200	$ 9,380	
Annual Production Li2CO3 (t)	-	-	-	1,600	3,200	3,200	3,200	3,200	3,200	3,200	3,200	
Market Price (USD/t)	$ 7,080	$ 7,390	$ 7,690	$ 7,970	$ 8,200	$ 8,430	$ 8,640	$ 8,830	$ 9,020	$ 9,200	$ 9,390	
Revenue (CAD)	$ -	$ -	$ -	$ 151,453,659	$ 311,658,537	$ 320,409,756	$ 328,400,000	$ 335,970,732	$ 343,200,000	$ 350,048,780	$ 356,936,585	
Revenue less NSR (CAD)	$ -	$ -	$ -	$ 148,424,585	$ 305,425,366	$ 314,001,561	$ 321,832,000	$ 329,251,317	$ 336,336,000	$ 343,047,805	$ 349,797,854	
Cost of Goods Sold												
Cost LiOH (CAD/t)	$ 3,450	$ 3,519	$ 3,589	$ 3,661	$ 3,734	$ 3,809	$ 3,885	$ 3,963	$ 4,042	$ 4,123	$ 4,206	
Cost Li2CO3 (CAD/t)	$ 4,190	$ 4,274	$ 4,359	$ 4,446	$ 4,535	$ 4,626	$ 4,719	$ 4,813	$ 4,909	$ 5,007	$ 5,108	
COGS	$ -	$ -	$ -	$ 58,370,685	$ 119,076,197	$ 121,457,721	$ 123,886,875	$ 126,364,613	$ 128,891,905	$ 131,469,743	$ 134,099,138	
Gross Margin	$ -	$ -	$ -	$ 90,053,901	$ 186,349,169	$ 192,543,840	$ 197,945,125	$ 202,886,704	$ 207,444,095	$ 211,578,062	$ 215,698,716	
Admin Expenses	$ 2,000,000	$ 3,000,000	$ 6,000,000	$ 6,120,000	$ 6,242,400	$ 6,367,248	$ 6,494,593	$ 6,624,485	$ 6,756,975	$ 6,892,114	$ 7,029,956	
Cash Flow Before Tax	$ (2,000,000)	$ (28,000,000)	$ (268,792,605)	$ 18,231,295	$ 115,195,963	$ 121,053,423	$ 126,110,751	$ 130,701,495	$ 134,901,034	$ 138,669,991	$ 196,710,941	
Tax								$ 41,131,493	$ 42,517,341	$ 43,761,097	$ 62,914,611	
Cash Flow After Tax	$ (2,000,000)	$ (28,000,000)	$ (268,792,605)	$ 18,231,295	$ 115,195,963	$ 121,053,423	$ 126,110,751	$ 89,570,002	$ 92,383,693	$ 94,908,894	$ 133,796,331	$ 401,388,992
Discount Rate	19%											
DCF	$ (2,000,000)	$ (23,529,412)	$ (189,811,881)	$ 10,818,739	$ 57,444,627	$ 50,727,361	$ 44,408,934	$ 26,505,369	$ 22,973,101	$ 19,832,810	$ 23,494,953	$ 59,230,975
NPV	$ 100,095,576											
Cash	$ 2,500,000											
Debt	$ -											
FD Share Count	191,596,104											
Target	$ 0.54											

Source: Stormcrow

The result of our financial analysis is that we believe the correct target value for Nemaska Lithium shares is CDN$0.54, using a long-term conversion rate of CDN$1.00 = USD$0.82. De-risking the project further, especially with respect to sourcing the required financing, would result in use of a far lower discount rate. We have included the following table to illustrate the impact:

Exhibit 9 – Target Value for Nemaska Lithium (with Phase I Plant) vs. Discount Rate

Discount Rate	Target (CDN$/share)
22%	$0.33
19%	$0.54
16%	$0.81
13%	$1.17
10%	$1.63

Source: Stormcrow

Lithium of the Future – Conclusions

The lithium battery industry is growing rapidly, especially in terms of GWh of energy storage. While the average investor seems to be seeking this growth in the form of electric vehicle and grid storage batteries, there is also very strong growth happening now in the form of the batteries for computing, communications and consumer devices. But in addition to battery demand, the use of higher levels of lithium in the high-performance glass that increasingly surrounds us is also driving substantial demand for particular types of lithium.

This growing battery demand, in combination with general economic growth, is very likely to result in shortfalls of material unless significant additional supply is brought into the market. Even with new supply from Orocobre, Lithium Americas, Galaxy Resources and from the mine and assets previously operated as RB Energy, the supply balance by the end of this decade is severely strained.

Nemaska Lithium has the potential to bring a new supply of lithium hydroxide to the market, in a timely way owing to the recent positive determination regarding the company's federal environmental assessment. This supply will come from a hard-rock source, minimizing the time and commercial risk between mining and commercial availability. In a period when batteries are an increasingly critical part of the final product, being able to minimize the risk of production delays in raw materials such as lithium will obviously prove to be valuable.

We have conducted an investigation into the technology planned for deployment by Nemaska, and have concluded that the technical and financial risks faced by the company are reasonable. We believe that this level of risk is properly reflected by a using a 19% discount rate in appropriate financial models. On this basis, we believe that the correct target value for Nemaska shares is CDN$0.54, considerably above the current trading range. We are initiating coverage on Nemaska with a Positive recommendation.

Keywords

Industry	Lithium, Batteries, Critical Materials, Mining, Industrial Minerals, Borosilicate
Relevant Companies	Lithium Americas – TSX:LAC Orocobre Limited – TSX:ORL, ASX:ORE Tesla Motors – NSDQ:TSLA Sichuan Tianqi Lithium – SHE:002466 Western Lithium – TSX:WLC Jiangxi Gangfeng Lithium: SHE:00 2460 Nemaska Lithium Inc. – TSXV:NMX Critical Elements Corp. -- TSXV:CRE Neometals Ltd. – ASX:NMT Bacanora Minerals – TSXV:BCN Galaxy Resources – ASX:GXY Sociedad Quimica y Minera de Chile (SQM) – NYSE:SQM Albemarle Corporation --- NYSE:ALB FMC Corp – NYSE:FMC Houston Lake Mining – TSXV:HLM Altura Mining – TSXV:AJM Cobre Montana – ASX:CXB
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