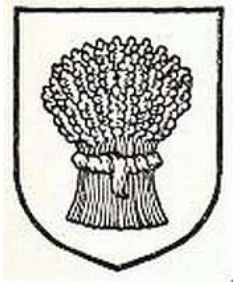
Tuesday, December 7, 2021



HALLGARTEN & COMPANY

Coverage Update

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Manganese X Energy

(TSX-V: MN, FSE: 9SC, OTCQB: MNXXF)

Strategy: Long

Key Metrics		
Price (CAD)	$	0.285
12-Month Target Price (CAD)	$	0.75
Upside to Target		163%
12 mth low-high		$0.17-$1.04
Market Cap (CAD mn)	$	35.5
Shares Outstanding (millions)		124.5
Fully Diluted		155.0

Manganese X Energy

Momentum Regained

- + The battery space has lifted off again since 2020, after a period of quiescence after the enthusiasm of 2017
- + Increasing sophistication (and education of) investors is filtering through that the battery revolution is about more than just Lithium & Cobalt, with increasing attention being paid to the critical roles of Manganese, Nickel, Fluorspar, Tin, Vanadium and Antimony
- + Maiden resource on Battery Hill came out in July signaling 34.86 million tonnes of Measured and Indicated mineral resources grading 6.42% Mn, plus an additional 25.91 million tonnes of Inferred mineral resources grading 6.66% Mn
- + Sensitivity analysis, utilizing a cut-off grade of 7% Mn, indicates 12.25mn tonnes of Measured & Indicated mineral resources at 8.77% Mn and 10.61mn tonnes of Inferred mineral resources grading 9.05% cent Mn,
- + Spin-out of Graphano Energy business has given shareholders a "payday" in the short term
- + Manganese Flake prices have soared over the last twelve months reaching levels not seen since 2010
- + Electrolytic Manganese (EMM) production outside China is minimal providing an opportunity for Manganese X to become one of the few Western players in EMM
- × Project is early stage therefore priority will be publishing a PEA and proving up the potential for production
- × Chinese dominate the EMM space and can move the price up (or down) at will

Cobalt's Loss is Manganese's Gain

If the Virus Crisis has been the cause of one positive development, it is the wake-up call on China-dependency in the West (and the non-Chinese) East. The Japanese and Koreans were already mightily concerned and quietly weaning themselves off *Mother China*, but the West naively believed that "Peking will provide". Without a single gunboat having sailed the realization has now set in that the West is vulnerable. Action is afoot to start the process of asserting resource independence from the all-embracing grip of the Panda.

With no current supplies of Manganese in the US or Canada, and battery-grade Manganese processing capacity held in a headlock by the Panda, the US ambitions in the EV space are essentially at the mercy of taking whatever scraps the Chinese feel inclined to sweep off their table. The US is reduced to the status of a Manganese scavenger unless it has access to not only non-Chinese sources of ore (which it has in Gabon and South Africa…. for now) but also, and more importantly, regional Manganese Sulphate

($MnSO_4$) sources.

With the strategic stockpile starting to rebuild holdings of EMM, for the first time since 2004, there is clearly rising concern in Washington. It needs more though than just ferreting away a few months' worth of consumption. It needs a complete North American supply chain.

Solutions that involved Electrolytic Manganese Dioxide (EMD) open up the interesting possibility that EMD, the production of which is currently dominated by China, might be tempting as an alternative within China in light of that country's lack of guaranteed Cobalt supplies.

In terms of environmental and cost considerations, EMM/EMD is likely to maintain its advantages as an energy material for the future generation, as it has been in recent decades.

It is into this void that Manganese X seeks to move and it has been directing its attentions towards developing its Battery Hill project, while also evolving technologies to enhance recoveries and processing of the ore.

In this note we shall review the most recent developments and strategy evolution at the company over the last twelve months.

The Back Story

Manganese X has been around since a decision in the second half of 2016 to focus on Electrolytic Manganese for battery usages.

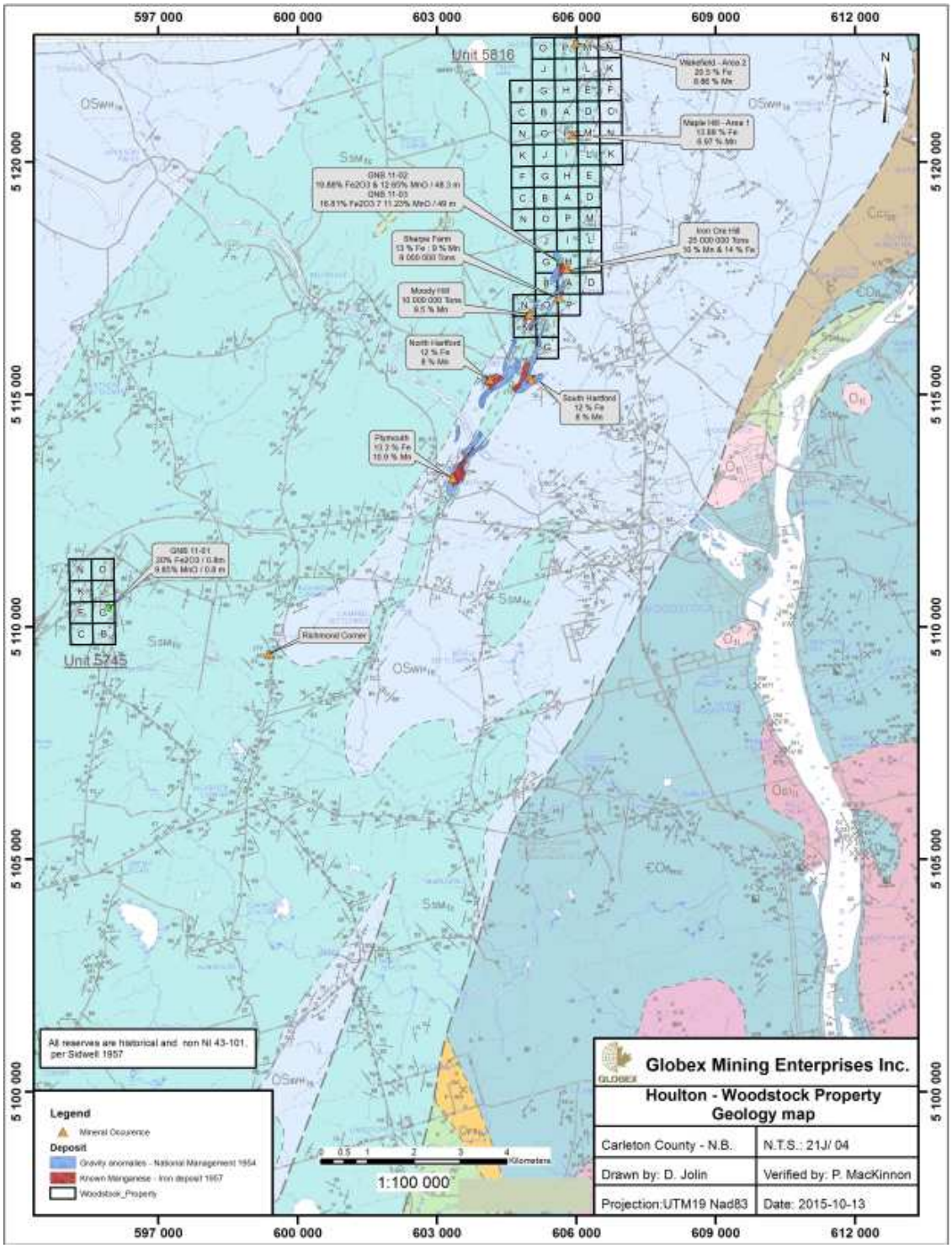
The company's main project is the Houlton Woodstock Manganese prospect (renamed Battery Hill) in New Brunswick. It optioned this property from the project generator, Globex Mining (GMX.to). Manganese X acquired a 100% interest in the property subject to a 3% Gross Metal Royalty.

Battery Hill

The property covers a significant portion of the known historic Manganese-bearing horizon(s) in an area approximately 6.3km northwest of the town of Woodstock, southwestern New Brunswick.

Subsequent to Manganese X obtaining the asset from Globex, the project has grown to be comprised of Mineral Claim 5816 and Mineral Claim 5745 (63 claim units in total) that cover approximately 1,407 hectares of surface area. Both mineral claims (shown in the map on the following page) are 100% owned by Manganese X.

The USA-Canada border is approximately 12 kilometres west of license 5816. Route 95, a twinned highway running from Woodstock to connect to the US interstate I-95 highway, is located approximately 3 km south of the claims.



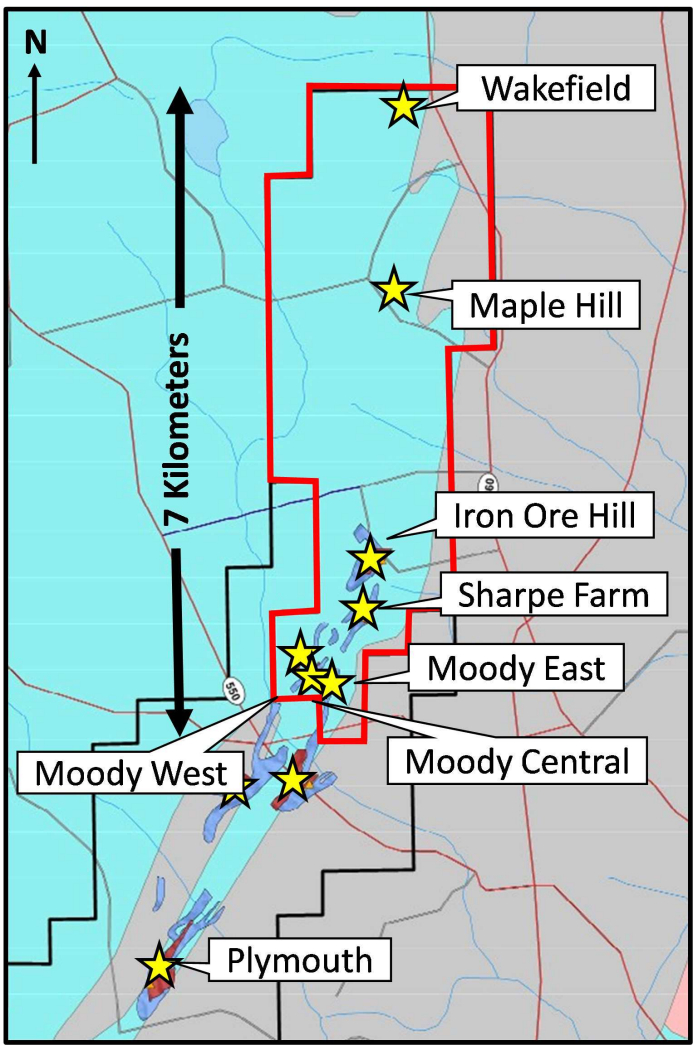
Geology

Iron and Manganese are considered to have been deposited from seawater in an oxidizing environment

and host strata have subsequently been structurally thickened through folding and faulting related to the Acadian Orogeny (middle to early Late Devonian in age). Some subsequent remobilization of Manganese has occurred and resulted in re-deposition of Manganese carbonate and oxides along the strata and in fracture zones.

The regional geology is dominated by the Smyrna Hills Formation of the Perham Group, which consists of shales, silty shales and associated ferro-manganiferous siltstone, calcareous shale and sandstone, limestone and conglomerate. The mineralization occurs in banded iron formation consisting of an interlayered sequence of Manganese oxide, Manganese-carbonate-silicate oxide shales and silty shales. The Manganese-iron mineralization occurs in tightly folded, northeast striking, steeply northwest dipping and plunging lenses that are occasionally overturned. Evidence of the structure is visible at the historic workings at Iron Ore Hill, where some of the rare outcrops occur.

The Woodstock manganiferous banded iron formations (BIFs) are known to be one of the largest Mn resources in North America and were mined as a source of iron from 1848 to 1884. Six major ferro-manganiferous bodies were identified by gravimetric surveys (circa 1954). The strike of these BIF's extends from Jacksontown to Plymouth, western New Brunswick, and similar deposits are known to occur nearby in Maine.



Three of the main historic Manganese occurrences plus at least two additional showings are located on claims of license 5816. Starting from the south, the Moody Hill occurrence was reported in 1957 by Sidwell (the area manager of Stratmat, that held the project at that time) to contain an estimated 9,072,000 tonnes, the Sharpe Farm occurrence an estimated 7,257,000 tonnes and the Iron Ore Hill occurrence 22,680,000 tonnes, all of an estimated average grade of 13% iron and 9% Manganese. These estimates are obviously not NI43-101 compliant.

North of the Iron Ore Hill occurrence approximately 2 kilometres, the Maple Hill

showing is reported to have grades of 13.9% iron and 6.97% Manganese. Located a further 1.5 kilometres north of the Maple Hill showing, at the far northern end of license 5816, the Wakefield Showing is reported to have tested 20.9% iron and 8.86% Manganese.

Additionally, the North and South Hartford occurrences, which are located near south end of license 5816, may be a continuation of the Moody Hill occurrence; however there is little exploration in this area. There appears to have been little or no exploration done in this area with the exception of the 1950s gravity survey.

In 2011 two diamond drill holes were collared in the area of Iron Ore Hill to test at depth near the historic workings. Sampling from wide intervals of this mineralization returned assays greater than 11% MnO and 16% Fe2O3. Manganese is understood to be primarily contained in the mineral rhodochrosite, a carbonate, along with several other minor Manganese minerals.

As a result of the considerable widths of iron and Manganese-bearing material encountered Globex ordered a magnetometer survey of the claims later in 2011. The geophysical results led to expansion of the Globex property to its current 63 claim configuration. The magnetic survey determined there is a large anomalous region centered roughly on the Iron Ore Hill area and a region of slightly more scattered magnetic anomalies trending to the south-southwest from Iron Ore Hill toward the North Hartford area as well as smaller, weaker anomalies trending to the north-northeast of the Iron Ore Hill area towards the Jacksontown area.

The mineralization is interpreted to be hosted by a folded sedimentary sequence with several horizons of Manganese mineralization. Due to the wide spaced drilling, the true widths of the mineralization intersected in the drill program have not been defined by previous campaigns. Further drilling is being undertaken to accurately interpret potential folding and true thicknesses.

Exploration Results under Manganese X

Since Manganese X acquired the Battery Hill project it has completed gravity and magnetometer ground geophysical surveys, three programs of core drilling that total 53 holes (9697m) plus a robust program of metallurgical investigation.

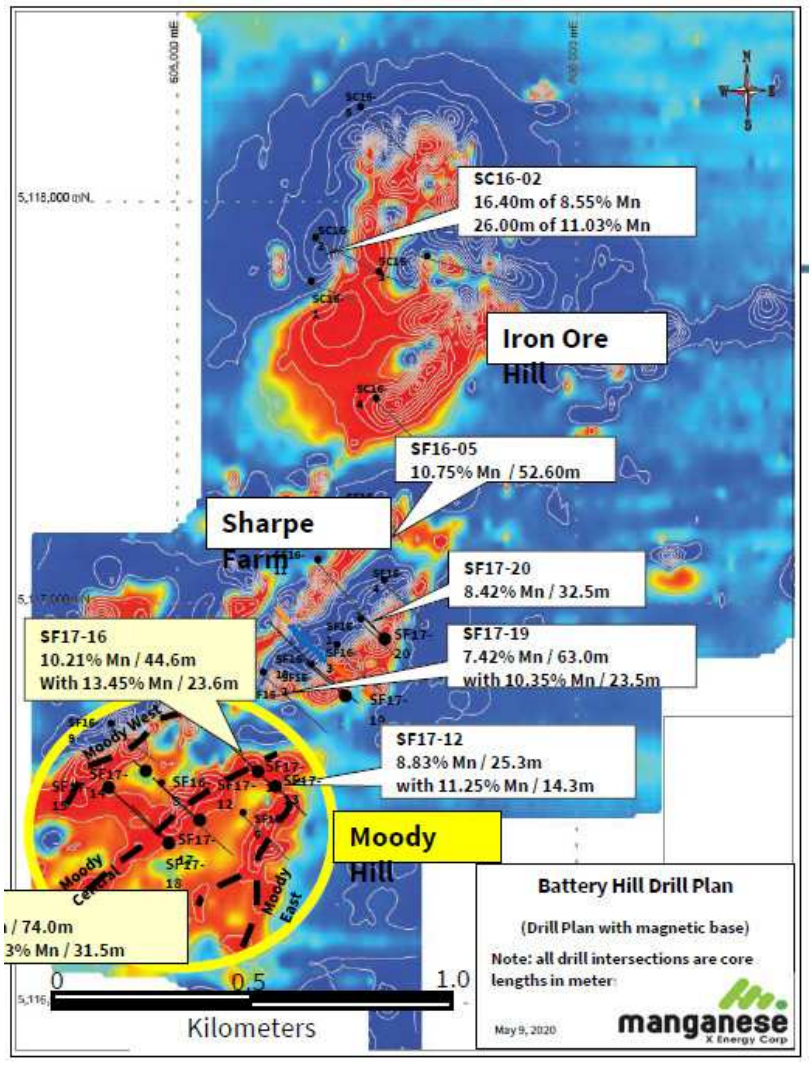
In mid-February 2017 the results from the first diamond drill program were released. That program consisted of 16 holes totaling 3,589 meters, and was designed as an initial evaluation of three historic Manganese occurrences on the property (Iron Ore Hill, Sharpe Farm and Moody Hill). In addition, the drill program provided core samples for metallurgical testing.

Five holes totaling 1,051 m were completed in the Iron Ore Hill sector of the property and eleven holes totalling 2,538 m in the Sharpe Farm/Moody Hill sector. Drilling was completed over a 1.8 km strike length of the prospective Manganese occurrence trend. During the drill program, emphasis was placed on the Sharpe Farm - Moody Hill sector.

The initial drill program, consisting of wide spaced drill holes, has confirmed significant widths of near surface Manganese mineralization over a strike length of approximately 1.5 km. Some truly surprising intersection widths of up to 87.7 m (287.7 ft) and MnO grades of up to 21.5% were encountered.

Based on those drill results the company was reassured that the mineralization showed good continuity and had been intersected from surface to vertical depths of 115 meters. Mineralization remained open to depth and along strike.

In 2017, the company completed nine diamond drill holes totaling 1,599 m of NQ-sized core on the Sharpe Farm and Moody Hill target areas. The program was designed to further delineate, expand, and improve the structural understanding of the significant Manganese mineralization identified during the 2016 drilling program. Due to the widely-spaced drilling of the initial 2016 drill program, further drilling was required to accurately interpret potential folding and true thicknesses. The objective was to confirm the structural interpretation of the folded sedimentary sequence that had been established to host several horizons of Manganese mineralization over a 1.8 km strike length.



In 2020, Manganese X completed 28 additional diamond drill holes totaling 4,509 m of NQ-sized core on the Moody Hill target areas. The drilling program was designed to further delineate,

expand, and improve the structural understanding of the iron-Manganese mineralization on the property.

The Metallurgy Project

In early 2017 the company announced that it had entered into development of a process to produce a Manganese concentrate to be utilized for production of EMM. The company was in contact with various government agencies for financial assistance to augment the current program which includes a metallurgical concept study on EMD metallurgy processes.

As part of this development the company had sent two batches of core samples from the Iron Ore Hill zone to SGS at Lakefield, Ontario. SGS have performed QemScan testing (Quantitative Evaluation of Minerals by Scanning Electron Microscopy) ion the samples. SGS also undertook chemical analysis of the samples enabling the company to measure in microns the various percentages of other minerals present on its property.

Concurrent with the QuemScan testing, Manganese X Energy's metallurgical team began to assess the viability of integrating and upgrading specific processes such as flotation, gravity, magnetic and electrostatic separations, as well as, ore sorting techniques to produce high grade Manganese concentrate while separating other minerals efficiently.

The first metallurgical programs consisted of diagnostic leach testing carried out by Kemetco and KPM to determine the achievable Manganese extraction, investigate the leach kinetics of the major leachable elements and to measure the acid consumption for the main types of mineralization on the property (Red, Grey and Mixed). The test results were encouraging, with the best Manganese extraction results exceeding 95%.

Resource

First it should be noted that management's objective is potential future development through low cost open pit mining.

In early July 2021, the company announced the maiden Mineral Resource Estimate for the Battery Hill project, which was prepared by Mercator Geological Services Limited. The estimated mineralized ore was 34.86 million tonnes of Measured and Indicated mineral resources grading 6.42% Mn, plus an additional 25.91 million tonnes of Inferred mineral resources grading 6.66% Mn.

The mineral resource estimate utilized a 2.5% Mn cut-off grade that reflects total operating costs having "reasonable prospects for economic extraction." Mineral resources are defined within an optimized pit shell with average pit slope angles of 45^{o} and a 3.7:1 strip ratio.

Pit optimization parameters were:

- Pricing of US$1500/tonne for High Purity Manganese Sulphate Monohydrate – 32% Mn

(HPMSM – 32 %)

- an exchange rate of CAD$1.30 to US$1
- Mining costs at CAD$6.50/t
- Combined processing and G&A costs (a 1,000 tpd runrate) at CAD$86.22/t processed
- Process recovery of Mn to HPMSM of 65%

Iron (Fe) content was not included in the pit optimization.

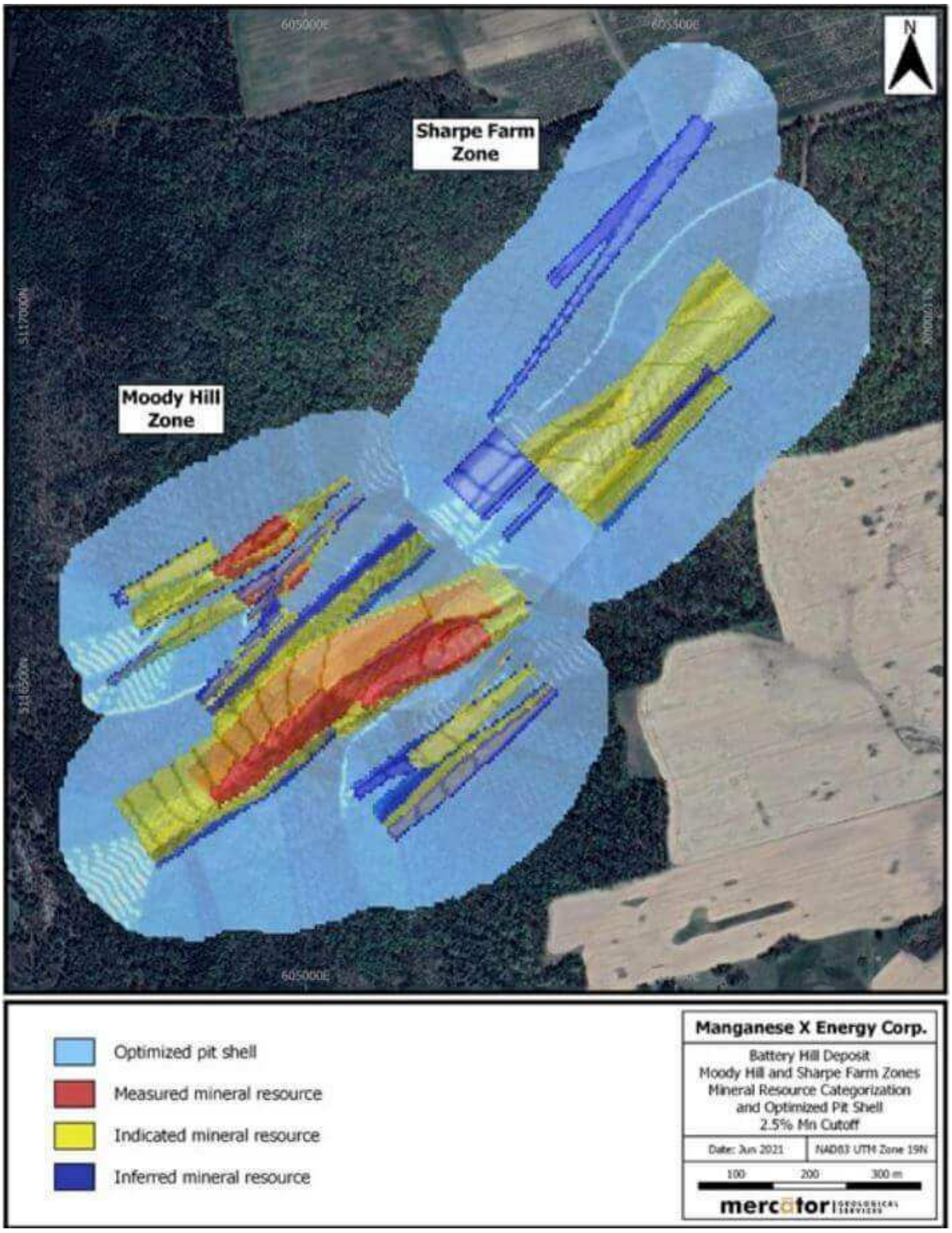
Battery Hill Resource

Cut-off 2.5% Mn

Category	Ore - Tonnes	Grade - Mn %	Grade - Fe %	Contained Mn - Tonnes
Measured	11,260,000	6.75	10.96	760,050
Indicated	23,600,000	6.26	10.53	1,477,360
Total M&I	34,860,000	6.42	10.67	2,238,012
Inferred	25,910,000	6.66	10.92	1,725,606

The Battery Hill Deposit is comprised of the Moody Hill, Sharpe Farm, and Iron Ore Hill Zones. On a contained tonnage basis the Moody Hill, Sharpe Farm, and Iron Ore Hill Zones comprise approximately 56%, 29%, 15%, respectively, of the Battery Hill Deposit mineral resource. The Moody Hill and Sharpe Farm Zones, just a few hundred meters apart, contain all of the Measured and Indicated mineral resources for the Battery Hill Deposit.

Operating costs applied in the pit optimization reflect an innovative processing flow sheet designed by Kemetco Research.


605000E
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Sharpe Farm Zone
Moody Hill Zone
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Optimized pit shell
Measured mineral resource
Indicated mineral resource
Inferred mineral resource
Manganese X Energy Corp.
Battery Hill Deposit
Moody Hill and Sharpe Farm Zones
Mineral Resource Categorization
and Optimized Pit Shell
2.5% Mn Cutoff
Date: Jun 2021
NAD83 UTM Zone 19N
100
200
300 m
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Technology

As mentioned, Kemetco has designed a processing flow sheet with the process focused on production of 99.95 % High Purity Manganese Sulphate Monohydrate (HPMSM) for the EV and back up energy storage sectors. This innovative process will produce HPMSM that will be devoid of selenium, the bane of some 98% of current producers.

Next Steps

With a large defined inventory of Measured and Indicated mineral resources the company intends to ramp up now to the Preliminary Economic Assessment stage. We would anticipate this to come out in the first half of 2022.

The upcoming drill program is directed towards converting more of the Inferred resource to Indicated status on the Sharpe Farm targets. It is not expected that the pit-shell design will be expanded at this time.

Once the PEA is in hand the next target in view will be to move to a PFS, which will involve the creation of a reserve. Most likely further drilling will be required to achieve this.

Financing

In mid-February of 2021, Manganese X completed a non-brokered private placement offering with gross proceeds of CAD$1,636,210 through the issuance of up to 4,958,212 units at a price of $0.33 per unit. Each unit is comprised of one common share and one common share purchase warrant (exercisable into one common share at a price of $0.44 per share until the 11th of February 2023).

Manganese – The Road Less Travelled in Battery Metals

The pace of change in the battery space has shifted up a few gears since a small group of developers moved into the Manganese space in 2016/7. Lithium plays first proliferated (and then came tumbling back to earth) and then Cobalt became the word on everyone's lips as the Cobalt crisis moved into centre stage and focusing minds on supply issues in the battery space. Manganese was regarded as the worry-free component of the Lithium Ion Battery formulations, however this ignored the fact that there is almost no production of the metal in North America, outside of Mexico's Autlan.

Since 2017 the metal has received heightened attention for its potential to reduce the Cobalt component in various battery types using that metal via the rebalancing of the relative weightings of elements in the battery cathode formulations, particularly Nickel/Cobalt/Manganese in NMC batteries.

A Blizzard of Technologies

Battery technologies have been proliferating in recent years like mushrooms after the rain. Despite this there are batteries and batteries. Many of the newly invented storage devices have specific usages and

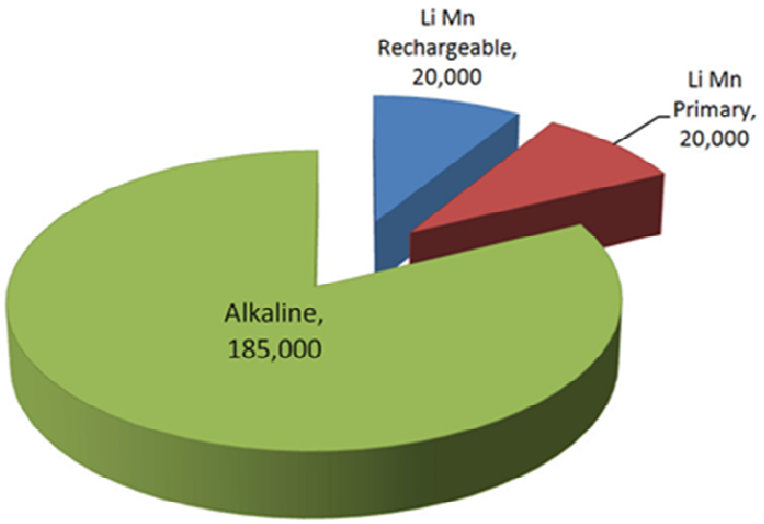
one new application is not necessarily a replacement for an existing type of battery. Unfortunately most parents still have reason to curse the ubiquitous *Double A* batteries that have long powered Christmas gifts for children and never seemed to have an up-to-date, cost-effective or long-lasting alternative.

Manganese Usage in Batteries

We should start by noting that Manganese is currently employed in that most prosaic of battery formats, the alkaline battery (think AA or AAA). There is nothing new in that but it does provide a constant demand for Manganese and has done for over half a century. It is also one in which little effort goes into the recycling of the Manganese metal in batteries.

The cutting edge application is the Lithiated Manganese Dioxide (LMD or LMO) Battery. The Lithium-Mn oxide spinel is a relatively new material with some proposing that, the ongoing expansion of the EV market may rely on its greater use in rechargeable batteries. LMO batteries are associated with good structural stability, low-cost and good electronic and lithium-ion conductivity. With growing concern over the safety and viability of other cathode designs spinels based on $LiMn_2O_4$ are growing in popularity as cathode materials.

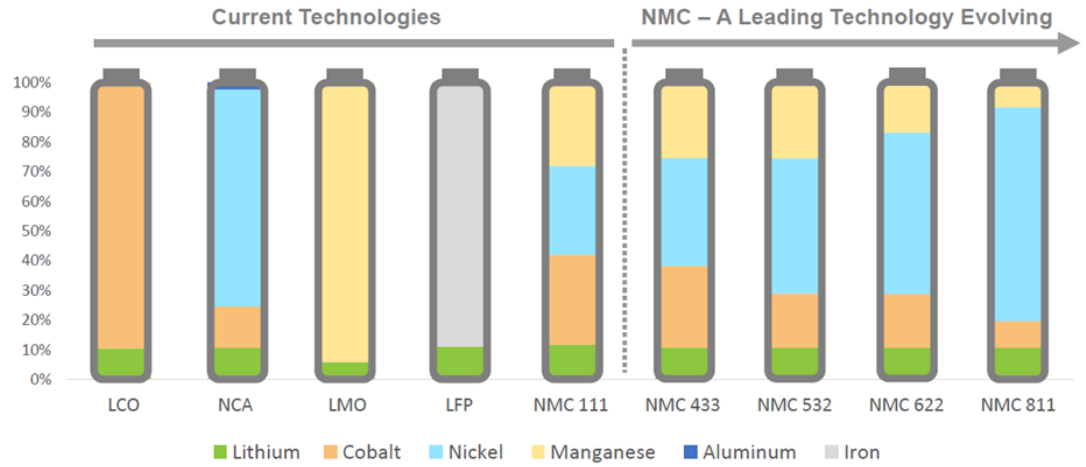
The standard mix of LMD used in batteries contains 4% Lithium, 61% Manganese and 35% oxygen by atomic weight. The attractions of this format are that LMD has high power output, thermal stability and enhanced safety when compared to other lithium ion battery types. For these reasons LMD batteries are used in the Chevy Volt and Nissan Leaf. Research at the University of Illinois has achieved an advanced prototype battery, using Lithiated Manganese that can be recharged in as little as two minutes (equivalent to filling a gas tank).



The Chinese market is currently heavily weighted towards the Lithium iron phosphate (LFP) battery formulation with little to no Cobalt involved. However, Manganese is a key ingredient in the cathodes of two of the most prominent up and coming electric vehicle battery types: the nickel-Manganese-cobalt (NMC) battery, and the LMD/LMO battery.

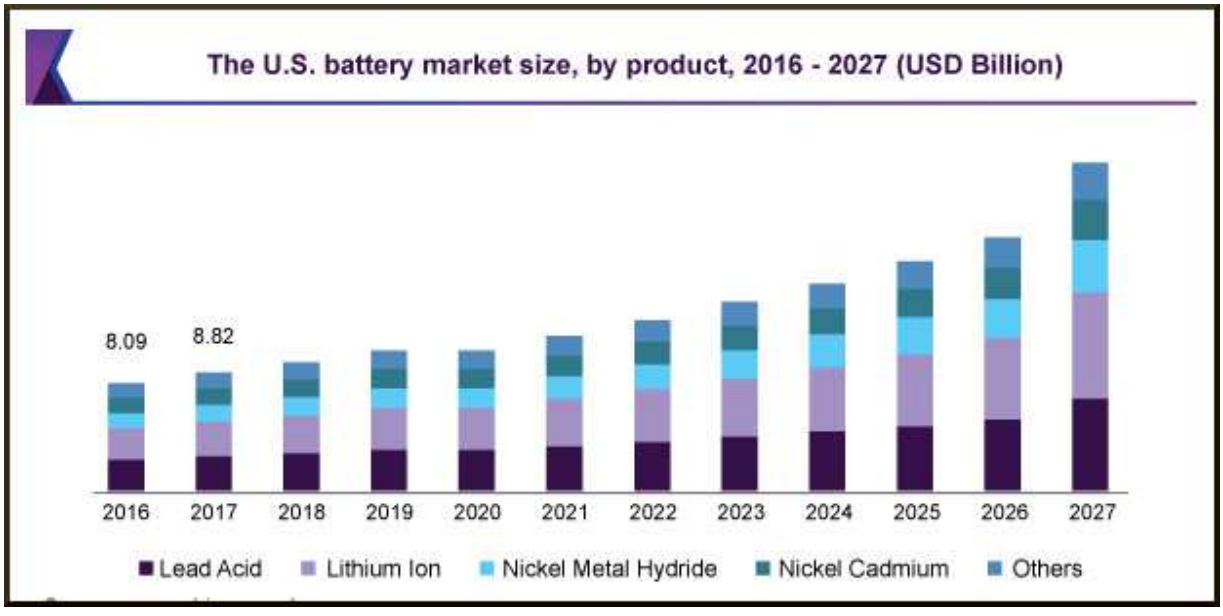
As the cathode markets develop toward NMC, it is felt by many observers that the LFP format favored by Chinese manufacturers, with lower suitability for electric vehicles will lose market share. Current

NMC ternary lithium-ion batteries from South Korean and Japanese makers typically employ a ratio of 60% nickel to 20% Manganese, and 20% cobalt (6:2:2), but as that ratio moves to 8:1:1 in 2018 and beyond, the cathode is a key element in achieving vast cost efficiencies. Currently though other formulations such as 5:2:3 and 1:1:1 have higher global markets shares than those favoured by the Japanese and Koreans.



Source: HIS Markit

Below one can see the rising of projected usages of different battery types in the United States alone:



Source: Grand View Research

The U.S. battery market size was valued at USD$10.49bn in 2019.

The LiB Format – Flawed but Entrenched

The shortcomings of Lithium Ion batteries are becoming more and more evident by the day. As if the travails of the Samsung Galaxy Note 7 were not enough there is a rising tide of frustration with the chargeability (or lack thereof) with the most common example of LIBs, namely in mobile phones. With rising usage (in terms of minutes and hours spent online) and ravenous apps continuing to operate even when a phone is not being actively used, the batteries are lasting ever shorter amounts of time and necessitating that users carry back-up power packs or spend their lives in search of "somewhere to plug in". If this is the future it looks very fraught and grim.

The die has already been cast though with regards to the type of battery that will go into the next few generations of EV and HEVs. It would be too expensive and disruptive for Western car makers to execute a *volte face* away from LiBs. However as applications proliferate, so do technologies. Prominent amongst these are batteries utilizing Manganese as a key component.

Collateral Advantages from the Cobalt Crunch

The pace of change in the battery space has quickened since the red-hot days of 2017/18, with Lithium plays dividing into the "serious" and the "non-serious" and the Cobalt crisis moving into centre stage and focusing minds on supply issues in the battery space, particularly as regards the "blue" metal. The price of Cobalt soared above 2008 levels and even breached $60 per lb. Despite a plethora of Cobalt wannabes appearing on the scene, the talk in markets was of an imminent supply crunch in absolute terms that might precipitate rationing by price and possible switching to other elements.

While there is no direct "switch" out of Cobalt into other metals there are patents out there for other technologies, both currently employed and theoretical, that employ other metals and minerals such as Manganese (Lithiated Manganese Dioxide batteries), Titanium (Lithium Titanate batteries) and Antimony/Magnesium (Molten Salt batteries), Vanadium (Vanadium Redox Flow batteries) and in other metals. Arguably, the Lithium Ion battery that looks to be a favorite amongst EV makers is the NMC (Nickel Manganese Cobalt) battery which can be produced in a range of ratios of these three elements. Current emphasis is on producing cathode chemistries with lower cobalt content like the (1-1-1), (5-2-3), and (6-2-2).

Conventional wisdom has it that battery manufacturers, particularly in the HEV/EV sphere, are committed to Lithium Ion batteries and will pay through the nose rather than retool or adapt. However, if there is a Cobalt shortage in absolute terms or supply becomes highly irregular then they may not have any choice but to consider changes in battery formulations that attempt to minimize the Cobalt component.

Battery chemistries that rely on higher percentage of Manganese at the expense of Cobalt open up the interesting possibility that EMM/EMD, the production of which is currently dominated by China, might

be tempting as a strategic choice within China in light of that country's lack of guaranteed Cobalt supplies.

Electrolytic Manganese Dioxide (EMD)

There are two primary forms of Electrolytic Manganese: Electrolytic Manganese Metal (EMM) and Electrolytic Manganese Dioxide (EMD). EMD is the critical component of the cathode material in alkaline, Lithium Ion, and sodium batteries. It is also important in electrochemical supercapacitors and hydrogen production.

Electrolytic Manganese is a refined Manganese product created through the purification and electrolysis of a Manganese-rich solution that is made by dissolving Manganese carbonate ore or calcined Manganese oxide ore.

Energy storage devices made from alternative and inexpensive sources, such as low-grade Manganese ores, have a niche in the renewable energy and portable electronics market. Along with substantial primary Manganese sources, there is also potential in modified EMD materials from synthetic solutions and secondary sources.

The recent investigations of fundamental advances in the electrochemical mechanisms involved in aqueous rechargeable batteries and electrochemical supercapacitors, are leading to an improved energy storage performance, which is essential for their long-term use in storing renewable energy supply.

Alphabet Soup

The company's current focus is on the HPMSM market.

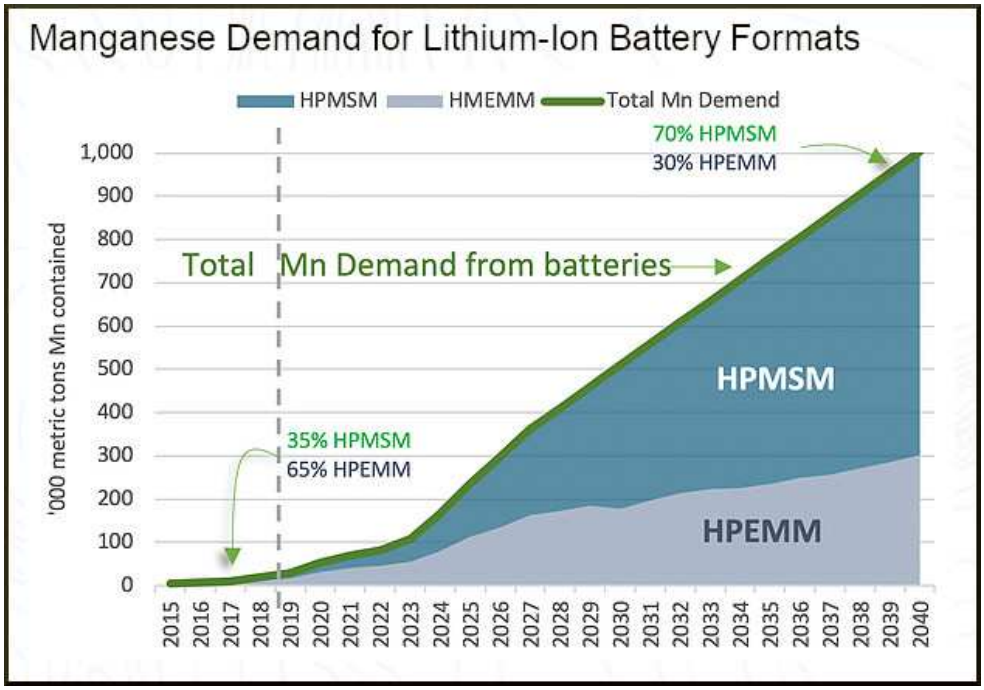
High-purity Manganese, also known as battery-grade Manganese, is sourced by cathode and battery manufacturers in either a metal or sulphate form, ergo High Purity Electrolytic Manganese Metal (HPEMM) or High Purity Manganese Sulphate Monohydrate (HPMSM). These products are produced by a handful of producers globally (of which only three companies are located outside of China). Meanwhile China supplies over 90% of the high-purity Manganese market. However, to put the nascent nature of this market in perspective, in 2020, the battery-grade market represented 0.5% of the total contained Manganese consumption.

Besides its use in battery cathodes, high-purity Manganese is also used in speciality steels, aluminium, and chemicals.

HPEMM is a 99.99% of contained Manganese, low impurity, metal.

HPMSM is a pale pink inorganic compound with typically 32% of contained Manganese. The chemical symbol of this low impurity salt is $MnSO_4 \cdot H_2O$.

The forecast demand for Manganese in NMC and LNMO battery formats is weighted towards HPMSM in preference to HPEMM.



Source: Cairn ERA

It is possible to make HPMSM directly from ore (carbonate, semi-carbonate or oxide) as is done in China. Alternatively, HPMSM can be dissolved from EMM. The economic viability of each operation is influenced by a number of factors such as; cost and access to electricity, cost of acid, access to infrastructure, soluble Manganese grade, ore impurities and metallurgy.

Traditionally precursor and cathode manufacturers purchased HPEMM and dissolved it in acid to produce HPMSM. This was done to maintain purity levels, however this comes at a significant cost. It is therefore more economical to manufacture HPMSM directly from ore, if metallurgically feasible.

Likely Demand

Electrolytic Manganese Dioxide (EMD) is a vital ingredient in the production of alkaline batteries with total annual production capacity estimated by the International Manganese Institute at roughly 430,000 mt. Battery consumption of Electrolytic Manganese Dioxide (EMD) has been predicted to be fastest growing segment of Manganese production with a CAGR of 5.1% from 2015 to 2022.

North American Supplies

The USGS in its latest survey of Manganese as it pertains to the US reported that Manganese ore was consumed mainly by eight firms, with plants principally in the East and Midwest. Most ore consumption

was related to steel production, either directly in pig iron manufacture or indirectly through upgrading the ore to ferroalloys. Additional quantities of ore were used for such non-metallurgical purposes as production of dry-cell batteries, in fertilizers and animal feed, and as a brick colorant.

A particularly dire statistic is that Manganese ore (containing 20% or more Manganese) has not been produced domestically since 1970. The value, in 2019, of domestic consumption, estimated from foreign trade data on a Manganese-content basis, was ~ $1.2bn. However these numbers are before the expected ramp-up in US-based production of LiBs for EVs, for which there are a plethora of new plants on the drawing boards (mainly in the South and the Mid-west).

Battery Metals - Chemical Processing/Refining

Nickel	13%	1%	65%
Cobalt	17%	0%	82%
Graphite	0%	0%	100%
Lithium	0%	4%	59%
Manganese	7%	0%	93%

Source: Benchmark Minerals

Manganese was recycled incidentally as a constituent of ferrous and nonferrous scrap; however, scrap recovery specifically for Manganese was negligible. Manganese is recovered along with iron from steel slag. As for imports, some 70% came from Gabon and then 17% from South Africa. Rather embarrassingly, the USGS has estimated in-ground reserves of Manganese at zero!

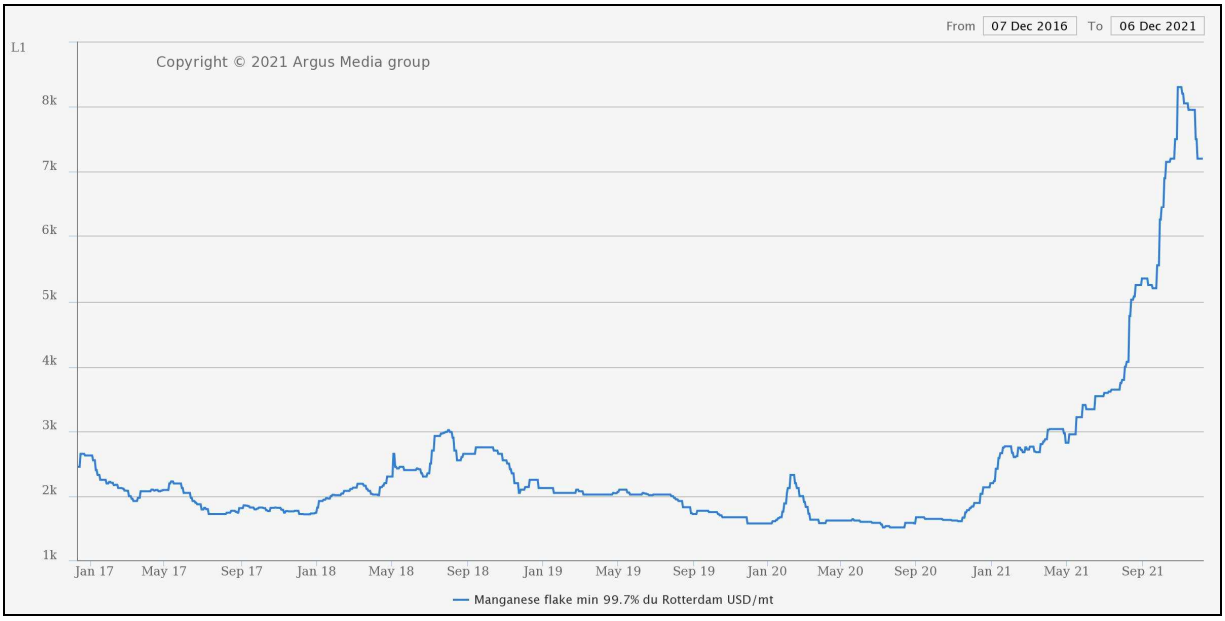
Poignantly, Electrolytic Manganese metal was newly added to the National Defense Stockpile in 2019 as a critical material for defense purposes. The last time Electrolytic Manganese metal was held in the government stockpile was in 2004.

Pricing

The devastation wreaked by the Virus Crisis did not spare the Manganese market in the first half of 2020. Most of the downward pressure could be ascribed to the kneejerk reaction that afflicted all metals, but in the case of Manganese, demand for its applications in construction steel alloys was temporarily depressed during the government-imposed lockdowns to curb the spread of new COVID-19 cases. This has largely bounced back as economies have returned to some semblance of normality.

On the battery front demand continued to power up from the second half of 2020 and still battery usage is not of the volumes to counteract negative tendencies in construction and other usages.

The reactivation has lifted the price of Manganese in all its formulations. The chart below shows the price specifically for EMM min 99.7%, fob US warehouse, US$ per lb, with EMM having a small spike and slump around the time of the first COVID sightings but is now way higher than it had been pre-pandemic and is clearly marching to the beat of another drum.



Source: Argus Metals

Risks

Amongst the risks at the current time are:

- Manganese price risk
- Chinese price manipulation to the high or low side
- Being superseded by new technologies
- Financing is still tenuous and dependent upon sentiments towards other metals, such as Lithium and Cobalt
- New Brunswick is a tough jurisdiction with a past history of Greenie/NIMBY issues

With the price for Manganese Flake is on a tear reaching levels way above the five-year average therefore a price retreat must be the biggest risk at the current time. The secular growth in battery uses for Electrolytic Manganese seems assured for the foreseeable future and thus any breakthrough mass adoption of LMD battery styles would be an added boost.

The company currently has good relations with New Brunswick and local communities. It seems a sense of reality is finally arriving here as jobs become an over-arching issue.

The Chinese currently have a stranglehold on the EMM space so it will be interesting to see whether

they try to earn more from their unique position or sink the price to ensure that interlopers are scared off (as per their actions in the Rare Earth space). Curiously though, at the moment the Chinese are closing down capacity to bump up prices in standard manganese products.

The company also anticipates potentially recovering lower grade Mn to produce additional products such as those used in the agricultural industry.

Revival

The share price has been a wild ride over the last 24 months.

Due to the major "derailment" of the battery metal space caused by the retreat from the overheated 2017 market, Manganese X lost three years when it could potentially have been moving forward. All was not in vain though as the market transitioned through a mind-shift, during the downtime, that has downplayed Cobalt's future and upgraded the prospects of Manganese.

As can be noted from the five year chart on the preceding page, after a long quiescence, the stock's price came to life in 2020, largely as a result of the market's hunt for collateral beneficiaries of Tesla's push for alternative (read non-Cobalt) battery metal formulations. Then the stock plunged in late 2020 before staging a dramatic revival and then was cut down in recent months.

Conclusion

With the rise of EVs the developers in the battery-grade Manganese (mining) space are few and far between. Increasingly the hunt for enhanced economics in EV production (to tease consumers into the

auto showrooms to take up the EV "promise") will mean that cheaper, more secure and more efficient battery formulations will be required and Manganese might well be the secret sauce to make EV economics more palatable to the mass market.

The battery metals surge of 2017 proved to be too much too early. While China was rapidly evolving the Western consumers sat on their collective hands feeling no compulsion to make the switch. With government fiat coming into play with deadlines for conversion to EV formats the OEMs finally started to grasp the nettle and from 2020, the EV revolution has started to gain traction and prices of battery metals (and the companies aspiring to mine them) have followed an upward trajectory.

Manganese X resolved to join the fray in 2017 with a rapid-fire campaign to stake out their space in the marketplace for EMD. Exploration results were then topped with the advancement of the project to develop an improved process for the upgrading of Electrolytic Manganese and in recent weeks a maiden resource.

The battery space is a fast moving one these days. The obvious "new" technology is the "plain vanilla" Lithium-Ion battery. It is gaining widespread adoption for automobiles but in less standardized applications requiring storage systems that are not necessarily mass-produced a plethora of variants on the Lithium battery formula are getting traction due to the all too evident shortcomings (particularly on the charging, safety and endurance fronts) for which LiBs are becoming notorious.

Manganese is shrugging off it rather prosaic image as "just" another steel alloy metal and is now being seen in many quarters as one of the rising battery metals. Manganese X is one of the few to have recognized this trend and is seeking to create a source of EMM in the North America where hitherto dependence upon China has been the norm. Despite the recent changing of the guard in Washington the subject of the US achieving "metals" independence in those categories that China has hitherto dominated remains front and centre on the political agenda.

Manganese X has identified a niche that potentially steals the thunder of the hard-to-source Cobalt with the goal of being the only Manganese producer in the US/Canada. Next up is the PEA which should give an idea of the likely capex and the potential economics.

Therefore we reiterate Manganese X Energy as a **LONG** call and our twelve-month target price of $0.75.


CA:MN Daily
12/06/21
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
Volume
©BigCharts.com
10
8
6
4
2
0
Millions
21
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

Important disclosures

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