



FOCUS ON ULTRA HIGH-PURITY MANGANESE PRODUCTS

**CORPORATE PRESENTATION** | January 30, 2019

## **Cautionary Note**



### **Forward-Looking Statements and Risks Notice**

Except for statements of historical fact relating to the Euro Manganese Inc. ("EMI" or the "Company"), certain information contained in this presentation constitutes forward-looking statements. When we discuss our costs and timing of current and proposed evaluation; planning; development; capital expenditures; cash flow; working capital requirements; and the requirement for additional capital; operations; revenue; margins and earnings; future prices of electrolytic manganese metal, manganese sulphate and other products; future foreign currency exchange rates; future accounting changes; future prices for marketable securities; future resolution of contingent liabilities; or other things that have not yet happened in this review, we are making statements considered to be forward-looking information or forward-looking statements under Canadian law. We refer to them in this review as forward-looking information.

The forward-looking information typically includes words and phrases about the future, such as: plan, expect, forecast, intend, anticipate, estimate, budget, scheduled, believe, may, could, would, should, might, and will. We can give no assurance that the forward-looking information will prove to be accurate. It is based on a number of assumptions management believes to be reasonable, including but not limited to the continued operation of the Company's exploration, evaluation and development activities, no material adverse change in the market price of commodities and exchange rates, and such other assumptions and factors as set out herein.

It is also subject to risks associated with our business, including but not limited to: risks inherent in the mineral exploration and evaluation and mineral extraction business; commodity price fluctuations and hedging; competition for mineral properties; mineral resources and reserves and recovery estimates; currency fluctuations; interest rate risk; financing risk; environmental risk; foreign activities; legal proceedings; and other risks.

If our assumptions prove to be incorrect or risks materialize, our actual results and events may vary materially and adversely from what we currently expect as set out in this review.

Forward-looking information is designed to help you understand management's current views of our near and longer-term prospects, and it is not appropriate for other purposes. We will not necessarily update this information unless we are required to by law.



## **Investment Highlights**









## WASTE REPROCESSING FROM HISTORIC MINING OPERATION

## STRATEGIC ASSET WITH TARGET~25-YEAR LIFE

- EMN holds 100% of the rights to the Chvaletice Manganese Project.
- Targeting competitive production of environmentally-superior, ultra-high-purity manganese products
- EMN pilot tests have confirmed ability to meet highest customer specifications for newgeneration of EV battery production.
- Czech Republic by reprocessing waste.
   Western Europe's largest manganese resource, in tailings from 1951-1975 mining operation.

- Significant measured and indicated resource of 26.96 million tonnes grading 7.33% manganese. 25 year target project life at ~48,000 TPA Mn-equivalent.
- Low-cost extraction method anticipated, involving the recycling of manganese-rich tailings – no hard rock mining or milling required – using combination of proven, commercial technology.
- Strategic Asset in Europe: China produces over 98% of electrolytic manganese metal and over 85% of high-purity manganese sulfate in the world.

## EXCELLENT INFRASTRUCTURE TIER-ONE JURISDICTION

- Rail, highway, gas pipeline, water and power available on-site.
- Adjacent to 820 MW power station at a key node in national electrical grid = competitively-priced electrical power.
- Secured industrial-zoned land for plant.
- Sophisticated, stable and businessfriendly European Union jurisdiction.
   Czech Government encourages direct foreign investment.
- Clear legal and regulatory framework.
- 19% corporate tax rate.

## **Investment Highlights**









## CLEAR TIMELINE TO DEVELOPMENT

### Extensive metallurgical tests and pilotplant runs completed. Confirmed ability to convert Chvaletice tailings into ultra

 Preliminary mining permit secured in April 2018.

high purity manganese products.

- Preliminary Economic Assessment expected in early 2019.
- Demonstration Plant planned for 2019 to produce bulk finished product for customer testing and qualification.
- Targeting construction start in 2020/2021.

## STRONG MANGANESE PRODUCT MARKET OUTLOOK

- Stable, growing manganese demand in the high-performance steel and aluminum superalloy production – Numerous European, North American and international consumers.
- Demand for manganese products for lithiumion battery production expected to ramp-up very significantly around the world.
- Major investments in European electrical vehicle battery and precursor plants in close proximity to Project. NMC cathode chemistry expected to dominate, requiring high-purity manganese inputs.

## HIGHLY EXPERIENCED MANAGEMENT TEAM

- Solid multidisciplinary team with proven exploration, corporate and project development expertise, as well as extensive operating experience.
- Secured access to leading high-purity manganese products production expertise and technology.
- Company founders have award-winning track record of excellence in environmental and social practices.

## **NEWS:** Euro Manganese Inc. - **PEA Summary**



Project Economics (USD)	Pre-Tax	After-Tax
Net Present value, (10% discount rate)	\$781.6 M	\$593.2 M
Internal Rate of Return	25.2%	22.6%
Payback (from start of processing)	4.5 Years	4.9 Years
Cumulative Cash Flow, undiscounted	\$4,088.8 M	\$3,291.8 M

Capital Requirements (USD)	
Initial Capital requirements	\$403.9 M
Life of Project Sustaining Capital (excludes \$255 M in maintenance costs which are included in operating costs)	\$24.8 M
Working Capital	\$30.5 M

Product Price Assumptions (USD)	Life of Project Average
High-purity electrolytic manganese metal ("HPEMM") (1)	\$4,617 per tonne
High purity manganese sulphate monohydrate ("HPMSM") (1)	\$2,666 per tonne

(1) Average real selling prices per tonne of HPEMM (99.9% Mn content) and HPMSM (32% Mn content) as projected in a market study prepared for the Company by CPM Group LLC, entitled "Market Outlook for High-purity Electrolytic Manganese Metal and High-purity Manganese sulphate monohydrate," dated January 21, 2019.

## **Euro Manganese Inc. - PEA Summary**



<b>Production Summary</b>	
Life of project	25 years
Chvaletice tailings extracted & processed	26,828 K tonnes
Total manganese grade	7.33%
Contained Manganese (Mn)	1,967 K tonnes
HPEMM produced	1,186.4 K tonnes
HPEMM further processed into HPMSM	782.3 K tonnes
HPEMM sold	404.1 k tonnes
HPMSM produced/sold	2,345.0 K tonnes
Total Mn contained in HPEMM & HPMSM	1,165 K tonnes
Overall Mn recovery (combined HPEMM and HPMSM)	59.2%

# **Management Team**CANADA





Marco Romero
PRESIDENT & CEO,
FOUNDER & DIRECTOR

- 39+ years of diversified international experience in mining and construction material industries.
- Co-founder of several Canadian companies including Eldorado Gold, Polaris Materials, Delta Gold and Euro Manganese.
- Recipient of several international, national and regional awards for achievements in corporate social responsibility and environmental excellence.



Pierre Masse
VP FINANCE & CHIEF
FINANCIAL OFFICER

- 35+ years of international experience in finance
- Held senior financial positions as a controller, Vice President Finance or CFO with several Canadian private and public exploration and mining companies, including Equinox Resources Ltd., Pan American Silver Corp. and Eldorado Gold Corporation.
- Mining Engineering degree, qualified as a Chartered Accountant in 1976 and is also a Chartered Financial Analyst.



Thomas Glück
VICE PRESIDENT,
DEVELOPMENT

- 26-year track record of successful development and operation of production facilities for electrolytic manganese metal and associated products.
- Held various leadership roles for world's leading producer of high purity, selenium-free EMM, Manganese Metal Company, including superintendent, development manager and works manager.
- Thomas holds a PhD in Chemical Engineering.



Gary Nordin
CHIEF GEOLOGIST

- Leading exploration geologist with a history of identifying, evaluating and developing successful mining projects, including the Refugio Mine, La Colorada mine, Kisladag mine and the Orca Sand & Gravel Quarry.
- Previously co-founder and director of several public companies including Bema Gold, Eldorado Gold, Polaris Materials, Delta Gold, Orestone Mining, Nevada Pacific Gold, Canasil Resources and Galileo Minerals.



Fausto Taddei

VP CORPORATE
DEVELOPMENT &
CORPORATE SECRETARY

- Over 30 years of public resource company experience with development and operating entities involved in precious and base metals, and metallurgical coal. Senior level experience in multiple mining operations, financing, treasury functions, off-take arrangements, tax planning and public company reporting and governance matters.
- Held Senior VP & CFO positions with Nevsun Resources Ltd., Aura Minerals Inc. and Western Canadian Coal Corp.
- Qualified as a CPA (CA) in 1985.

# **Management Team EUROPE**





Jan Votava

MANAGING DIRECTOR (MANGAN
CHVALETICE S.R.O.) & DIRECTOR
(EURO MANGANESE INC.)

- 18+ years experience as an engineer and executive leader in Czech republic.
- Responsible for leading the Euro Manganese's activities in the Czech Republic, for its organizational and reputational development, as well as for Project permitting and development.
- Previously held different managerial roles as Head of Transformation Team for Europe, Technical Director for Central Europe, and Executive Chairman and Managing Director for the Czech Republic for Lafarge Holcim.
- Holds a doctorate in mechanical engineering.



Wenling Sun
STRATEGIC DIRECTOR,
CHINA

- Highly experienced mining industry professional with an 18-year track record in China, covering mining project development, metal trading, pricing, trade structure, and project management and financing.
- Ran an active consulting practice, advising international clients on the procurement of Chinese technology, equipment and services from Europe.
- Managed the development of the first bio-heap copper and nickel leaching projects in China and played a key role in several international mine and plant developments.
- Holds a Masters degree in Economics from Renmin University.



Klaus Acker
VICE PRESIDENT,
MANGANESE MARKETS

- Prominent and highly experienced metal sales and trading professional, with 27 years of experience in European metal markets.
- Represented some of the world's leading EMM producers, including Vice President, Ferro Alloys for Traxys SA.
- Based in Cologne, Germany



Tomas Hochmann
TECHNICAL DIRECTOR

- Started career in basic research related to petrochemistry leading to a PhD in Chemical Engineering after which he worked in applied research and development for petrochemical and pharmaceutical companies.
- The last 20 years have been spent in the cement industry working in cement plants in the Czech republic, Bosnia, Libya, Serbia, Venezuela and Canada – responsible for process development and optimization, plant operations as well as plant strategy, investment planning and construction management.
- Has also been engaged in the technical training of young engineers, troubleshooting and plant start-ups within the cement group.

## **Non-Executive Directors**





Roman Shklanka
CHAIRMAN &
CO-FOUNDER

- Geologist, mine finder and company builder whose experience includes
   Chairman, director and cofounder of Canico Resource Corp, Polaris Materials, International Barytex, Kobex Resources, Pacific Imperial Mines, Delta Gold and Sutton Resources.
- Previously held various senior exploration roles with Placer Dome over more than 20 years, including VP Exploration. Inducted into Canadian Mining Hall of Fame in 2009.



David Dreisinger
DIRECTOR

- Professor and chairholder of the Industrial Research Chair in Hydrometallurgy at UBC.
- Published over 200 papers and involved in 16 U.S. patents for work in hydrometallurgical research.
- Active international consulting practice on many major hydrometallurgical projects and plants.
- Previous corporate experience includes director positions Search Minerals, Clifton Star Resources and South American Silver.



Daniel Rosický
DIRECTOR

- Practiced law for 22 years and is fluent in English and Czech. Daniel is an attorney at law of the Czech Bar Association and is also admitted to the Bar in Ontario, Canada.
- Senior partner at PRK
   Partners, a leading Czech
   corporate law firm.
- Specializes in real estate and inbound foreign investment law, including resource development.
- Born in the Czech Republic and educated in Canada.



Harvey McLeod
DIRECTOR

- Geotechnical engineer and a world leader in the evolution and development of mine tailings management over a 40-year career, with work on over 100 tailings dams in over 20 countries.
- Chairman of the ICOLD subcommittee on tailings dams and active in the Canadian Dam Association.
- Currently VP Strategic Marketing for Klohn Crippen Berger.
- Inducted as Fellow of the Canadian Engineering Institute in 2017.



John Webster
DIRECTOR

- Senior finance professional who spent over 30 years with PricewaterhouseCoopers until his retirement in 2014.
- Roles included British
   Columbia Managing Partner,
   three years as Assurance
   Leader in Romania and head
   of the firm's mining practice
   in Canada.
- Extensive experience as audit partner and advising private and listed clients.
- Director of Eldorado Gold Corporation.



Gregory Martyr
DIRECTOR

- Over 30 years experience in resources investment banking and corporate finance, as well as the management of international mining companies.
- Currently Executive Director of Carbon Fibre Development Technologies Pty Ltd.
- Formerly Managing Director with Standard Chartered Bank, ultimately as the Global Head of Advisory, Mining and Metals.
- Previously a partner with Gryphon Partners and held several executive roles with Normandy Mining Ltd. including President, Americas.







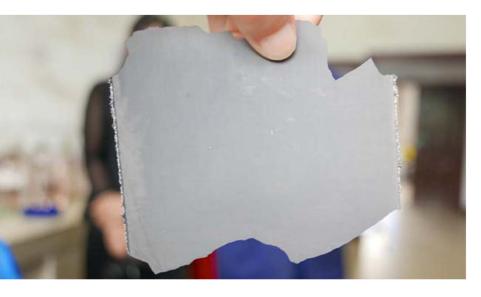




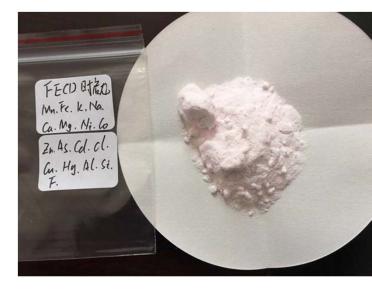
## **MANGANESE MARKET**

## **Manganese Market Opportunity**









1 Photos show ultra high purity manganese products made from Chvaletice Manganese Project tailings during 2018 product development and testwork program.

### WHAT IS MANGANESE?

- 12th most abundant element on Earth.
- Fifth most mined metal in the world.
  - Mostly traded as raw ore and semi-processed products, such as ferro-manganese.
  - >90% used for steelmaking.
  - Component of aluminum alloys and agricultural products, as well as conventional dry cell batteries.

- Ultra-high-purity manganese products have emerged as a **critical raw material** for high-performance, low-cobalt lithium-ion battery cathode manufacturing.
- High-purity manganese for lithium-ion batteries sold as:
  - High Purity Electrolytic Manganese Metal ("HPEMM"); or
  - High Purity Manganese Sulphate Monohydrate ("HPMSM"
     Granulated or liquid).

Source: Cairn Energy Research Advisors ©2018

## **Electric Vehicle Demand for Manganese**











### **Chevy Bolt**

Battery Pack Size:	60 kWh
Battery Manufacturer:	LG Chem
Cathode Material:	NMC 1-1-1
Mn Sulfate Content:	87 KG
Mn Metal Content:	28 KG

### BMW i3

Battery Pack Size:	42 kWh
Battery Manufacturer:	Samsung SDI
Cathode Material:	NMC 1-1-1
Mn Sulfate Content:	61 KG
Mn Metal Content:	20 KG

### **BAIC EC 200**

Battery Pack Size:	36.8 kWh
Battery Manufacturer:	CATL
Cathode Material:	NMC 5-3-2
Mn Sulfate Content:	53 KG
Mn Metal Content:	17 KG

### **Jaguar iPace**

Battery Pack Size:	90 kWh
Battery Manufacturer:	LG Chem
Cathode Material:	NMC 1-1-1
Mn Sulfate Content:	131 KG
Mn Metal Content:	43 KG

Source: Cairn Energy Research Advisors ©2018

## How much Manganese is needed for one EV?



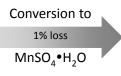
Some new battery chemistries

will use up to 2.3 times more

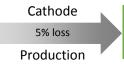
manganese than the current

**NMC-111 chemistry** 

0.473 kg HPEMM



1.453 kg HPMSM



1.439 kg HPMSM

Equivalent to 0.445 kg HPEMM



1 kWh Cathode

x90

NMC-111: **0.473 kg** HPEMM, or **1.453 kg** HPMSM

Gross Mn weight required for 1 kWh of battery capacity:

LNMO: **1.096 kg 3.367 kg** 

1kWh = 0.1 - 1.0 kg HPEMM

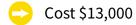
for a 90kWh battery pack

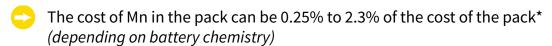


### A 90-kwh BATTERY PACK MAY:









<sup>\*</sup> assuming \$3/kg of HPEMM (average 2018 price)

Source: Cairn Energy Research Advisors, CPM Group, 2019

## **Lithium Ion Battery Market Demand**



## Manganese use in NMC and LNMO cathode formulations

- NMC has several major formulations, each expressed as a ratio of Nickel to Manganese to Cobalt:
- NMC 1-1-1

  Most NMC today is the 1-1-1 formulation, which is the most stable and long-lasting.
- NMC 5-3-2 and 6-2-2
  Going forward, 5-3-2 and 6-2-2 will emerge in 2020 and 8-1-1 in 2023. By 2026 the majority will be 5-3-2.
- Higher Ni-content is preferable to buyers due to the lower proportion of Co, making it cheaper. Additionally, 8-1-1 has a higher energy density. If durability & stability issues can be solved, it will become the cathode chemistry of choice for carmakers.
- NMC 3-7-0
  New chemistry announced by BASF in 2018.
  Will use 70% Mn in its cathode
- LNMO (Lithium-Nickel-Manganese Oxide)
  The highest consumer of Mn per 1 kWh of capacity (1+ kg) will mature commercially after 2025, principally in electronics and in certain formulations of EV batteries.

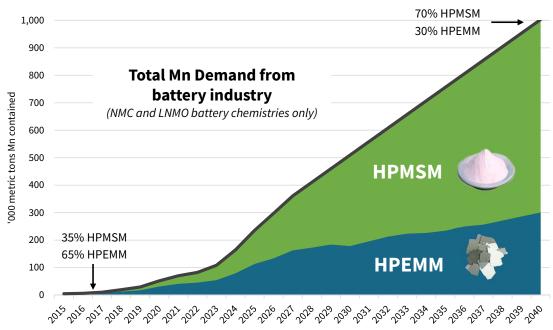


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## **Manganese Market Opportunity**







### MANGANESE USE IN LI-ION BATTERY MARKET

- Li-ion battery market due to increase ~24x in the next twenty years, growing from 99 GigaWattHours (GWh) of annual capacity production in 2017 to 2,325 GWh in 2040.
- The primary cathode chemistry in 2040 will be NMC and LNMO, requiring manganese input of the over one million tonnes of manganese metal equivalent.
- Li-ion cathode manufacturers and NMC powder producers purchase high-purity manganese sulfate monohydrate (HPMSM) that has been made from manganese ore or from electrolytic manganese metal (EMM), or purchase High-Purity EMM in order to make their own MnSO<sub>4</sub>.

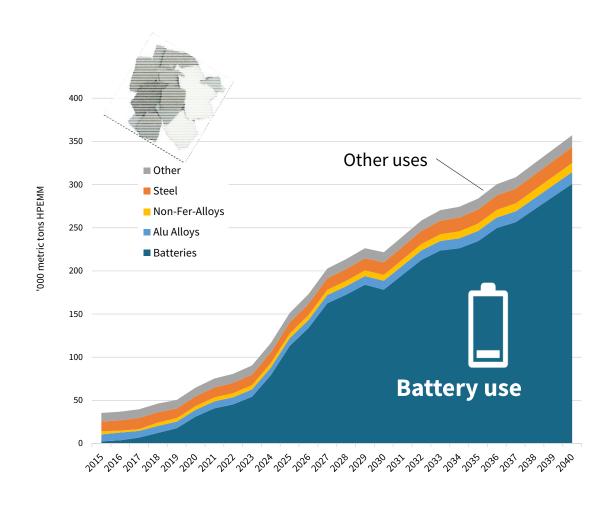
Source: Cairn Energy Research Advisors ©2017

# Manganese Sulfate Demand Lithium Ion Batteries



# HPEMM SHIPMENT FORECAST FOR Li ION BATTERIES

- Some battery makers prefer to buy HPEMM and make the HPMSM needed for the cathodes themselves.
- CPM Group expects that HPEMM use in batteries will decline in percentage terms (while the use of HPMSM will go up), but will still rise in absolute terms because of the increase in battery production (see graph)
- Other uses of HPEMM that dominate the market today will be marginalized (in percentage terms) due to increase of HPEMM use by the battery industry.



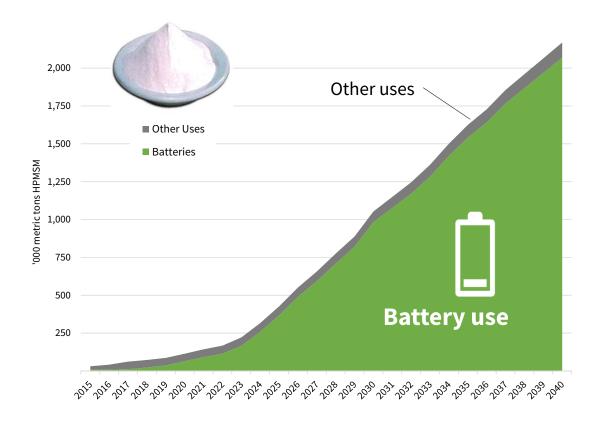
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# Manganese Sulfate Demand Lithium Ion Batteries



# HPMSM SHIPMENT FORECAST FOR Li ION BATTERIES

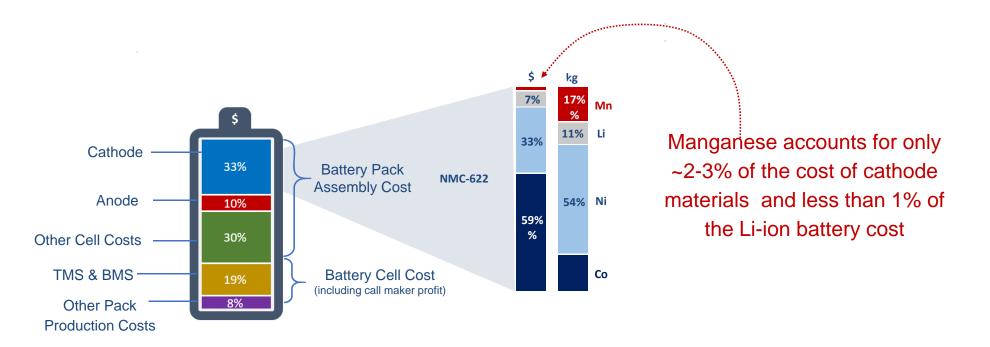
- Note that this forecast only tracks HPMSM, containing approximately 32% manganese content. There is a much larger market for low-grade, commoditized MSM that goes into agricultural, nutritional and other markets.
- Cairn ERA expects the Li ion battery industry's appetite for High Purity Manganese Sulfate, or HP-MSM, for battery cathodes to grow from 33,000 tons in 2017 to over 3 million tons in 2040.
- CPM Group agrees, but expects that's some of this demand will be satisfied by HPEMM (see next slide) and that demand for HPMSM from the battery sector in 2040 will be 'only' 2 million tons (see graph)
- The vast majority of this HP-MSM will go into NMC and LNMO cathode material.



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## Mn Demand from Lithium-ion Batteries...





### Assumptions for this pricing model:

Capacity: 55 kwh EV battery pack assembled in China

TMS: Flat plate liquid Thermal Management System with augmented air Cell manufacturer: 10 GWh factory in China built in the last two years

Battery chemistry: NMC-622 cathode

Battery Form Factor: large format prismatic cell

Cell and pack built in Q1 2019

*TMS* = *Thermal Management System* 

BMS = Battery Management System

Source: Cairn ERA, CPM Group,

**Bloomberg** 

Price assumptions: Li \$17/kg, Co \$36/lb,

Ni \$14.700/mt.

Mn 2.03/kg [EMM 99.7%]

## ... is not sensitive to the price of HPEMM/HPMSM

## **Growing Lithium Battery Cluster in Europe**

(The wave of production capacity development that has gone through Asia is now washing over Europe)



### **SWEDEN**

northvolt

Plant Type: Precursors/Batteries **Construction 2018** Production Start: 2019 Planned Capacity: 32 GWH



**GERMANY** 

Plant Type: **Batteries** Construction 2019 Production Start: 2020 Planned Capacity: 5-55 GWh



### **POLAND**

northvolt

Plant Type: **Battery Packs Assembly** Construction

Production Start: 2019 Planned Capacity: 10k packs



**GERMANY** 

Plant Type: **Batteries** Status: Announced Jan 2019 Production Start: NA

Planned Capacity: 100 M cells/year



### **POLAND**

Plant Type: **NMC** cathode plant Construction Production Start: 2020



### HUNGARY

Plant Type: **Batteries** Operational Production Start: 2018

Planned Capacity: 2-5 GWh



### **POLAND**

Plant Type: **Batteries** 

Planned Capacity: TBC

Operational + expansion Production Start: 2018

Planned Capacity: 17 GWh



### HUNGARY

Plant Type: **Batteries** Status: Operational Production Start: 2018 Planned Capacity: 7-10 GWh



### **POLAND**

Plant Type: **Batteries** 

Discussed Production Start: NA

Planned Capacity: 100k battery cells



**SK** innovation

### **TBD**

Plant Type: **Batteries** Discussed Production Start: TBD

Planned Capacity: 100 GWh



### **POLAND**

Plant Type: Li-ion Electrolyte Construction 2019 Production Start: 2020

Planned Capacity: Electrolyte for 1 million EVs



UNITED KINGDOM **Battery Packs Assembly** Plant Type:

Status: Announced Jan 2019 Production Start: TRA

**Batteries** 

Discussed

Planned Capacity: TBA

Production Start: TBD Planned Capacity: 100 GWh



### **FINLAND**

FINLAND

**D-BASE** 

Plant Type: **Cathode Precursors Announced Oct 2018** 

Production Start: 2020 Planned Capacity: ~15 GWh



**TBD** 

Plant Type:

Terrafame

Plant Type: Cathode Precursors Announced

Production Start: 2021 Planned Capacity: 177 Kilotons



### **TBD**

Plant Type: **Batteries & Autos Construction 2019** 

Production Start: 2020 Planned Capacity: ~20-40 GWh; TBC





## **EMN Strategic Approach**



### TWO KEY PRODUCT LINES FOR EMN

**UHP Electrolytic Manganese Metal** (99.9% EMM / HPEMM)

Highest specifications: Selenium-free, >99.9% Mn.

Form: Flake and powder

From lithium ion battery cathodes to military Use:

grade super-alloys

### **AND**

**UHP Manganese Sulphate Monohydrate** (HP MnSO4 / HPMSM)

**Battery-grade: Highest specifications (>32.34 Mn)** 

Form: Granulated or liquid

Key to production of new generation of NMC Use: rechargeable, automotive and other lithium ion battery cathodes.

> Ultra -High-Purity EMM and MSM (granulated 🕒 and liquid) made from Chvaletice tailings.





## **EMN Strategic Considerations**









Manganese in oil pipeline segments

♠ Mn in Ford F-150 pickup aluminum frame and body

Mercedez Benz NMC lithium-ion battery prototype

### GROWING MARKETS FOR HIGH-PURITY MANGANESE PRODUCTS

- NMC Lithium-Ion Batteries demand for Electric Vehicles (EVs) growing very rapidly
- High-Performance Specialty Steel and Aluminum Alloys
- Non-Ferrous Metal Alloys

### **MARKET INTEREST IN EMN PRODUCTS**

- Ongoing discussions with several major international manganese consumers who require a reliable, long-term supply of ultra high-purity manganese products
- EMN plans to commission a demonstration Plant at Chvaletice in 2019 to produce bulk, ultra-high-purity finished product samples for customer testing and qualification



# OVERVIEW OF THE CHVALETICE MANGANESE PROJECT

## **Project Highlights**



### **LEADING MANGANESE PROJECT**

- 2 100% ownership of rights to Chvaletice Manganese Resource
- Targeted 25-Year Life-of-Project /designed by world-leaders in the HPEMM and HPMSM field
- Recovering manganese by reprocessing tailings (waste recycling) makes Chvaletice exceptionally green - Environmentally-superior manganese products.
  - Major manganese resource. No hard rock mining, crushing or milling required.
  - Manganese carbonate ore: Direct leach.
     No calcination required prior to leaching.
  - Extensive metallurgical test work completed with modern, conventional, proven process technology.
  - Pilot-plant tests completed in 2018.
  - Extraction of Chvaletice manganese is expected to result in self-funding environmental remediation of the Chvaletice site, bringing it in compliance with all Czech and EU regulations.

EMN executives, Thomas Glück and Jan Votava, inspecting Chvaletice bulk sample preparation at CRIMM R&D Center in Changsha, China.



## **Project Highlights**



### **Working in the Czech Republic**

- Electrical supply 820 MW power station adjacent to project site
  - Competitively-priced electrical power in Czech Republic (key cost driver).
- Key process inputs
  - Conventional reagents available in Czech Republic and Europe.
  - Industrialized region Highly-skilled labour, quality goods and first-world technical services locally available.
- Excellent infrastructure
  - Rail, highway, natural gas, water and electrical power are available on or immediately adjacent to site.
- Investment-friendly jurisdiction
  - Prosperous free-market economy. Local & national governments encourage direct foreign investment.
     Property rights are legally protected.



## **Project Location and Infrastructure**



# STRATEGICALLY LOCATED 90 KM EAST OF PRAGUE AND IDEALLY SITUATED TO SERVE CUSTOMERS ACROSS EUROPE.

- Set in an industrialized valley with gentle topography, served by excellent infrastructure
- Adjacent to 820 MW power station at a major node in the Czech Republic's modern electrical distribution grid.
- Direct rail and road access to the ports of Hamburg, Gdansk and Rotterdam.





### **METALLURGICAL TESTING AND PROCESS DESIGN**

- March 2017 HPEMM Metallurgical Testing Initiated Extensive metallurgical testwork program comprised of hundreds of tests, including beneficiation, leaching, purification and electrowinning with Changsha Research Institute for Mining & Metallurgy (CRIMM), a division of China Minmetals, Culminating with pilot plant tests from Q1 to Q3 2018.
- **May 2017 Magnetic Separation Breakthrough** Tests on Chvaletice ore (bulk sample) conducted in CRIMM: Condensate successfully produced using advanced high-intensity magnetic separation technology. Positive impact on capex and opex expected.
- 2017-2018 Metallurgical Testwork Program Chvaletice ore and concentrate using EMN bulk sample. Preliminary results indicate that manganese recoveries in the 60-63% range are possible.

Pilot scale magnetic separation tests at CRIMM R&D laboratory in Changsha.

## **Metallurgical Testing**



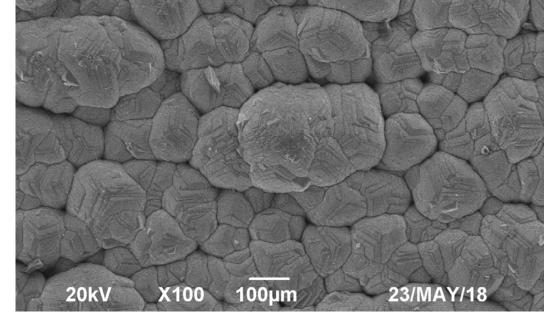
### MINERAL PROCESSING & METALLURGICAL TESTING

- Recent Findings of Bulk Sample Pilot-Scale Metallurgical Testwork
  - Magnetic Separation pilot scale tests were successful and confirmed earlier exploratory results.
  - Leaching test were successful. Good leach recoveries on fine and coarse tailings.
  - Iron and other impurities removal and precipitate dewatering tests were successful.
  - Exploratory Flotation Tests were not successful (as expected).
  - Electrowinning tests ongoing (HPEMM meeting highest known customer specifications even for demanding NMC 811).
  - Solid-liquid separation tests on magnetic separation and leach tails were successful.
- Locked-system HPEMM pilot plant tests combining all aspects of preliminary process flowsheet from Q1-Q3 2018. Optimized flowsheet confirmed in December 2018 and in subsequent PEA.
- Significant capital and operating cost savings result from smaller scale leaching plant required to process a magnetic separation concentrate. Optimization tests completed for leaching and solution purification process.
- Path to ultra-high-purity MSM production and related economics confirmed for process involving dissolution of HPEMM, followed by deep purification. Assures quality of product, meeting the battery specifications of tomorrow. Producing both battery-grade products provides flexibility to deliver either HPEMM or HPMSM to customers, to suit their preferences.



### **ENGINEERING**

- January 2017 and On-going Process Design and **Economic Assessment** 
  - Various engineering studies initiated with China's CINF Engineering, a division of Aluminum Company of China/Chinalco, for process and Project design, as well as capital and operating cost estimation and completion of Chinese standard Pre-Feasibility Study in Q4 2018.
  - 43:101/JORC Preliminary Economic Assessment by Tetra Tech Canada, to be issued January 30, 2019.
- **Localization Studies and Planning** 
  - Tebodin Bilfinger Czech Republic (A division of Bilfinger Engineering) to provide local cost estimation, standards definition and regulatory compliance inputs for the CINF PFS and Tetra Tech PFA.





Above: Ultra-high-purity EMM produced during pilot plant run with Chvaletice tailings. Below: Euro Manganese team meeting with CRIMM to review of metallurgical testwork results.





### SITE ACTIVITIES

**Early 2017** 

Backhoe samples collected for characterization studies and exploratory metallurgical testing in China and Canada.

- Summer-Winter 2017
  - 80-hole Sonic drill program completed.
  - Bulk sample (14.8 tonnes) collected for metallurgical bench-scale and pilot plant tests.
  - Geophysical studies (cone penetration tests).
  - Environmental baseline studies completed.
- Ongoing
  - Hydrological studies (drilling and modelling)
  - Environmental studies and planning (waste characterization, reclamation planning
  - Plant site selection studies / land acquisition
  - Mine planning / materials handling studies
  - Intensive community consultation





### **RESOURCE DEFINITION**

November 2017

Tetra Tech Canada Inc completed NI43:101/JORC-compliant Indicated and Inferred Mineral Resource Estimate. (Report issued on June 21, 2018.)

### **TENURE AND PERMITTING**

December 2017

Euro Manganese secured registration of Chvaletice resource in Czech Sate Register, the first step in the Project permitting process.

April 2018

Secured Preliminary Mining Permit (Important milestone)

December 2018

Secured 5-year extension to exploration license to 2023

- On-going
  - EIA planning
  - Community consultation
  - Land acquisition program
  - 2018 resource estimate upgrade (Q4 2018)





## **Summer 2017: Drilling & Bulk Sampling**









♠ Sonic drill – modern, effective sampling tool

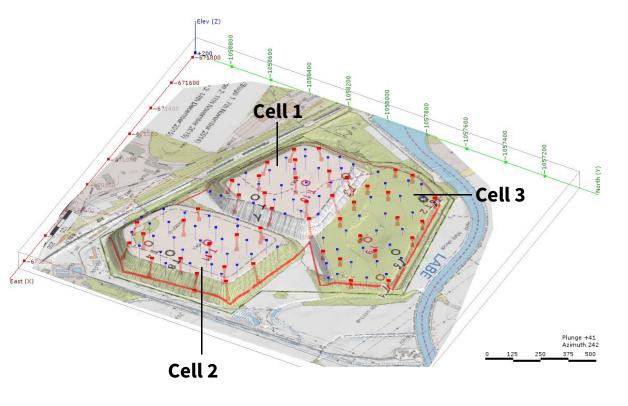
• Sonic drill "core" of soft, sandy tailings material

14.8-tonne bulk sample collected using Sonic drill for metallurgical and pilot plant testing

# Summer 2018: 2nd Drilling & Bulk Sampling Program



## 2018 DRILL PROGRAM HOLE LAYOUT - ONGOING



- 80-Hole 2018 Sonic and auger drill program was designed to upgrade the resource estimate to a Measured and Indicated Status.
- Resulting resource model is expected to form a reliable basis for mine planning and future economic evaluation.
- Angled holes drilled on the periphery of each tailings piles, to better evaluate and sample the harder to reach embankments.
- Representative bulk samples were collected with drill rig to support extensive 2019 metallurgical optimization testwork and process design program.
- Test mining program is planned for 2019.

Completed 2018 Drill holes

## 2018 NI 43-101 Resource Estimate:





### NI43:101/JORC-Compliant Resource Estimate

Updated Resource Estimate issued on December 12, 2018 by Tetra Tech – a leading diversified North American engineering firm with extensive mineral resource estimation and manganese geology experience.

### Chvaletice Mineral Resource Statement, Effective Date December 8, 2018

Tailings Cell #	Classification	Volume (m³)	Tonnage (metric tonnes)	Dry In -situ Bulk Density (t/m³)	Total Mn (%)	Soluble Mn (%)
#1	MEASURED	6,577,000	10,029,000	1.52	7.95	6.49
	INDICATED	160,000	236,000	1.47	8.35	6.67
#2	MEASURED	7,990,000	12,201,000	1.53	6.79	5.42
	INDICATED	123,000	189,000	1.55	7.22	5.30
#3	MEASURED	2,942,000	4,265,000	1.45	7.35	5.63
	INDICATED	27,000	39,000	1.45	7.90	5.89
TOTAL	MEASURED	17,509,000	26,496,000	1.51	7.32	5.86
	INDICATED	309,000	464,000	1.50	7.85	6.05
COMBINED	M&I	17,818,000	26,960,000	1.51	7.33	5.86



### 2017 – 80-hole drilling program findings

- Manganese is for the most part evenly distributed through entire deposit.
- Finely milled, unconsolidated tailings placed above ground expected to result in very low mining and virtually zero ore dressing costs.
- ~80% of manganese is contained in easily leachable manganese carbonate minerals that require no calcination prior to leaching, unlike manganese oxide ore.



### 2018 - 80-hole drilling program

- Upgraded 100% of Resource to Measured and Indicated Categories (98.3% Measured).
- Bulk sampling for 2019 Demonstration Plant.

# Proposed Chvaletice Plant Site: Land Secured!

- 1. November 2017: EMN acquired 100% of 1.7 hectare parcel of land with rail siding (Shaded red on lower map)
- 2. October 16, 2018: closed option to acquire 100% of Czech company that owns 19.94 hectares of strategically-located land (Shaded blue on map), with payments spread over up to 5-years, and tied to permitting progress milestones.
  - Land zoned for industrial use
  - Onsite infrastructure: Two rail spurs and sidings, highway access, gas, water and electrical energy.
  - Located less than 200 metres from Chvaletice tailings. Adjacent to 820 MW power plant, as well as ready-mix concrete and pre-cast concrete plants.



## **Target Project Development Timeline**



### **SHORT TERM MILESTONES**

### **MEDIUM TERM MILESTONES**

2018	2019	2020/2021	2022
Upgrade resource estimate to Measured	Complete NI-43-101/JORC-	Detailed engineering	Start-up, commissioning
and Indicated status	compliant Preliminary Economic Assessment (for both HPEMM and	Complete permitting	and commercial production
Exploratory and Pilot Scale met testwork, process design and optimization studies	HPMSM production)	Project financing	
Confirm ability to produce ultra-high- purity EMM and MSM, meeting highest customer specifications for low-cobalt and high-nickel EV battery formulations	Initiate environmental permitting process - File Project Description early in 2019 and EIA later in the year	Initiate Construction	
Determine target products and specifications for modeling in PEA and Feasibility Study (HPEMM and HPMSM)	Build and Commission Demonstration/ Training Plant in Czech Republic and produce customer bulk samples of finished manganese products		
Plant site selection and land acquisition	Complete feasibility study		
Complete environmental baseline studies	Organizational development		
Intensifying community engagement	Initial offtake agreements and first steps of project financing		
	Intensive community consultation		

## **Going Forward**













## **Chvaletice Manganese Project Highlights**



- Western Europe's largest manganese deposit Could become its only primary producer of HPEMM and HPMSM.
- EMN focus on production of ultra-high-purity manganese products, to serve most demanding customers by 2022.
- EMN strategically located in the heart of Europe, amidst a major emerging cluster of EV, cathode and battery plants.
- EV and battery industry growing rapidly in Europe Investment and plant development wave has been shifting from Asia to Europe. (Is North America next?)
- Chvaletice tailings deposit is well-suited for production of HPEMM and HPMSM, using a combination of clean, modern and commercially-proven technology.

- EMN has secured rights to strategic, industrially-zoned land for plant site adjacent to Chvaletice tailings deposit.
- Valuable, strategic, European alternative and complement to existing and planned HPEMM and HPMSM production.
- Green production: No hard rock mining. Recycling of old mine waste. Self-funding remediation of old environmentally-damaged site. Czech electrical power is made from 48% non-carbon energy sources. Environmentally-superior Mn products.
- Proactive, respectful and increasingly intensive community engagement. Solid permitting momentum.
- Solid EMN management team. Paying great attention to details.







## **Euro Manganese Inc. - Capitalization**



- IPOs completed on ASX and TSX Venture Exchange (October 2nd, 2018).
- 35M Shares at C\$0.25, raised C\$7.62M net proceeds.
- ASX & TSXV Symbol: "EMN"
- Cash position as of 11/30/2018 ~C\$10.0M.
- Current Market Cap. at ~C\$43Mm based on C\$0.25

Capitalization as of December 31, 2018 (Note 1)		
Shares (including 74.5M CDIs)		170,709,600
Options		12,525,000
Warrants		8,684,015
Fully Diluted		191,918,615

Ownership Structure at December 31, 2018			
Directors/Management	35.2M	20.6%	
Institutional	37.8M	22.1%	
Other	97.7M	57.3%	
Total	170.7M	100.0%	





# FOCUS ON ULTRA HIGH-PURITY MANGANESE PRODUCTS

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