# LEADING Emerging Materials Expanding Markets Exceptional Opportunities MATERIALS TSX.V: LEM

**Nasdag First North: LEMSE** www.leadingedgematerials.com

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The Woxna project has never defined a mineral reserve and the previous preliminary economic assessment on Woxna dated October 29, 2013, has been superseded by a technical report dated May 11, 2015. As the Woxna facility is not in production but remains on a production ready status, any future decision to recommence mining at Woxna will not be based on a preliminary economic assessment demonstrating the potential viability of mineral resources or feasibility study of mineral reserves demonstrating economic and technical viability. Under these circumstances, there is increased risk of technical and economic failure for the Woxna project, and Leading Edge discloses additional risk factors relating thereto. Leading Edge advises that it has not based its production decision on a feasibility study of mineral reserves, demonstrating economic and technical viability, and, as a result, there may be an increased uncertainty of achieving any particular level of recovery of minerals or the cost of such recovery, including increased risks associated with developing a commercially mineable deposit. Historically, such projects have a much higher risk of economic and technical failure. There is no guarantee that production will begin as anticipated or at all or that anticipated production costs will be achieved. Failure to commence production would have a material adverse impact on the Leading Edge's ability to generate revenue and cash flow to fund operations. Failure to achieve any anticipated production costs would have a material adverse impact on Leading Edge's cash flow and future profitability. Mineral resources that are not mineral reserves do not have demonstrated economic viability. The estimate of mineral resources may be materially affected by environmental, permitting, legal, title, socio-political, marketing or other relevant issues.

This presentation has been prepared, reviewed and verified by Blair Way, President, CEO and director of Leading Edge who is a Fellow of the Australasian Institute of Mining and Metallurgy, a qualified person as defined by NI 43-101.

# **About Leading Edge Materials**



- Leading Edge Materials is a Canadian public company with principal assets in Scandinavia, a region well recognised for its promotion and investment in innovation.
- LEM's flagship asset is the Woxna Graphite production facility located in central Sweden targeting the supply of specialty materials for lithium ion battery production.
- LEM's core investments are matched to high growth markets, linked to the global shift to low-carbon energy generation and energy storage.
- Our assets and research focus are towards the raw materials for Li-ion batteries (graphite, lithium, cobalt); materials for high thermal efficiency building products (graphite, silica, nepheline); and materials that improve the efficiency of energy generation (dysprosium, neodymium, hafnium).
- LEM is ideally placed to play a pivotal role in the sustainable supply of technology and energy critical materials.

### **Corporate Overview**



CANADA: TSXV : LEM

**SWEDEN:** Nasdaq First North: LEMSE

USA: OTCQX : LEMIF

**GERMANY:** FSE: 7FL

**DAILY VOLUME:** 120,000 shares

INSIDERS: 13%

SHARES ON ISSUE: 88.9M

**FULLY DILUTED:** 105.3 M

**RECENT PRICE:** \$0.75

**52 WK LOW/HIGH:** \$0.51/1.03

MARKET CAP: C\$ 67 M

**CASH:** C\$ 3.4 M



### **Board and Management**



# Bringing together a deep knowledge of mining, emerging technologies and process development for high purity materials.

- ▶ Blair Way (President, CEO & Director) B.Sc., MBA, FAusIMM,

  Mr. Way has over 30 years management experience within the resources and construction industry throughout Australasia,

  Canada, the United States and Europe.
- Mark Saxon (Director) B.Sc.(Hons), GDipAppFin, FAusIMM, MAIG,
  Mr. Saxon has 20 years of experience in exploration and resource geology. He graduated from the University of Melbourne in 1991 with a First Class Bachelor of Science (Honours) in geology
- Michael Hudson (Chairman & Director) B.Sc (Hons), GDipAppFin, FAusIMM, MAIG

  Mr Hudson is an explorationist and entrepreneur. He graduated from the University of Melbourne in 1990 with a B.Sc. (Hons 1st).
- Nick DeMare (CFO): CPA, CA

  Mr. DeMare, a chartered professional accountant, has been President of Chase Management Inc. since 1991, providing accounting, management, securities regulatory compliance and corporate secretarial services to private and public-listed companies.
- Filip Kozlowski (Director): MSc

  Mr. Kozlowski is based in Stockholm and has 15 years of experience in various EU capital market roles, including as an investment manager for private funds, a market trader with a global tier one investment bank, and as an advisor to smaller boutique investment firms.

The team has a long history of operating in the Nordic countries.

#### **LEM – Assets Overview**



With key assets in the Nordic region and research partners across Europe, Leading Edge Materials is working to be a sustainable supplier of a range of critical raw materials.



#### **WOXNA GRAPHITE MINE**

graphite, high purity graphite, graphene

LEM is 100% owner of the fully built, fully permitted Woxna graphite mine and process facility. One of the western world's few graphite producers, and one of only two in Europe, LEM is ideally position to supply graphite to the growing lithium-ion battery market.

#### **KONTIO COBALT PROJECT**

cobalt, copper

LEM is 100% owner of 30,800 hectare Kontio-Sarvivaara reservation which is valid until September 2018.

#### **BERGBY LITHIUM PROJECT**

lithium, tantalum

LEM is 100% owner of exploration permits prospective for lithium, including a new high grade discovery.

#### NORRA KÄRR REE PROJECT

rare earth elements, nepheline, hafnium, zirconium, aluminium

LEM is 100% owner of the Norra Karr rare earth element (REE) project, one of the worlds most significant heavy REE deposits. Norra Karr can also be a significant supplier of a range of other critical metals and minerals.

#### **SWEDISH GRAPHENE PROJECT**

graphene

Woxna graphene is being tested in the Vinnova Aeronautic Composite Technology project to develop polymeric composites which can withstand long term exposure to high temperatures and humid environment.

#### **Markets**



Leading Edge Materials is focussed on the supply of materials needed for the efficient production, storage and conservation of low carbon energy. These high growth markets will drive the future of the Company.

#### **ENERGY PRODUCTION AND STORAGE**



graphite, aluminium, hafnium, REEs

The generation of low-carbon energy from renewable sources, and the efficient storage of that energy, are mega-trends of the 21<sup>st</sup> century. Electric mobility (EV's, HEV, PHEV's) and stationary electricity storage are dependant on high purity graphite, lithium and cobalt.



#### **ENERGY EFFICIENT BUILDING MATERIALS**



graphite, graphene, nepheline, silica

With 60% of the worlds energy needs still met by fossil fuels, energy efficient building products and insulation are essential to lower carbon emissions. A new generation of concrete, coatings, paints and insulation capture heat and reduce energy demands.



#### **POWER TRAIN EFFICIENCY**



dysprosium, neodymium

Transport today accounts for around one third of global energy consumption. Whether electric or internal combustion powered, rare earth element (REE) permanent magnets greatly increase drive train efficiency, and lower energy needs. REE magnets are equally essential in wind energy generation.



Feb 2018 emerging materials expanding market

### The Nordic Advantage



The Nordic region is the mining powerhouse of Europe, with clear exploration and development pathways. The region is an innovation hub, providing many opportunities in critical raw materials.

Strong mining industries with renowned mining + mineral processing equipment manufacturers

Close to European customers via secure transport



Highly efficient industry, low operating costs.



outokumpu

Very supportive of green technologies and innovation with excellent co-investment opportunities





Atlas Copco

**Excellent Infrastructure, low risk** 







**Facebook chose Sweden for its European** datacenter due to low cost renewable energy







# Leading Edge Materials Portfolio















# **LEM** - preparing for the future



LEM has a pipeline of projects starting with the Woxna graphite production facility which is being prepared for production of battery grade graphite products. Lithium and cobalt properties are being de-risked while identifying future development prospects.

- Optimization of the Woxna flow sheet in preparation for battery grade material production
- Working with battery specialist labs and consultants to ensure product lines are tailored to battery customer needs
- Developing relationships with battery customer. Qualification of battery materials in anticipation of future supply relationships
- Drilling of the Bergby Lithium Project to better understand the prospect
- Ground work on the cobalt projects to advance them in the most cost effective manner
- Norra Karr REE project advancing as the market dictates. The PFS is the starting point for the next round of study work

#### **LEM – R&D PROJECTS**



#### LEM has a pipeline of projects underway.

- Optimization of the Woxna flow sheet in preparation for production of battery grade material production
- Vinnova Graphene Energy Project —partners in the project are 2D fab AB, VestaSi AB, Ångström Advanced Battery Centre (ÅABC), Uppsala University (UU) and Mid Sweden University (MIUN). The project objective is to use graphene from the companies Woxna graphite facility to enhance the electrical conductivity and to enhance the mechanical strength of the anode, along with providing a protection of Si particles to reduce the problem associated with formation of the SEI (solid electrolyte interface) layer
- Vinnova High Purity Graphite Battery Project founding partner in the project, along with the Ångström Advanced Battery Centre ("ÅABC"), Uppsala University, Sweden. The project is focused on the application and optimization of high purity natural graphite as anode material for lithium ion batteries, using graphite sourced from Woxna.
- InnoEnergy Li Ion Battery Manufacturing Project partnered with Northvolt AB as a part of an innovation project for the establishment of a Large Scale Battery Manufacturing Project in Sweden. The aim of the project is that LEM will contribute to the production of battery cells through qualification of sustainably produced natural graphite
- Vinnova Graphene Composite Project Graphene Modified Composites for Long-Term and High-Temperature Applications – The project focus is on aerospace and aeronautic applications, and aims to develop graphene modified polymeric materials using graphite sourced from Woxna.

### **Woxna Graphite Mine and Processing Facility**









**Overview:** Leading Edge Materials owns and operates one of the western world's few graphite mines, in central Sweden. The Woxna mine was commissioned in 1997, and is fully permitted for 100,000 tonnes per annum feed which equates to 10,000 tons of graphite per year. The facility has operated intermittently since then. The project includes significant high-grade mineral resources secured by Mining Leases. LEM is focussed on value-add opportunities for the Woxna graphite products, including battery-grade materials, expandable graphite and thermal products.

- Production facility re-opened July 2014
- Measured and indicated resource of 7.7 M tonnes at 9.3% graphite
- Test work to produce high purity graphite for emerging markets has been successful. Optimization work is on-going
- Excellent infrastructure road, power, ports, water and services
- No comparable graphite producer on the TSX or ASX markets
- Unique ability to underpin a secure and sustainable European graphite supply chain.
- Road access to customers, minimizes transport and handling costs for traditional and emerging markets

# **Woxna Graphite Mine - Resources**



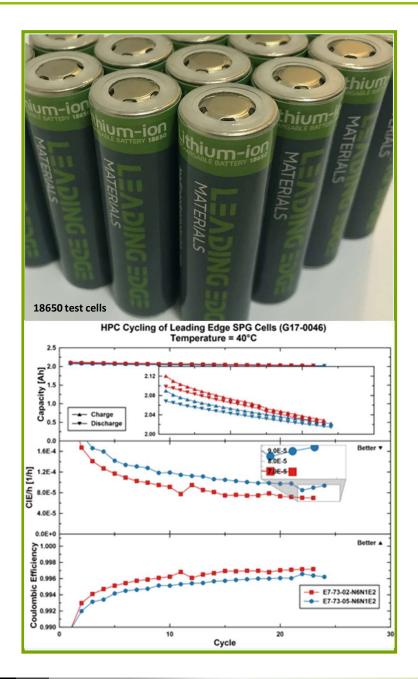
Mining Lease	Classification	Tonnes (Mt)	Graphite ("Cg") %
Gropabo <sup>1</sup>	Indicated	1.5	8.8
Mattsmyra <sup>1</sup>	Indicated	3.4	8.4
Kringelgruven <sup>2</sup>	Measured	1.0	10.7
Kringelgruven <sup>2</sup>	Indicated	1.8	10.7
TOTAL MEASURED		1.0	10.7
TOTAL INDICATED		7.7	9.3

Mining Lease	Classification	Tonnes (Mt)	Graphite ("Cg") %
Gropabo <sup>1</sup>	Inferred	0.7	8.7
Mattsmyra <sup>1</sup>	Inferred	1.2	8.4
TOTAL INFERRED		1.9	8.5

These mineral resources are calculated in accordance with Canadian Institute of Mining, Metallurgy, and Petroleum ("CIM") guidelines and reported within two National Instrument 43-101 reports with effective dates October 11, 2013 and March 24, 2015. See <a href="www.sedar.ca">www.sedar.ca</a> for reports and more information.

# **Woxna Graphite Mine – High Purity Project**





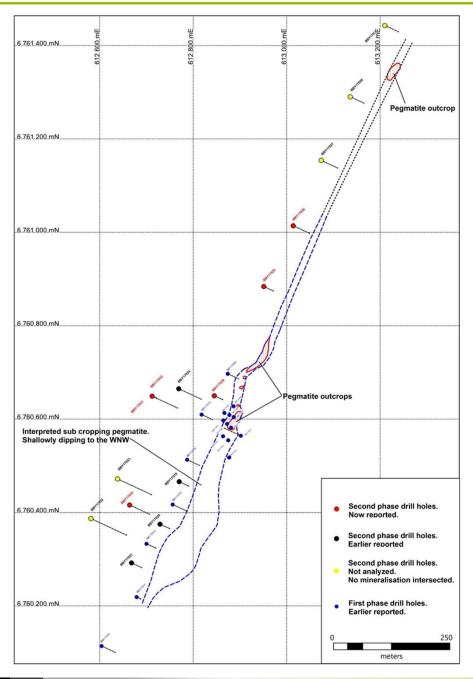
With a fully permitted and constructed facility, Woxna is in a strong position to become a preferred supplier to the growing lithium-ion battery market. A lithium-ion battery is comprised of up to 16% graphite by mass.

High purity (>99.9%) shaped graphite is required, the production of which is presently concentrated in China.

- Recent HPC test results on 18650 cells made using Woxna graphite concentrate has yielded excellent result for automotive grade battery material
- Jet milling of this high purity concentrate at Uppsala University yielded very high discharge rates and packing density
- Engineering and optimisation of the value add process to produce high value battery grade materials is well advanced
- LEM has used commercial processes from both Chinese and
   Western partners to define the commercial value add process
- LEM is working with graphite end users in the LIB market to align our product specification targets with their requirements

# **Bergby Lithium Project**





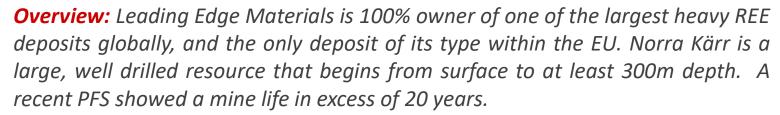
- Newly discovered lithium project in central Sweden, less than 100km from the Woxna graphite mine and close to major infrastructure.
- Bergby lies in central Sweden, 25km north of the town of Gävle, secured by three exploration licenses that cover a total of 1,903 Ha.
- The site is close to infrastructure, with major roads, rail and power supply passing immediately adjacent to the claim boundaries.
- Bergby has been tested by a total of 1525m of drilling in 33 drillholes to a maximum depth of 131.1m over an approximate 1500m strike length.
- Drilling intersected regular high lithium grades, and increased tantalum grades in some of the more northly drill holes.
- Preliminary petrographic studies indicate the presence of the lithium minerals spodumene and petalite, which should support a traditional mineral processing path.



#### Norra Kärr REE Project - Sweden







LEM is focussed on adding value to high value by-product materials from Norra Kärr, including nepheline, silica, aluminum, zirconium and hafnium.



- Norra Kärr is a nepheline syenite intrusion which is 300m wide, 800m long and begins at surface
- REE metals are hosted by the mineral eudialyte which dissolves easily in sulphuric acid
- Resource grade of 0.61% TREO. 52% HREO/TREO = high basket price
- PFS was completed January 2015. Can produce > than 200 t of dysprosium oxide per year for at least 60 years.



- The extraction process requires no new technologies, uses common chemicals and equipment
- Only advanced REE project in the EU with extensive transport/ power/water infrastructure. Close to major European REE consumers
- Numerous value-add opportunities

# Leading Edge Materials

# Critical Materials Market Defined









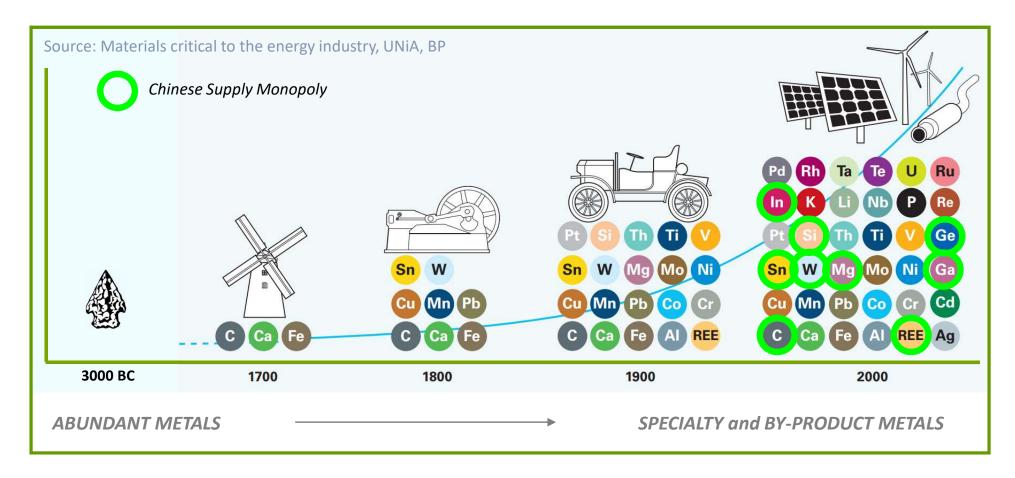






# **Emerging Materials, Expanding Markets**





The Past is No Guide to the Future. The exciting technologies of the 21<sup>st</sup> century are enabled by the properties and potential of minor metals and new materials. The properties of iron, zinc and copper are well known, while new metals and materials open the door to higher function, lower energy use, and greater resource efficiency.

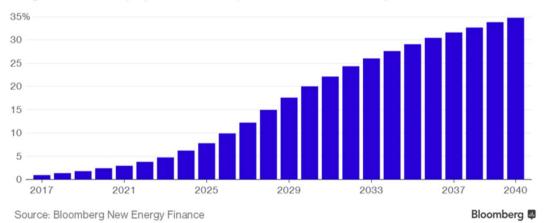
Secure and sustainable sources are needed if we are to reduce our carbon emissions.

# The LIB Market is Changing – Bloomberg - Europe Gigaplants



#### **Electric Cruising**

Plug-in vehicles are projected to make up a fifth of new car sales by 2030



#### Cheaper, Faster

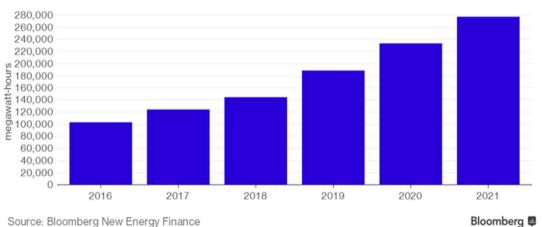
Lithium-ion batteries are expected to get a lot more affordable very quickly



Source: Bloomberg New Energy Finance

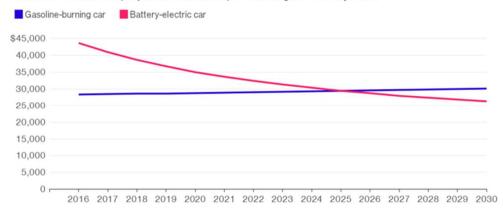
#### **Battery Boom**

Global battery manufacturing capacity is set to more than double by 2021



#### **Bargain Option**

Electric vehicles are projected to be cheaper than regular cars by 2026



Source: Bloomberg New Energy Finance Note: Data is for medium-sized cars in U.S. prices

Bloomberg 4

Feb 2018

# Meeting the future LIB Market in the EU











**BMZ** 

Nissan/renault

Jaguar/LandRover/ BMW/Ford

Volkswagen

Tesla

TerraE









Northvolt

DaimlerMercedes

LG Chemical

Samsung1

Samsung2

# LEM - The Right Place, The Right Time



HIGH GROWTH SECTOR

**Leading Edge Materials** is positioned to supply critical raw materials to the high growth low carbon energy sector. Electrification of vehicles and renewable energy generation are forming mega-trends of the 21<sup>st</sup> century.

RIGHT LOCATION With assets and a team in innovation-rich Scandinavia, Leading Edge Materials is well placed to play role in the raw material needs of Europe. Both Sweden and the EC provide excellent co-funding opportunities to accelerate research.

UNIQUE ASSET MIX

Leading Edge Materials owns projects which include graphite, lithium, cobalt, REEs, tungsten, zirconium, hafnium, niobium and nepheline. This unique asset mix includes many materials for which Europe is entirely import dependant.

VALUE ADD OPPORTUNITIES

The project portfolio of Leading Edge Materials provides unique value-add opportunities. Producing high purity graphite at Woxna, optimizing hafnium, nepheline or aluminium flowsheets for Norra Kärr can create immediate value.

NEW INVESTMENTS

Leading Edge Materials lies in strong position to find opportunities in emerging materials and markets in Europe. Our strong research focus, and deep mining industry network provides a strong flow of ideas.

SKILLED AND EXPERIENCED TEAM

The experienced team behind Leading Edge Materials brings together the technical and market knowledge to take advantage of all projects and opportunities.