Closing the Loop on the Battery Supply Chain

Unit 2 - 17942 55 Ave
Surrey, BC V3S 6C8
Canada

+1-778-574-4444

zmeseldzija@amymn.com

www.americanmanganeseinc.com

TSX.V: AMY | OTCQB: AMYZF | FSE: 2AM
Disclaimer

This presentation contains “forward-looking information” which may include, but is not limited to, statements with respect to the future financial or operating performance of American Manganese Inc. (the “Company”), its subsidiaries and its projects; the timing, costs and anticipated results of tests carried out on the Company’s proprietary process; assumptions, estimates or projections of future potential income; assumptions, estimates or projections of the state of markets and industries relevant to the Company’s products and services; and assumptions, estimates or projections of government regulation of the Company’s industry and markets. Often, but not always, forward-looking statements can be identified by the use of words such as “plans”, “expects”, “is expected”, “budget”, “scheduled”, “estimates”, “forecasts”, “intends”, “anticipates”, or “believes” or variations (including negative variations) of such words and phrases, or state that certain actions, events or results “may”, “could”, “would”, “might” or “will” be taken, occur or be achieved. Forward-looking statements involve known and unknown risks, uncertainties and other factors which may cause the actual results, performance or achievements of American Manganese Inc., and/or its subsidiaries to be materially different from any future results, performance or achievements expressed or implied by the forward-looking statements. Such factors include, among others, general business, economic, competitive, political and social uncertainties; the actual results of testing activities; actual results of production activities; conclusions of economic evaluations; changes in project parameters as plans continue to be refined; failure of plant, equipment or processes to operate as anticipated; accident, labor disputes and other risks; and delays in obtaining governmental approvals or financing or in the completion of development or construction activities. Although American Manganese Inc. has attempted to identify important factors that could cause actual actions, events or results to differ materially from those described in forward-looking statements, there may be other factors that could cause actions, events or results to differ from those anticipated, estimated or intended. Forward-looking statements contained herein are made as of the date of this presentation and American Manganese Inc. disclaims any obligation to update any forward-looking statements, whether as a result of new information, future events or results or otherwise. There can be no assurance that forward-looking statements will prove to be accurate, as actual results and future events could differ materially from those anticipated in such statements. American Manganese Inc. undertakes no obligation to update forward-looking statements if circumstances or management’s estimates or opinions should change. Accordingly, the reader is cautioned not to place undue reliance on forward-looking statements.

This presentation is for informational purposes only and is not an offering of securities nor a solicitation for the sale or purchase of securities.
Lithium-ion Battery Components and Cost

Inside the Lithium-ion Battery

Estimated Lithium-ion Battery Material Costs

Cathode Material 49%
Anode Material 16%
Binder 3%
Conductive Carbon 1%
Positive Current Collector 2%
Negative Current Collector 5%
Separator 16%

Packaging Foil 2%
Electrolyte 6%

Cathode Material Breakdown:
- Active cathode material: Li, Co, Ni
- Carbon black and binder: e.g., PVDF
- Aluminum: current collector
- Copper: current collector
- Electrolyte solution
- Separator plastics

Electrode material costs:
- Cathode: 31%
- Anode: 22%
- Binder: 3%
- Conductive Carbon: 1%
- Positive Current Collector: 2%
- Negative Current Collector: 5%
- Separator: 16%
- Electrolyte: 6%
- Packaging Foil: 2%

Source: Argonne National Laboratory.
Complex and Linear Battery Supply Chain

- **Li**₂**CO**₃
- **Li**₂**CO**₃
- **Li**
- **Ni**
- **Co**
- **MnSO**₄
- **CoSO**₄
- **NiSO**₄
- **LiNiCo**

**American Manganese Inc.**

Refining

Battery and EV Manufacturing

PCAM & CAM

Precursor Cathode Active Material and Lithium

Cathode Active Material

Battery and EV Manufacturing

Li Ni Co

Precursor Cathode Active Material and Lithium

Cathode Active Material

PCAM

Battery and EV Manufacturing

Li Ni Co

Precursor Cathode Active Material and Lithium

Cathode Active Material

PCAM

Battery and EV Manufacturing

Li Ni Co

Precursor Cathode Active Material and Lithium

Cathode Active Material

PCAM

Battery and EV Manufacturing

Li Ni Co

Precursor Cathode Active Material and Lithium

Cathode Active Material

PCAM
Closing the Loop on the Battery Supply Chain

Battery Material Feedstock for Hydrometallurgical Processing

- Battery Production Scrap
- Black Mass
Cathode Scrap from Battery Production
Gigafactories

Over 800 GWh of Planned Battery Production by 2025
Battery Production

Complex and Costly Processing Steps = Off-Spec and Valuable Battery Materials = **Near Term Recycling Opportunity**

*Source: ScienceDirect - Current and future lithium-ion battery manufacturing*
Battery Production Scrap

TESLA Panasonic Cell Production

Percent of Apparent Capacity

- GF1 Battery Yield Rate
- GF1 Battery Yield Loss

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>45%</td>
<td>58%</td>
<td>16%</td>
<td>31%</td>
<td>72%</td>
<td>75%</td>
<td>77%</td>
<td>71%</td>
<td>76%</td>
<td>80%</td>
<td>73%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Panasonic Investor Presentation, Tesla Company Reports

39% Average Quarterly Cell Production Loss
## Recycling Battery Production Scrap

### 80 GWh of Battery Production Scrap (10% Scrap Rate of 800GWh)\(^1\)

<table>
<thead>
<tr>
<th>Material</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lithium</td>
<td>9,500t</td>
</tr>
<tr>
<td>Cobalt</td>
<td>16,000t</td>
</tr>
<tr>
<td>Nickel</td>
<td>48,000t</td>
</tr>
<tr>
<td>Manganese</td>
<td>15,000t</td>
</tr>
</tbody>
</table>

### Mine Production by Country in 2020\(^2\)

- **6,200t** from Argentina
- **9,500t** from Canada and Russia
- **49,000t** from Cuba
- **3,300t** from Australia

**Source:**

1. Calculation based on NMC622 cathode chemistry
2. Data from the USGS.gov

---

TSX.V: AMY | OTCQB: AMYZF | FSE: 2AM | December 2021

American Manganese Inc. | 10
Black Mass from End-of-Life Batteries
Projected Electric Vehicle Growth

End-of-Life Battery Recycling Stages

All Stages Defined as Recycling

Stage 0: End-of-Life Battery Collection and Storage (OEM / Third Party)

Stage 1: Mechanical Size Reduction (OEM / Third Party)

Stage 2: Hydrometallurgy (RecyLiCo Process)

Precursor Cathode Active Material and Lithium
RecycLiCo Solution

Reduce supply chain complexity from conventional mining process
Recycling

- Over **99% leach extraction** efficiency of Li, Ni, Mn, and Co
- Capable of recycling NMC, NCA, LCO, and LMO battery chemistries
- Proven high efficiency with the RecycLiCo Pilot Plant project

**RecycLiCo Pilot Plant**

- NMC Mixed Hydroxide Precipitate
- NCA Mixed Hydroxide Precipitate
**Upcycling**

- Upcycling extracted battery materials into NMC532, NMC622, and NMC811 cathode precursors

- Benefits:
  i. Compress battery supply chain
  ii. Produce high value end product
  iii. Reduce transportation related costs and emissions
Lithium Extraction

- Production of high purity Li₂CO₃, LiOH, or Li₂SO₄
- Over 99% extraction and purity
- Closed-loop regeneration of process chemicals and water
Hydrometallurgy ≠ Hydrometallurgy

+ Direct production of high value battery materials
+ Over 99% extraction of Li, Ni, Mn, and Co
+ Closed loop
+ Minimal processing steps

- Low-value and intermediate-grade products
- Complex processing and purification steps
- Large consumption of reactants and energy
- Extensive liquid and waste production
- Low Li recovery

Competitors

American Manganese Inc. | 18
Road to Commercialization

Pilot Plant / R&D
• Tested multiple samples of black mass and cathode scrap from third parties
• Proven high purity lithium and PCAM production

Demonstration Plant
• Completed mass and energy balance modelling
• Major equipment on-route with operation start-up expected in early 2022
• 500 kg/day cathode material processing capacity

Commercial Plant
• Licensing and Joint Venture business model (Technology Partner)
Circular Supply Chain Business Opportunities

RecycLiCo Licensing and JV model adds value to the supply chain

- “Close the loop” by integrating specialized RecycLiCo technology alongside existing battery footprint
- Reduce transportation associated costs and emissions with an in-house and recycling plant
- Reduce reliance on mined materials and gain control over the battery supply chain
- Environmentally friendly and circular supply of critical battery materials
- Recover maximum value from producer’s own battery supply
- Adhere to increasing Extended Producer Responsibility (EPR) and recovery rate legislation
# American Manganese Summary

<table>
<thead>
<tr>
<th>Headquarters</th>
<th>British Columbia, Canada (est. 2010)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patents</td>
<td>US, Canada, Japan, Korea, India, and China</td>
</tr>
<tr>
<td>Business Model</td>
<td>License / Joint Venture / Technology Partner</td>
</tr>
</tbody>
</table>

“Extractions of 100% for both lithium and cobalt were achieved from cathode powders used for lithium-ion batteries” – August 4, 2016

“Located in Greater Vancouver, Canada, the fully integrated and continuous RecycLiCo™ demonstration plant has been designed to simulate real-world operating conditions” – October 20, 2021
- American Manganese’s research and development contractor
- Privately-owned contract research and development company with over 350 clients worldwide
- Specialize in extractive metallurgy, chemical and environmental processing, cleantech and specialty chemical analysis
- Over 30 technical, scientific, engineering, and support staff with diverse specialties
Recycle With Us

zmeseldzija@amymn.com

www.americanmanganeseinc.com | www.recyclico.com

@AmerManganese

linkedin.com/company/american-manganese-inc

/AmerManganese

American Manganese Inc.