



Making Lithium-ion  
Last *Forever.*<sup>TM</sup>



TSX.V: AMY | OTC-US: AMYZF | FSE: 2AM

July 2020



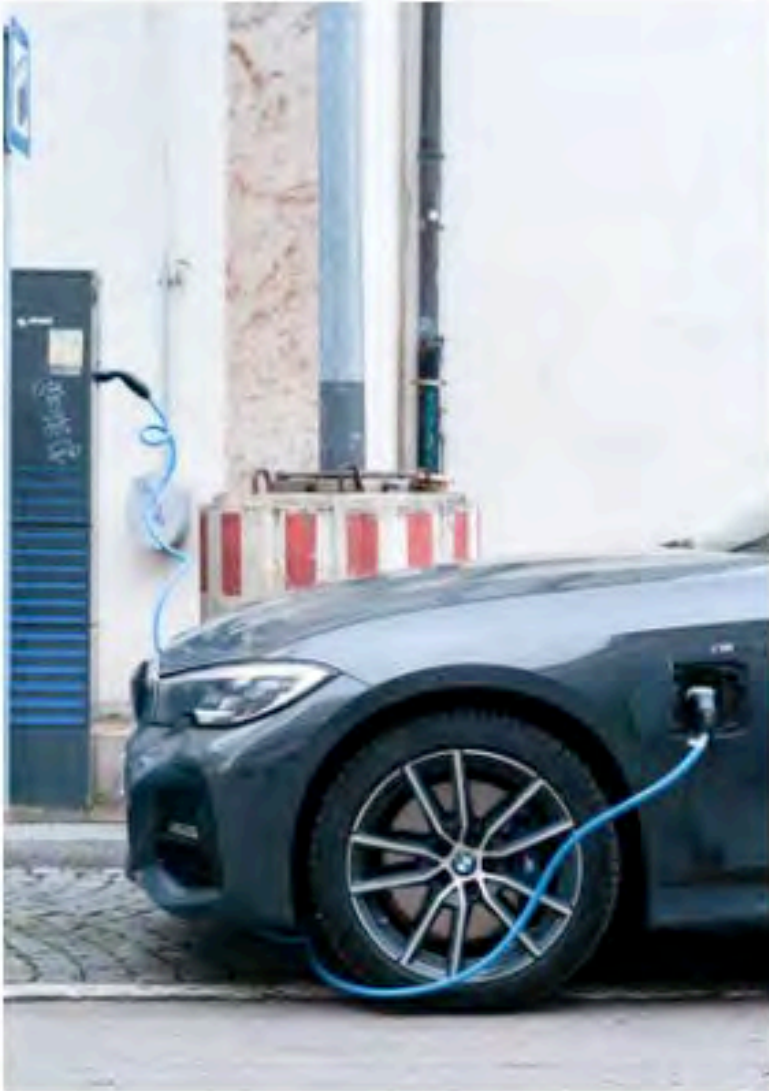
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Beginning of a New Era



# Inevitable Future





# Current Options - Smelters



1

## Harmful Emissions

Smelting oxides requires a fuel and generates about 2 tonnes CO<sub>2</sub> per tonne of metal

2

## Low Recovery

40%-60% of the nickel and cobalt and no lithium recovery

3

## Additional Steps

Requires major processing to make cathode ready precursors

# Current Options - Shred and Collect



## 1 Shred

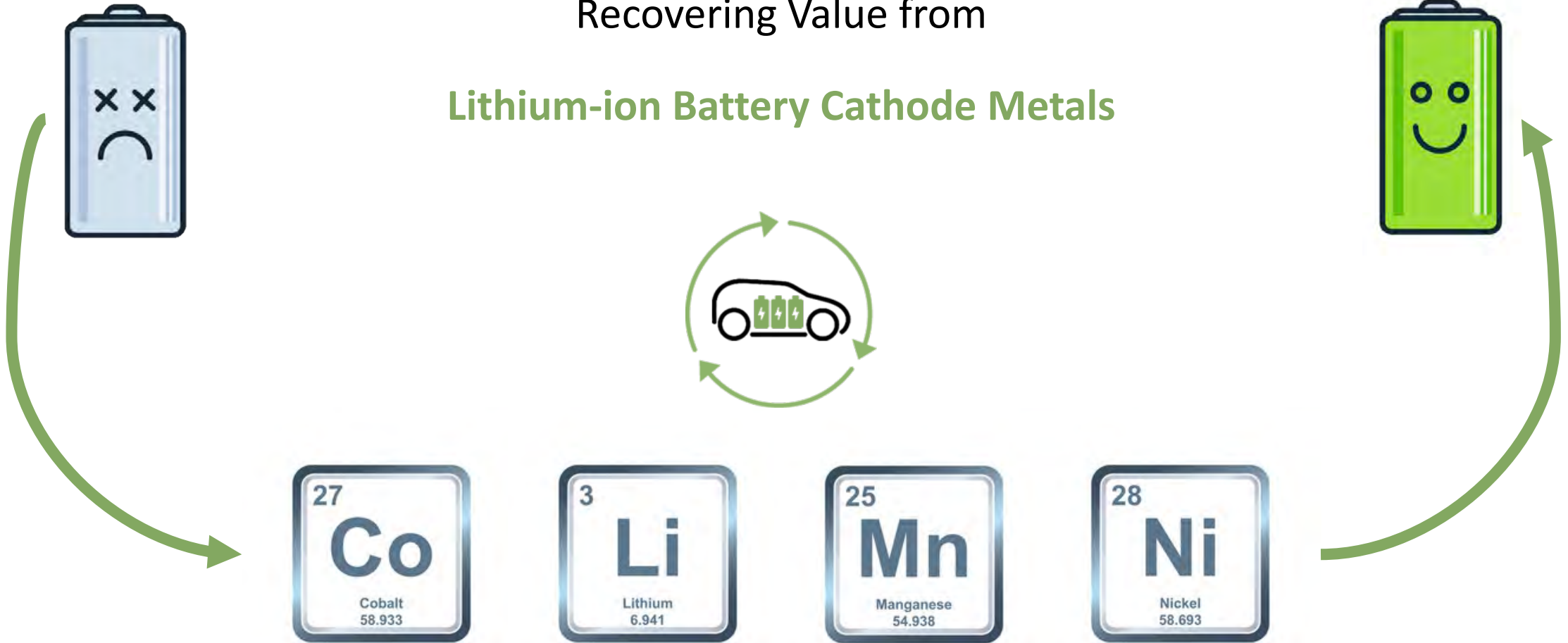
Low value sludge is produced and sold to open market

## 2 Collect

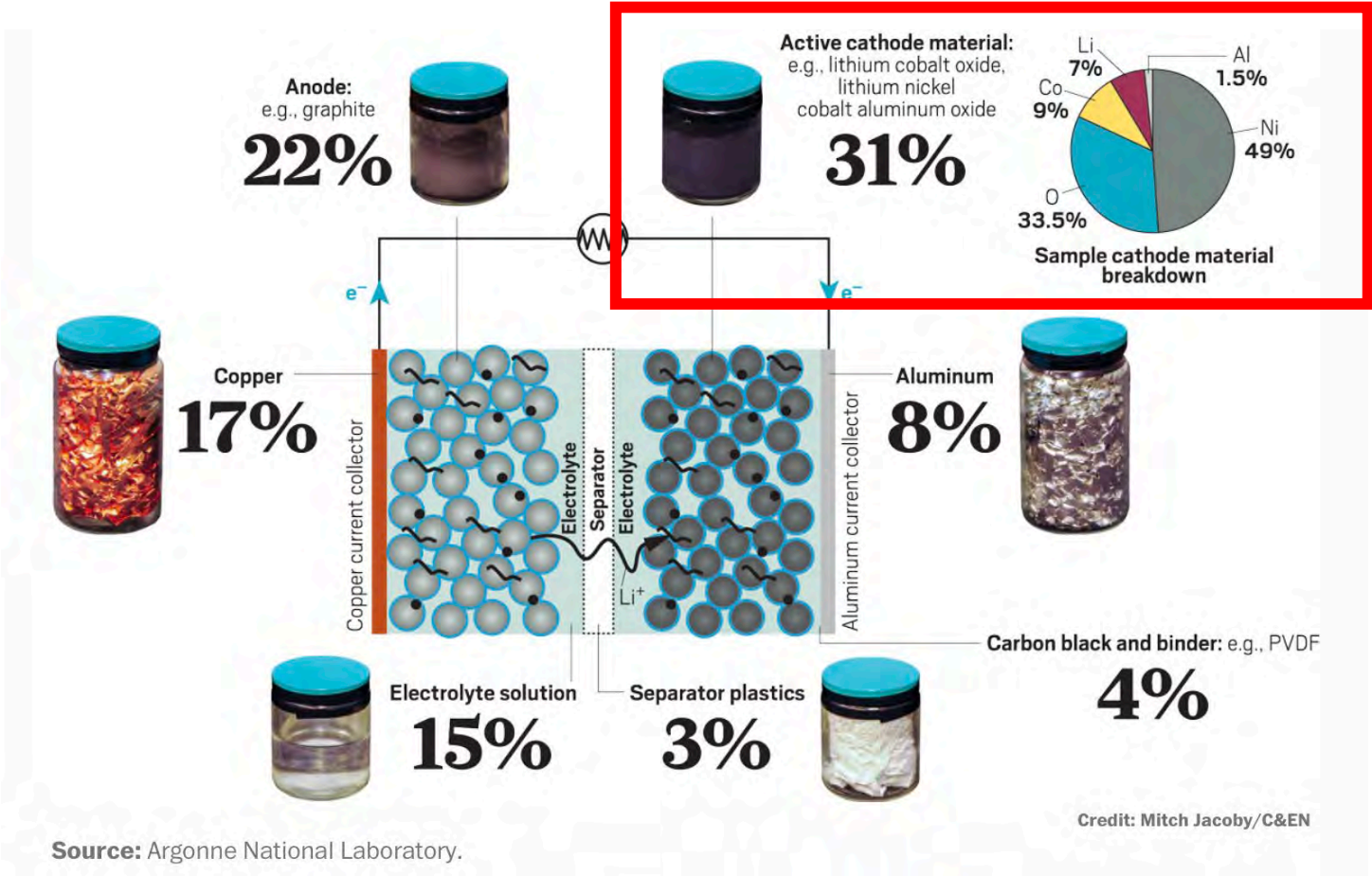
Collected by off-shore refiners

# Company Objective

Recovering Value from  
Lithium-ion Battery Cathode Metals

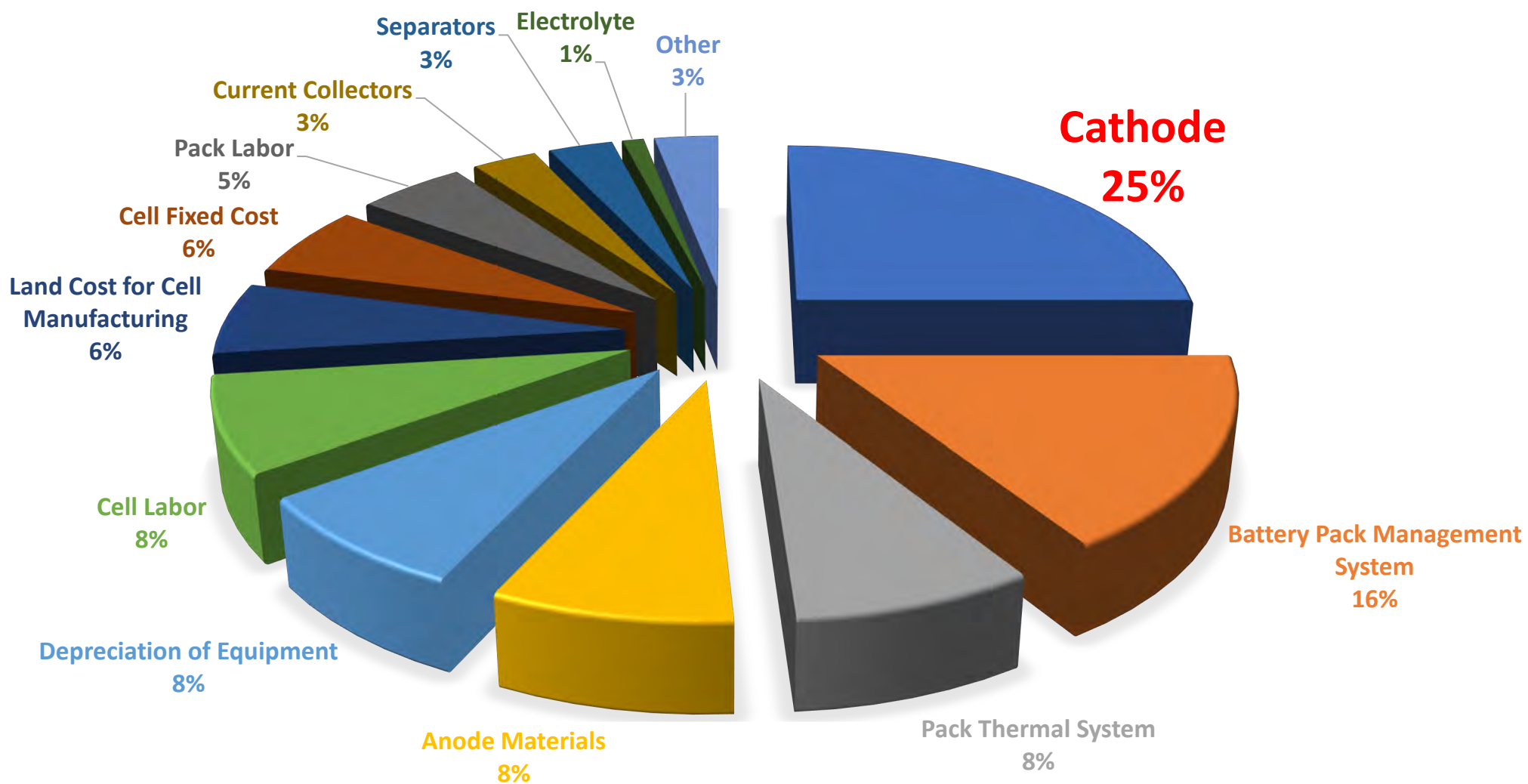


# Inside Lithium-ion Batteries





# Fully Burdened Lithium-ion Battery Pack Cost Breakdown



# Growing Demand for Lithium-ion and Production Waste



Planned Battery Manufacturing Capacity by 2028:

1,956,000,000 kWh

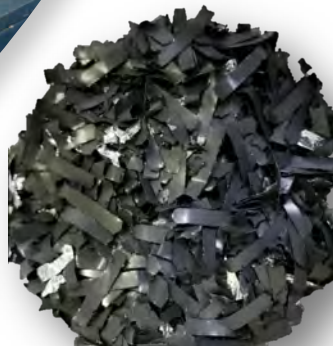


20M+ Tesla Model S Battery Packs

## Estimated Battery Manufacturing Waste



# Pilot Plant Recycling



Cathode Manufacturing Waste



Nickel-Manganese-Cobalt (NMC) Precipitation



High Purity NMC (99.93%)



Nickel-Cobalt-Aluminum (NCA) Precipitation



High Purity NCA (99.94%)



RecycLiCo<sup>TM</sup>  
PATENTED PROCESS

Making Lithium-ion  
Last *Forever*.<sup>TM</sup>

An Innovation of



AMERICAN  
MANGANESE INC.

CATHODE SCRAPS



RECYCLED ALUMINUM FOIL



RECYCLED HIGH PURITY  
NICKEL-COBALT HYDROXIDE



RECYCLED HIGH PURITY  
LITHIUM CARBONATE



**RecycLiCo™**  
PATENTED PROCESS

Making Lithium-ion  
Last *Forever.*™

*An Innovation of*



**AMERICAN**  
MANGANESE INC.



**99.99% Pure Nickel-Cobalt Sulfate  
Produced From Tier 1 NCA Cathode Scraps  
Using the RecycLiCo™ Patented Process**





### **Patent No. 10,246,343**

United States Patent and Trademark Office granted patent for lithium-ion battery recycling process and recovery of cathode materials on April 2, 2019

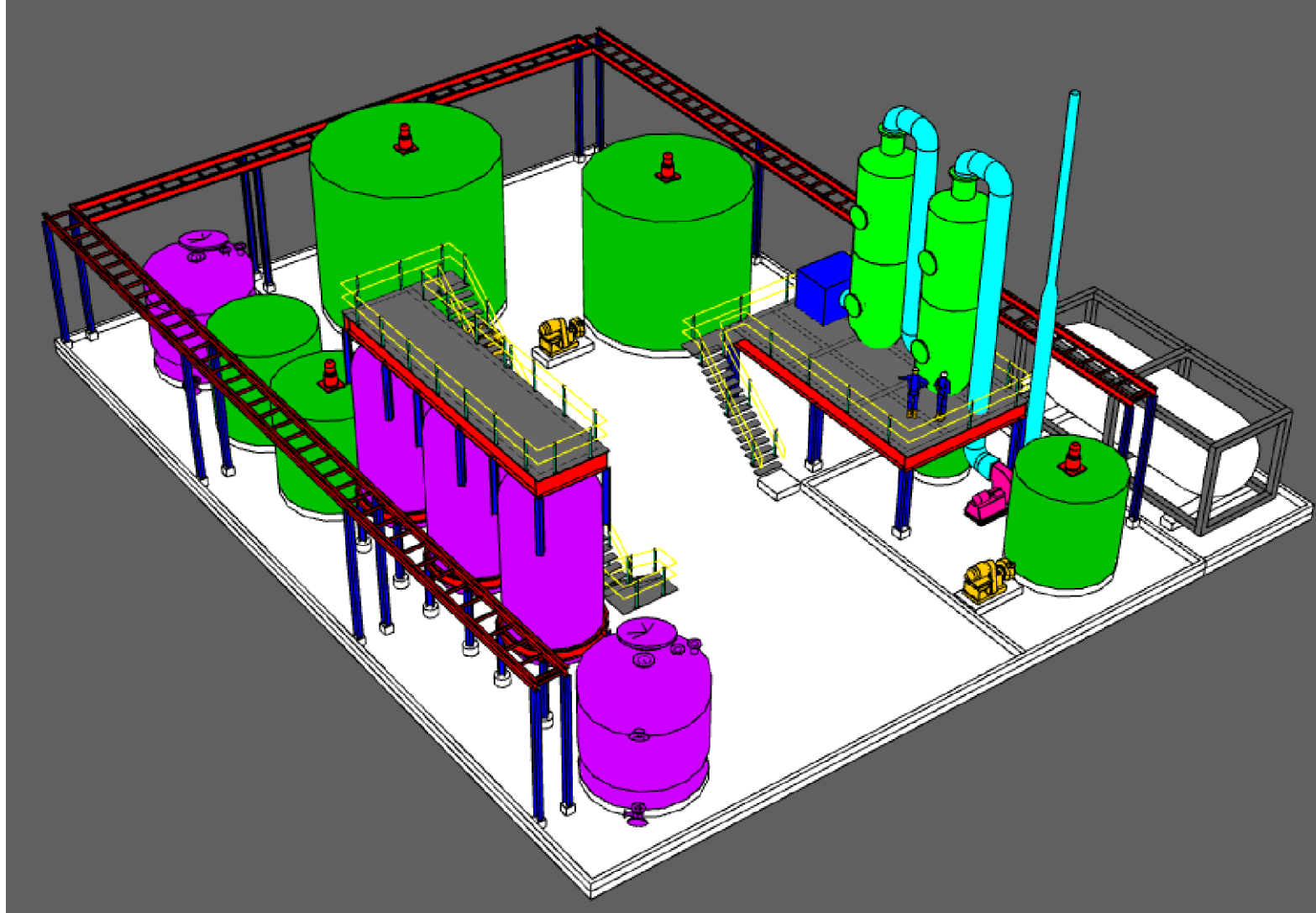
### **Patent No. 10,308,523**

United States Patent and Trademark Office granted patent on June 4, 2019 for:

- Recovery of graphite and carbon from ground battery concentrates
- Treatment of fluoride originating from electrolyte solution
- Separation of aluminum from cathode active material

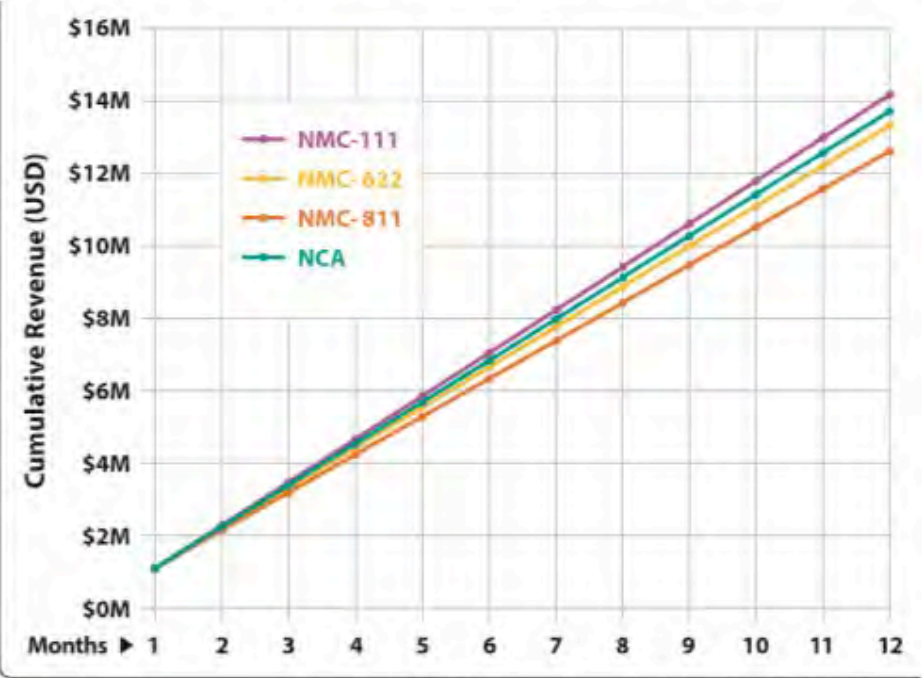


# Commercial Demonstration Recycling Plant (3 Tonnes/Day)



# Financial Model

## Pro-Forma 3 TPD Commercial Demonstration Plant



Revenue is based upon 95% recovery of cathode materials and commodity prices as of January 13th, 2020.

Type	Li2CO3 (kg)	Co (kg)	Ni (kg)	Mn (kg)
NMC-111	1,092	580	578	541
NMC-622	1,086	347	1,035	323
NMC-811	1,082	173	1,376	161
NCA	1,096	262	1,393	0

Metal	Li2CO3	Co	Ni	Mn
Market Price (USD/kg)	\$10.00	\$33.00	\$14.00	\$2.00

Estimated Revenue Based on a **3 Tonnes/Day** Commercial Demonstration Plant

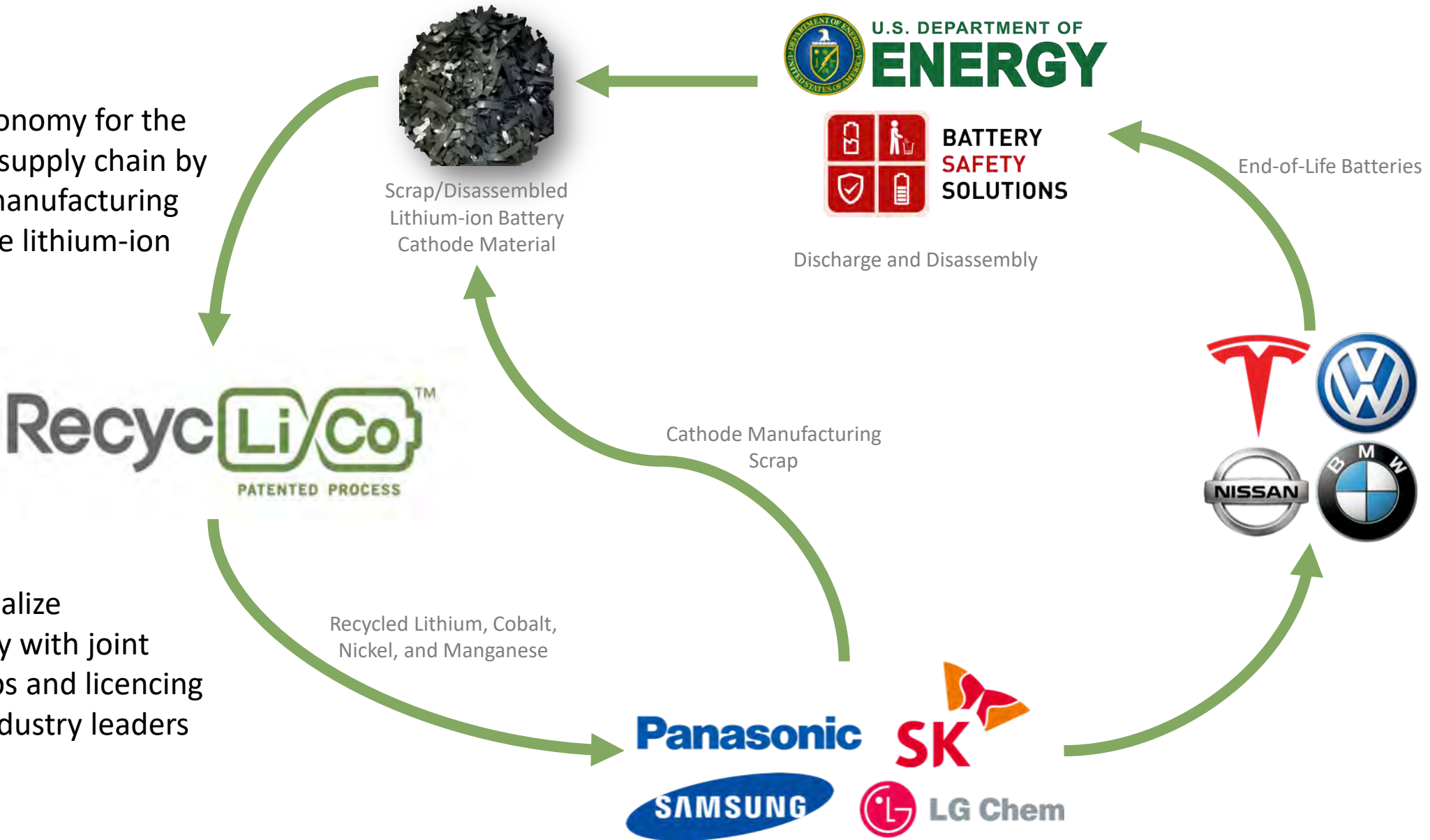
Estimated Capital Cost of **US\$12 Million**

Reagent Consumption Cost Less Than **\$1/kg** of Cathode Material Processed

# Business Strategy

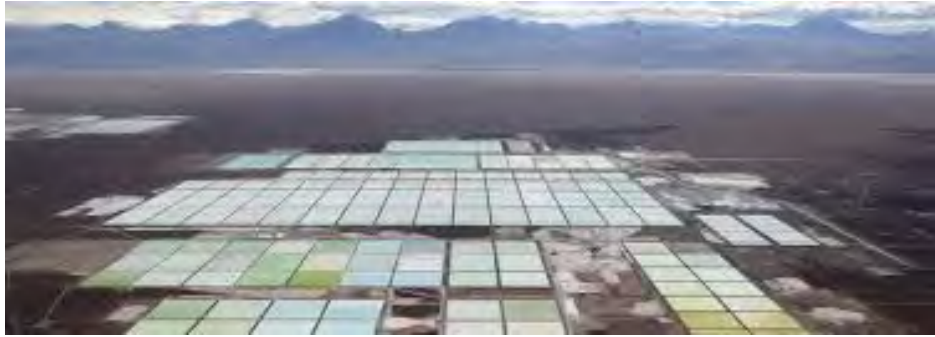
Create a circular economy for the lithium-ion battery supply chain by recycling cathode manufacturing scrap and end-of-life lithium-ion batteries

Intend to commercialize intellectual property with joint venture partnerships and licencing agreements with industry leaders





# Battery Metal Supply Chain



## LITHIUM

Mining: South America  
Processing: South America



## ALUMINUM

Mining: Australia  
Refining: Middle East, Canada

## NICKEL & COBALT

Mining: DRC, Canada  
Smelting: China, Canada, Europe  
Refining: China, Canada, Europe



## MANGANESE

Mining: Africa  
Refining: USA/China/Europe



# Contact Us



[lreaugh@amymn.com](mailto:lreaugh@amymn.com)



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