

iM3NY

iM3NY Recycling Strategy: a Full 360° Circular Economy

Upcycling, Recycling and Second Life



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iM3NY Partner C4V: Recycling Concept 10 Years Old

- 2011** - Key discovery
- 2012** - First patent filed
- 2013** - Performance validated
- 2014** - C4V established
- 2015** - Market traction (licensed)
- 2016** – First Recycling Partner qualification begin
- 2017** – **Second Recycling partner qualification begin**
- 2018** – Third Recycling Partner qualification begin

3 Recycling Companies Partnered

Leadership: The leadership team at C4V and iM3NY empowers its team to think creatively, critically, and holistically.

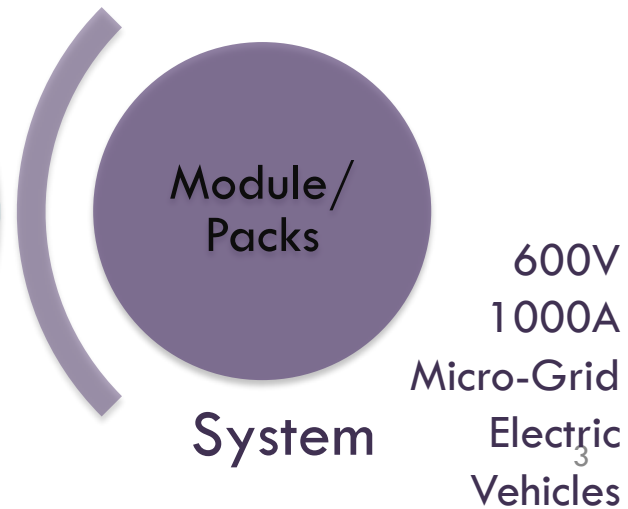
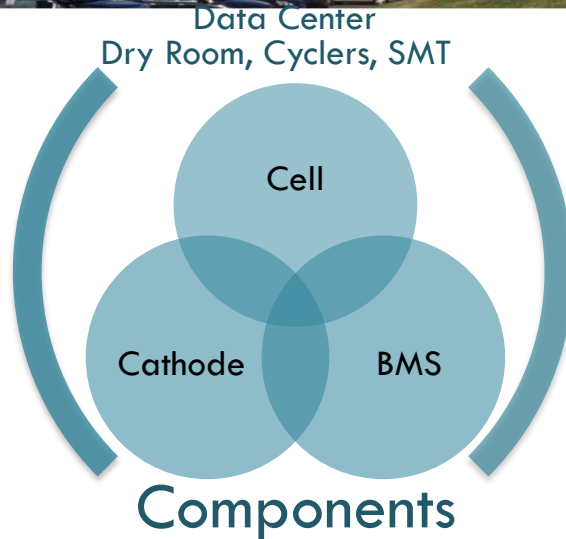
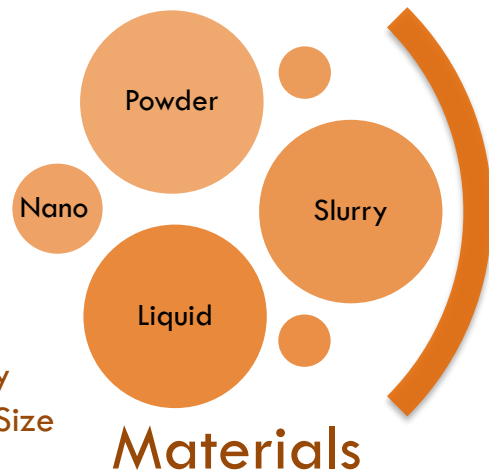
C4V and iM3NY have spent many years identifying and recruiting experienced, highly-talented individuals to its executive core. The current team has over 100 years of cumulative lithium-ion battery materials, design and manufacturing expertise, with critical knowledge in electrochemistry and particle engineering that facilitate expedited commercialization of lab developments to the production floor and market.

C4V Development Center: Accelerating Recycling Test Plans

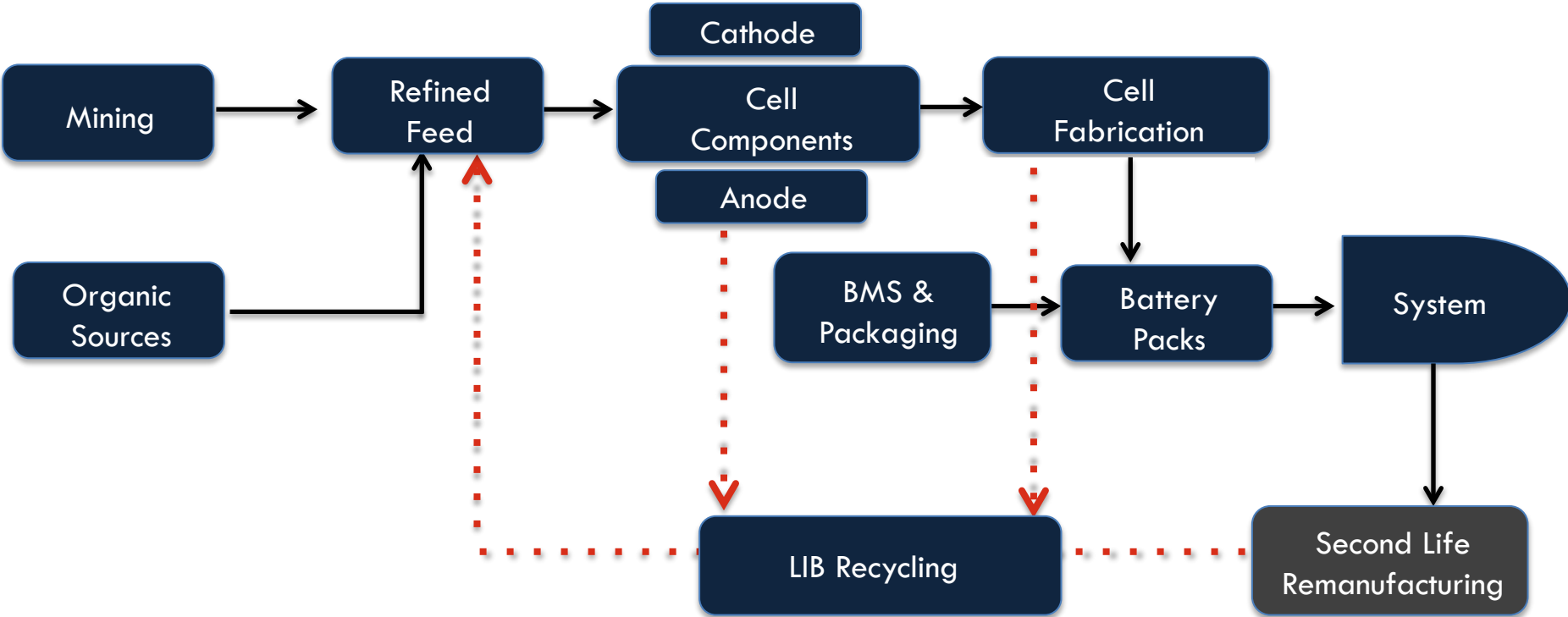


C4V Office

- XRD
- SEM
- TEM
- TGA
- DTA
- XPS
- FIB
- BET
- ICP
- FTIR
- EELS
- TGMS
- Raman
- Rheology
- Particle Size



Our Li-ion Supply Chain and Recycling: Close Loop Efforts



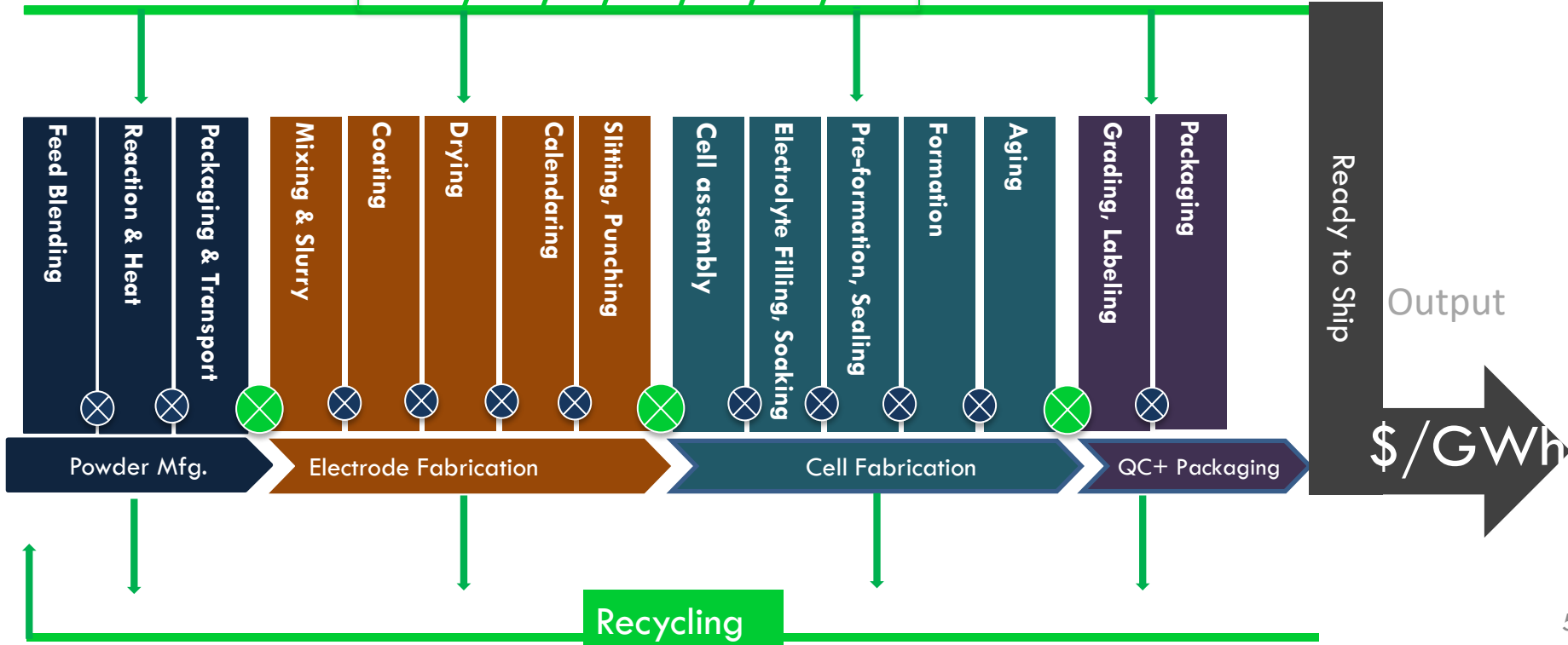
Recycling Stream from Production Lines

Additive Manufacturing

Input

Artificial Intelligence + Robotics in Manufacturing

\$/kWh \$/Km \$/L \$/m² \$/pc \$/Hr \$/Kg



Components That Can be Recycling: 99.99% Reusable

20+ Components = High (Precision + Throughput) Manufacturing

Cathode	Anode	Electrolyte	Separator	Cell Casing
<ul style="list-style-type: none">• Active Material• Binder (PVDF)• Super P• Current Collector (aluminum)• Other Additives	<ul style="list-style-type: none">• Synthetic graphite• Natural Graphite• Carbon Black• Binder (CMC)• Binder (SBR)• Current Collector (Copper)	<ul style="list-style-type: none">• Solvent A• Solvent B• Salt• Additives	<ul style="list-style-type: none">• Mono PP• Tri layer• Ceramic• Non woven	<ul style="list-style-type: none">• Can• Lid• Vent/• Spacer• Core Rod• Tabs• Washer• Pouch
5+	5+	4+	1+	5+

Repurposing & Recycling: Economic Benefits

- The number of lithium-ion batteries becoming available annually for remanufacturing, recycling and repurposing is likely to exceed 3,000,000 between 2029 and 2032 as well as reaching 50% of new vehicle demand between 2020 and 2033. Thus, a sufficient number of batteries will be available.
- Cost benefit analysis shows that remanufacturing is also an economically feasible, saving approximately 40% over new battery use. Repurposing is likewise economically feasible if research and development costs for new applications are less than \$82.65 per kWh for upper bound sales price of \$150.00 per kWh.
- For a lower bound in R&D expenses of \$50 per kWh, the lowest economic sales price is \$114.05 per kWh. Recycling becomes economically feasible when the price of lithium salts increases, which is possible with increasing demand for lithium-ion batteries.
- For majority of manufacturing plant to keep up with the pace and cost, Recycling would become very important for good control over the supply chain. Could bring up to 10% overall cost savings.

Summary

- C4V and iM3NY has spent several years to identify partners to establish recycling
 - To bring greener batteries with time
 - Improve upon cost
 - Lower foreign dependency
 - Add more local value, also mean local economic impact
- Company has full overview on technology as well as cost associated with recycling and up-cycling
- iM3NY's Endicott plant would be leading factory globally to have such close loop, and domestic supply chain with lowest possible toxic footprint as well as local value add.
- iM3NY would work with its customers to send dead batteries to its recycling partner for more efficient supply chain.

Contact

Charging Ahead!!!

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