

Welcome SP Members!

Battery Solutions Overview and Tour

Battery Solutions



Founded in 1992 in Southeastern Michigan



Largest battery recycling company in North America, processing more than 50 million pounds, annually



Mesa, AZ operations opened in 2007



First R2:2013/RIOS™ certified battery recycler



140+ employees



Acquired in 2012 by a group of private equity investors with principal investments focusing on clean technology and environmental practices



Acquired P4C Global in 2018 to further reuse and repurpose

Howell, Michigan

Headquarters

- 60,000 SQFT
- All business functions
- Compliant storage
- Sorting
- Disassembly
- Aggregation
- Fulfillment

- 38,000 SQFT
- Compliant storage
- Sorting
- Aggregation
- Fulfillment

Mesa, Arizona

- 28,500 SQFT
- Alkaline processing
- NiMH processing
- Secondary commodities production

Brighton, Michigan



- 45,000 SQFT
- E-commerce engine
- Market data generation
- Battery and accessory reuse

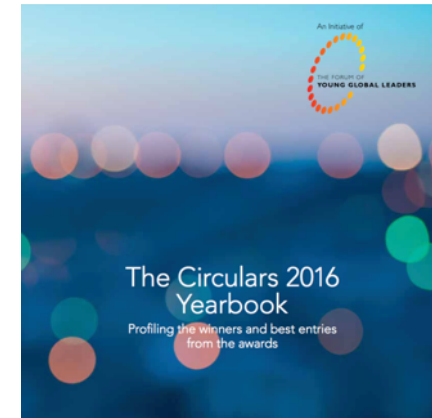
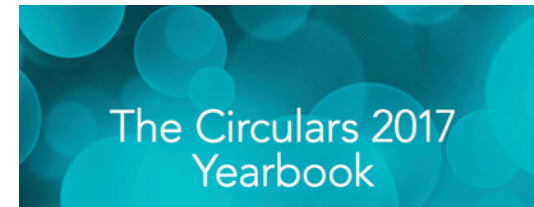
Chatsworth, CA

World Wide Recognition

Detroit Free Press



WORLD ECONOMIC FORUM



luxresearch | LUX RESEARCH INC. CLIENT CONFIDENTIAL

This is a preview of an unpublished profile. It is not currently visible to the public.

COMPANY PROFILE

Battery Solutions

NOT FOLLOWING

Battery collection and sorting for recycling

Coverage Areas: Energy Storage
Categories: Lead-acid batteries (Pb, EFB, AGM), Lithium-ion batteries, Nickel-zinc batteries (Primary batteries)
Last Update: November 18, 2018

WHAT YOU NEED TO KNOW

- Battery Solutions collects, sorts, and in some cases recycles a wide variety of battery chemistries.
- Recycles spent and primary alkaline batteries with cutting normally chemical technology, although not protected by patents, and uses partners for recycling chemistries such as lead-acid and Li-ion.
- Offers services in North America to both large customers such as national retailers and telecom companies, charging based on the type of battery received, as well as smaller individual customers which pay a flat rate for recycling.
- Client should view Battery Solutions as an early leader in collecting and sorting batteries for recycling, but wait and see for further development of its Li-ion sorting and testing technology.

STAGE OF DEVELOPMENT

Scale

Headquarters:
Founded: 1992
Business: Products/Services
Employees: 100
Cash: \$20 million (Source: trade assuming \$100,000 of net cash per employee)
Revenue: \$20 million (Source: based on \$200,000 of revenue per employee)

1845 Industrial Lux Research estimate only
Last Update: November 18, 2018

TECHNOLOGY/SOLUTION VALUE - 3

Battery Solutions has established an early advantage in managing logistics and sorting battery technologies, but doesn't yet have capabilities for Li-ion recycling for plug-in-vehicle batteries, which will be the more lucrative opportunity in five to ten years time.

ADDRESSABLE MARKET SIZE - 4

There are hundreds of millions of pounds of batteries that need to be recycled, although the current market size of batteries that are recycled is unclear. We estimate the financial opportunity in North America to be in the billions of dollars.

COMPETITIVE LANDSCAPE - 4

Face competition in the actual recycling process, but much less competition in the collection and sorting of batteries.

BARRIERS TO GROWTH - 3

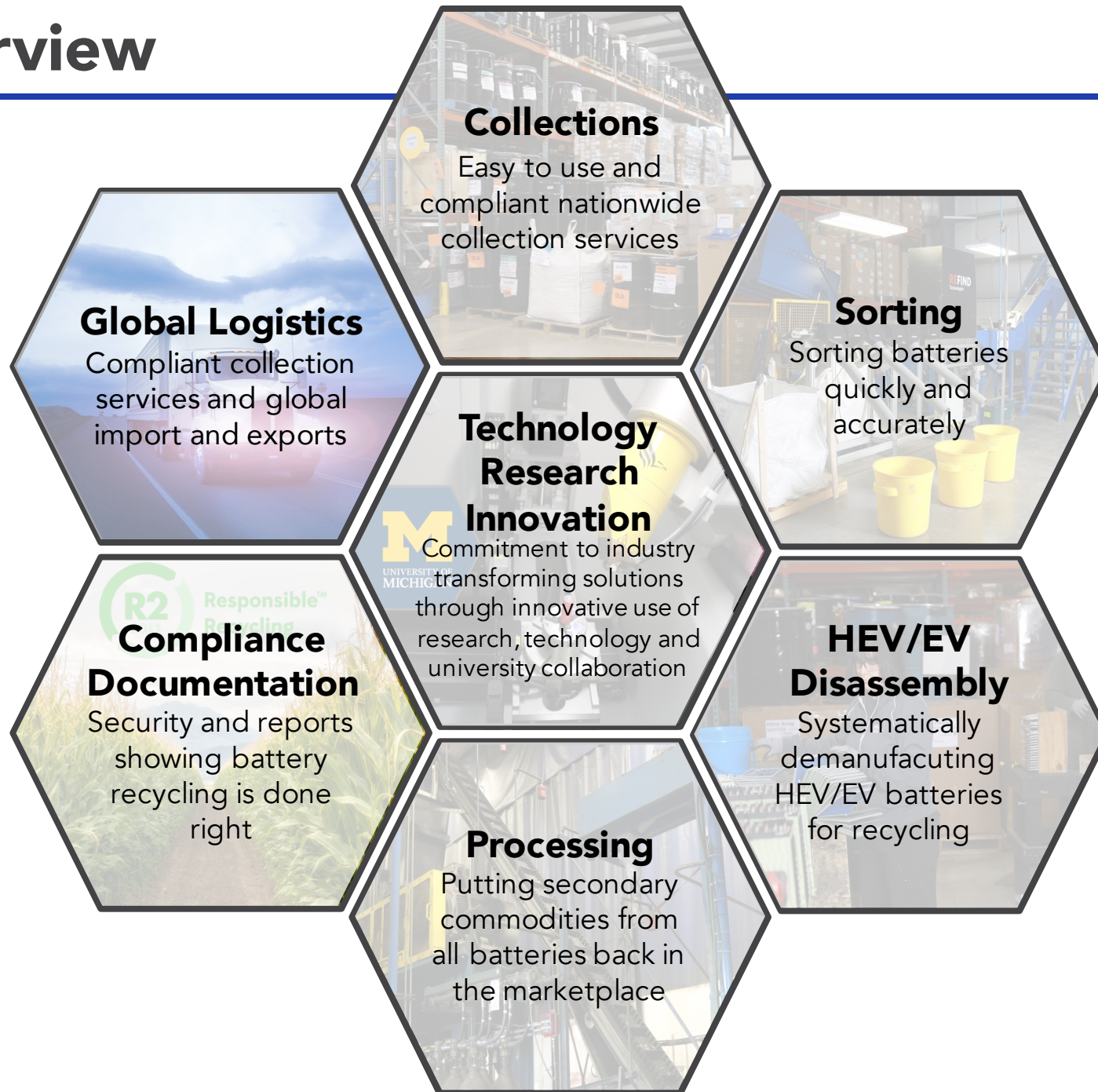
Further developing its Li-ion testing and sorting technologies to be ready for the much larger Li-ion opportunity.

IP POSITION - 1

No IP currently filed, although Thomas noted the company likely should have protected its alkaline process, but looking into filing protection for its sorting and testing technology for Li-ion batteries since this is more advanced.

REGULATORY FACTORS - 5

There are a number of initiatives and regulations requiring battery recycling in North America and



Battery Solutions and University of Michigan Research Engagement

SofM / UofM

- State of Michigan (SofM) grant
- Conducting lithium-ion research on thermal runaway events
- Goal: create an internal Li-ion safety strategy and establish BSL as a Li-ion thought leader

UofM - Dearborn

- CT scan research project on state of health for lithium-ion
- Goal: find the most efficient avenue to reuse and repurposing

UofM Battery Lab

- Leveraging information and resources of the Battery Lab
- Goal: act as an extension of our engineering department

UofM Capstone

- Two projects:
- Discover the state of health (SOH) using X-ray, ultrasound, etc.
- Build a statistical model of SOH based on battery origination

UofM SCIP

- Market intelligence research project to assess the variety of 18650 cells
- Goal: develop the aftermarket audience for reuse and repurpose

Battery Reuse and Repurposing

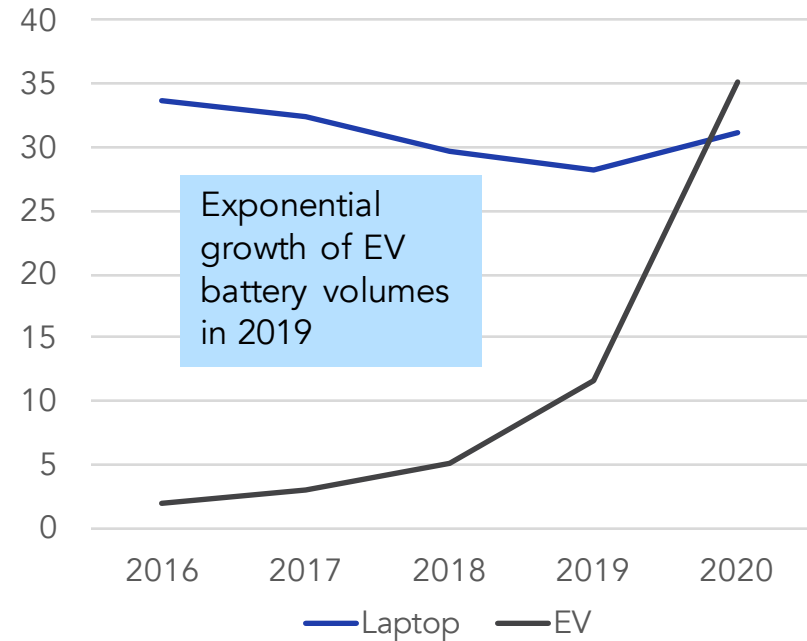
- Reuse and repurposing represents a major shift in business model and market potential
- BSL can use volume to build business which will meet requirements in the EV segment
- Ability to evaluate and rate batteries, based on SoH



	Tesla P60 Battery
Recovery value	\$200
Reuse value	\$21,000
Requirements for receiving batteries	Competitive li-ion process and/or proven reuse and repurposing operation

	Dell Inspiron Battery
Recovery value	\$0.26
Reuse value	\$18
Requirements for receiving batteries	Competitive collection and sorting of mixed dry batteries

End of Life Batteries, M Lb.



Battery Solutions Future Wixom Location

- The new facility:
 - Accommodates business growth
 - Is designed to support the increased technological complexity of the current business
 - Consolidates existing MI facilities
 - Reinforces image of technology driven service company
 - Milford Twp. location provides improved access to the Detroit Metro area talent pool
- Total of 95,000 sqft
 - 12,000 office
 - 34,000 shipping & receiving and storage
 - 25,000 manufacturing
 - 12,000 alkaline and NiMH processing
 - 12,000 common areas, maintenance room, locker rooms, breakroom, warehouse offices, etc.
- Modern contemporary design
- Open, bright, office layout centered around collaborative areas
- Training center for employees and customers
- Project room and lab space suitable for permanent test and development work
- Employee recreational areas, breakroom, outdoor patio, full kitchen

- R2:2013 (Responsible Recycling) Certification: Certificate No. C0327625-R21
- RIOS:2006 (Recycling Industry Operating Standard): Certificate No. C0327625-RI1
- DOT HAZMAT certifications
- IMDG (International Maritime Dangerous Goods) certifications for shipping over the ocean
- Dangerous goods certifications
- Spill response training and/or HAZWOPER certified
- Reverse logistics solutions
- Consolidation services
- Battery Solutions has an environmental, Health and Safety management system built to comply with R2 REV.7/2013 and RIOS Rev. 4/2016 Standards

Our Processing Partners – High Standards



**Responsible™
Recycling**



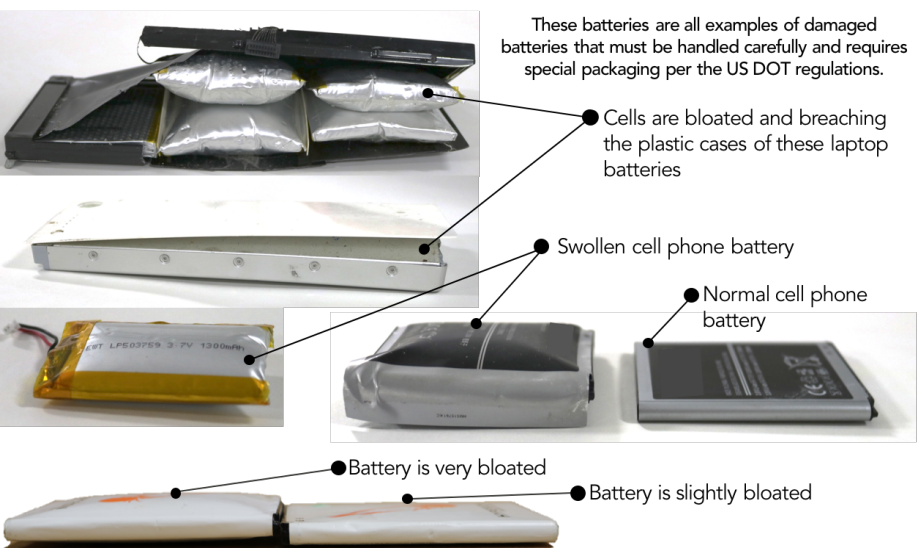
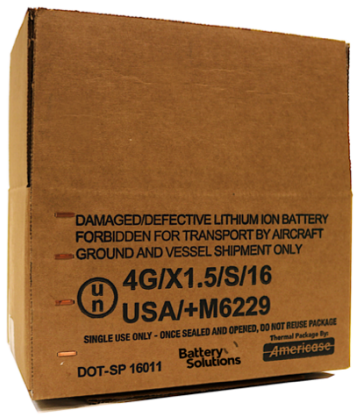
PLAN, DO, CHECK, ACT



- Rigorous onboarding process with auditing by BSL and/or third parties annually
- Fully permitted to process batteries
- Emission and air quality tested
- Abide by all federal, state and local laws
- Highest QEHS standards
- Batteries are processed using highest known industry standards
- Flexible process allowing for client specific processing site restrictions

Leadership in Lithium-ion Safety

Compliant storage and transportation solutions for damaged, defective or recalled (DDR) lithium-ion batteries, post-consumer sized through HEV/EV battery sized



- Grant from the State of Michigan to research thermal runaway with University of Michigan
- US DOT Special Permits for transporting: DOT-SP 20584
- Educational materials
- Online hazardous material training for customers (coming soon!)
- Video on safe handling