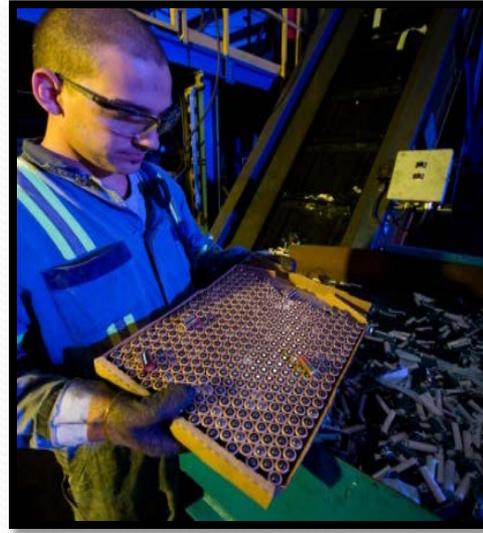


2011 US CHINA ELECTRIC VEHICLE AND
BATTERY TECHNOLOGY WORKSHOP
ARGONNE NATIONAL LAB AUGUST 4TH
AND 5TH 2011

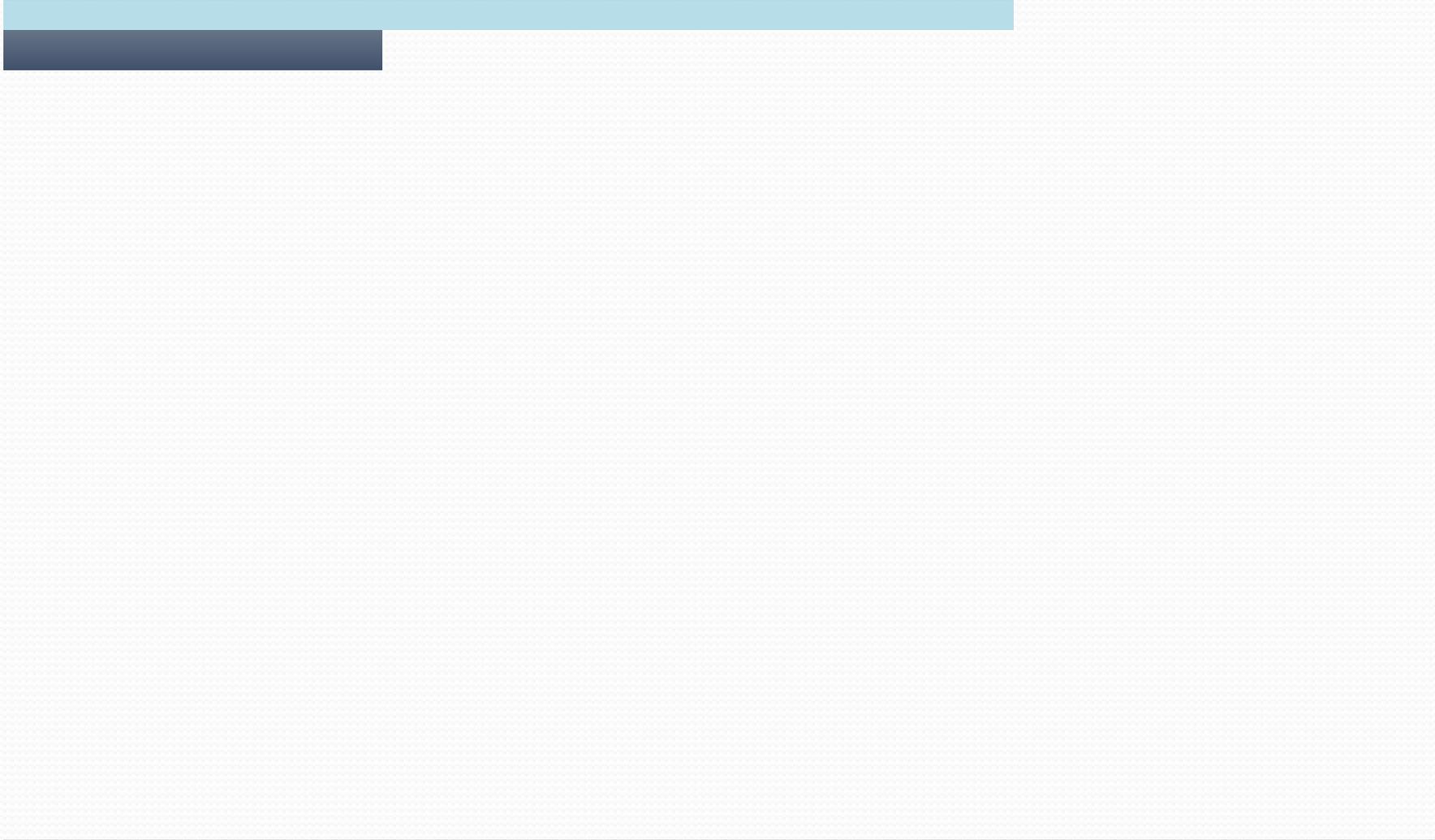
KINSBURSKY /TOXCO OVERVIEW
SHANE THOMPSON
VICE PRESIDENT, KINSBURSKY BROTHERS

This Presentation does not contain any proprietary, confidential, or
otherwise restricted information

Overview



Summary

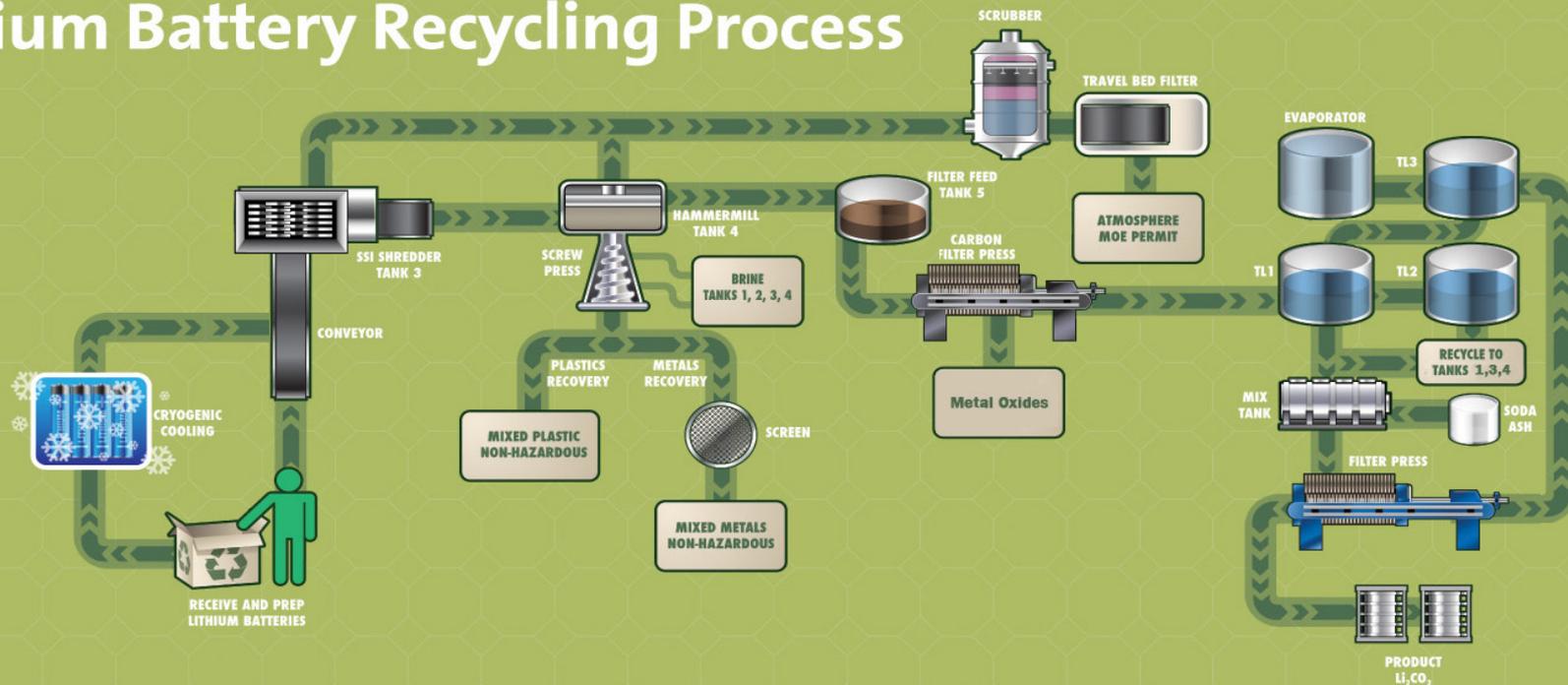


KBI / Toxco

▣ *Battery Recycling*

- ▣ *KBI /Toxco manages and recycles over 35,0000 MT of batteries per year.*
- ▣ *Toxco has been recycling lithium batteries for over 18 years.*
- ▣ *Toxco Inc. was selected as a DOE funding recipient to construct a dedicated facility in Ohio to recycle large format high energy batteries used in hybrid and electric vehicles.*
- ▣ *Toxco Inc. is expanding existing battery recycling operations in Ohio with the DOE expansion facility being built adjacent to Toxco's existing operations.*
- ▣ *Toxco has developed enhance recycling and recovery technologies to recover battery components to return to the manufacturing sector.*
- ▣ *KBI / Toxco are fully permitted battery recycling facilities.*

Lithium Battery Recycling Process



Lithium Carbonate



Cobalt Filter Cake

Automated Lead Acid Battery Breaker-*Investing in processing technology*

- In 2008 Toxco added a state of the art mechanical process to automatically break industrial Pb batteries and produce PbO, a premium feedstock material for Pb smelters

Benefits...

- Improved worker safety
- Closed loop system, reduction of emissions and or wastes
- High degree of recyclability of the battery generating multiple reusable materials;
 - *PbO*
 - *Grid metals*
 - *Polypropylene plastic*
 - *At some point, sulfuric acid*



Retort Operations in Ohio-*Upgrading Battery Materials*

- Acquired Moltech Technology (formerly Energizer-Alachua, FL NiCd mfg facility) in 2002
- 24 hours/day Operation
- Cadmium Recovered in 7 Pound Ingots
- Production of Fe-Ni Cells
- System is modular and scalable. (Can be moved and expanded with nominal impact)
- The process is deemed to be a best demonstrated available technology (BDAT) for the treatment of Cadmium by the EPA. One of only 2 facilities in North America with this distinction.



Cadmium Ingots



Retorted Cells



Logistical Advantage



Beyond Recycling; The evolution of the company from a Recycling company to being a Technology company

- ▣ *KBI/Toxco engaged in all areas of Battery issues:*
 - ▣ *Energy Materials Development*
 - ▣ *Infrastructure Development*
 - ▣ *Policy*
 - ▣ *Trade Association Board - Battery Recycling Association of North America - U.S., Canada*
 - ▣ *Regulatory /Legislation – Washington D.C.*
 - ▣ *State Legislation – CA, Ohio.*
 - ▣ *Society Automotive Engineers Task Force on Recycling*
 - ▣ *USABC*

JET-Using IT to create new business models

- ▣ *Joint Venture company formed in 2009*
 - ▣ *Support for Oil and Gas Industry.*
 - ▣ *Packaging services for Hazardous material lithium batteries.*
 - ▣ *Field services work:*
 - ▣ *Russia*
 - ▣ *Siberia*
 - ▣ *India*
 - ▣ *Venezuela*
 - ▣ *Mexico*
 - ▣ *North America*
- ▣ *Permitting/Transboundary international approvals on behalf of Clients.*

LithChem Energy

- ▣ ***Battery Research and Development Laboratory in Folcroft PA.***
 - ▣ *Development of High Energy Lithium Battery Cathodes*
 - ▣ *Development of High Energy Ultracapacitors*
 - ▣ *Battery Manufacturing /Cell assembly line installation.*

- ▣ ***US Patents Issued/Pending (Lithium Batteries)***
 - ▣ 7,141,332 B2: Hard Prismatic Packaging Structure for Electrochemical Devices and Method of Assembly (MDA)
 - ▣ 09/911,036: Electrode Structure and Manufacturing Method.
 - ▣ 11/332,817:Lithium-ion Cell Structure and Automated Manufacturing Method. (Divisional from 10/119,220.)
 - ▣ 11/378,973: Lithium-ion Cell Structure and Automated Manufacturing Method.

LithChem Energy

- ▣ ***Department of Defense funding for the Development of Primary Lithium Battery Manufacturing line in Folcroft.***
 - ▣ *Low Cost high Energy Lithium Batteries in Support of U.S. War fighter program – Approx 5.6 M in Funding to Date*

- ▣ ***Advanced Battery Recycling Technology Development:***
 - ▣ 12/000,00: Recycling of Nickel Metal Hydride Batteries
 - ▣ 12/806,877: Recycling of Lithium Ion Batteries

- ▣ ***Ultra Capacitor Development***
 - ▣ 6,728,096 B1 (2004): Non-Aqueous Electrolyte. (Non Acetonitrile)
 - ▣ 6,902,684 B1 (2005): Non-Aqueous Electrolyte (HF)_{2.3}F
 - ▣ 7,675,737 (2010): Low Temperature Non-Aqueous Electrolyte

- ▣ ***Pending:***
 - ▣ 12/287,867: Preparation of Carbon Electrodes for High Voltage Capacitors (>3.2 V)
 - ▣ 12/455,239 : Preparation of High Voltage(>3.2 V) Capacitors

Advanced Charger Technologies

- ▣ *Advanced Battery Chargers - ACT*
 - ▣ *Formed in 2009 to design and manufacture high frequency fast chargers for electric forklifts.*
 - ▣ *2011 developed and launched Level II chargers for electric vehicle applications.*
 - ▣ *2011 launch of Level III fast chargers for EV infrastructure in North America. UL approval scheduled for Oct. 2011.*



Future work



TOXCO INC. - EV/HEV BATTERY RECYCLING EFFORTS TO DATE

IDENTIFYING AND ADDRESSING THE CHALLENGES OPPORTUNITIES IN RECYCLING BEV BATTERIES IN THE FUTURE...

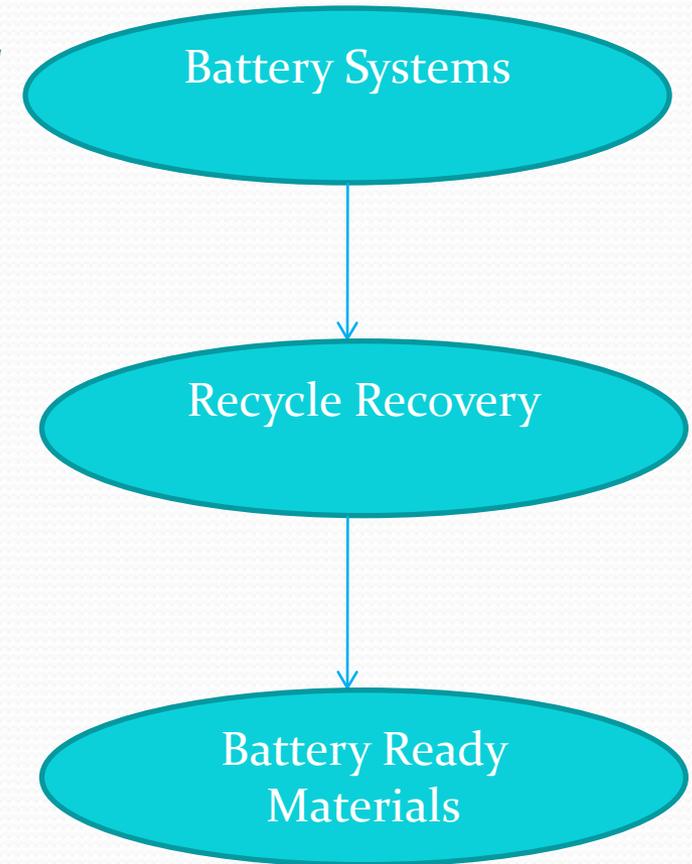
Expanding upon the history of extractive metallurgy with batteries Toxco has been on the forefront of hybrid and electric vehicle battery recycling for the past decade. Currently, we are working with both the battery and auto OEM's as well as the auto dealers and environmental service companies that are likely to collect and or manage EOL batteries on all of the issues associated with the proper collection, packaging, repurposing and or eventual recycling.

Kinsbursky and Toxco have recycled over 1 million pounds of NiMH and Li-Ion vehicle batteries in the past three years alone. As a result of this experience we have a highly nuanced understanding of both the **challenges** and **opportunities** associated with the recycling of large format EV batteries...



Overview – DOE Project

- ▣ *2009 Toxco Received 9.5 Million Dollars in funding from Department of Energy*
 - ▣ *Dedicated large format nickel metal hydride and lithium ion HEV/EV recycling plant*
 - ▣ *Manage multiple battery chemistries*
 - ▣ *NMC / Mixed Metal Oxides*
 - ▣ *LiCO*
 - ▣ *NiMh*
 - ▣ *Designed to Separate/Isolate Battery constituents enabling Battery Ready Materials*
 - ▣ *Battery Cathode Materials*
 - ▣ *Rare Earth Recovery from NiMh batteries*
 - ▣ *Secondary Battery Applications:*
 - ▣ *Energy Storage*
 - ▣ *Other*



Large Format EV battery Recycling Challenges and opportunities

- CHALLENGES:

- Economically viable extraction (profit tied to fluctuating commodity prices)
- Technical issues with separation (using technology to produce product, not scrap). In conjunction with this, Li Ion battery chemistry has competing technologies that yield different economic outcomes.
- Varied sources of collection, ownership and different interest group competing for the batteries.
- High Power management, these batteries are not traditional “car batteries” and as such pose a risk of damage and even death if mishandled.
- Undefined issues associated with creating a viable re-use, re-sale market (testing technology, certification and or warranting the batteries, alternative markets for the batteries.)
- Significant capital investment required to maximize opportunity.
- Complex regulatory issues (particularly transportation regulations) surrounding these batteries.

Transportation Regulations

- Regardless of the environmental classification, both NiMH and Li Ion batteries are regulated by the DOT (PHMSA)
- 49 CFR 173.21 “electrical devices” including batteries must be packaged in a manner so as to prevent heat, discharge or sparking or it is “forbidden for transportation”
- “forbidden for transportation” = \$\$\$\$ Fines
- The originating facility is considered to the “**offerer for transportation**” ultimately responsibility resides with the offerer.
- The Department Of Transportation now has an increased focus on the transportation of batteries, (both as a product and EOL) and focus will continue.

Large Format EV battery Recycling Challenges and opportunities cont...

- **Opportunities:**

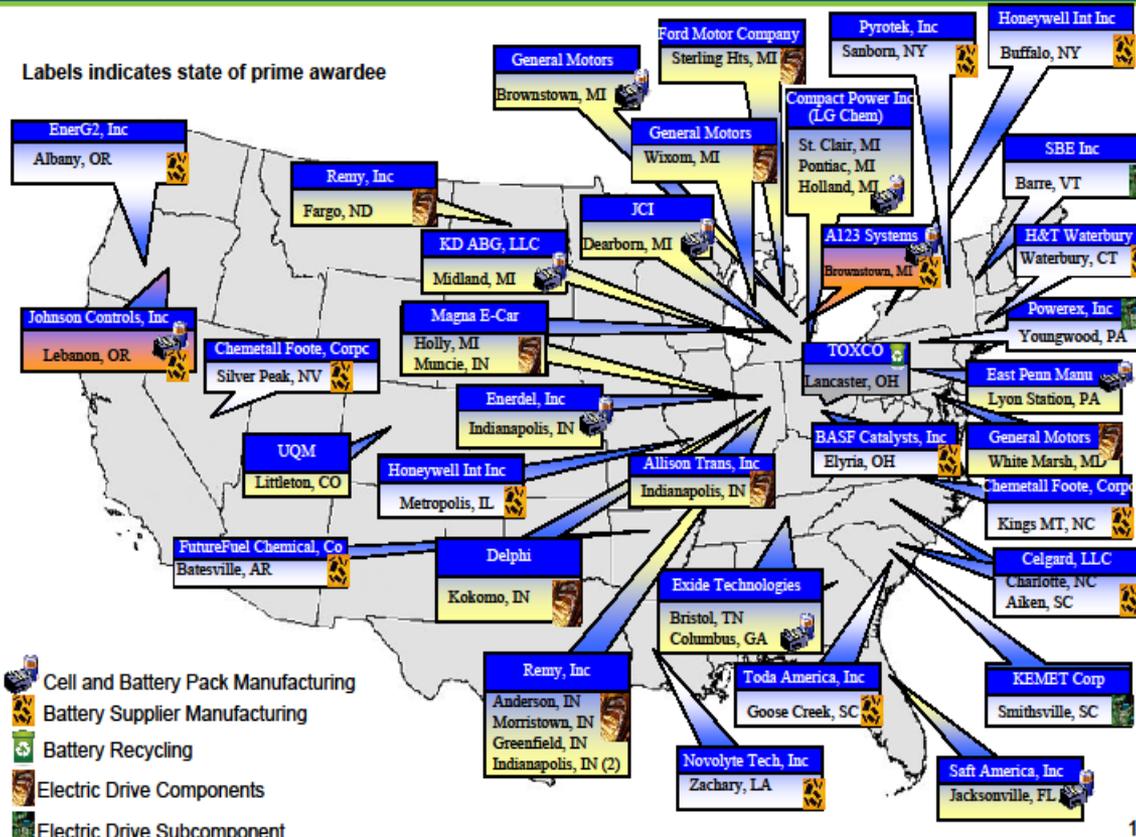
- Economic benefits associated with “upgrading” scrap to produce raw materials (for batteries) and in doing so, provide an alternative market for the raw materials supply chain. With regards to materials like Rare Earth Elements, there are far reaching implications to having a domestic source of these material(s).
- New and emerging market.
- Diversification into the “supply chain”. By creating a new market for materials (whether product or high grade feed materials for refiners or material mfg) it enables Toxco-KBI to interact with new companies and expand its market reach.
- Leadership role in the evolution of the renewable resource market.

Logistical Advantage continued...

Battery and Electric Drive Manufacturing Distribution

U.S. DEPARTMENT OF ENERGY Energy Efficiency & Renewable Energy

Labels indicates state of prime awardee



- Facility Siting in Lancaster Ohio.
- 60 % of Population within 650 miles.
- Close proximity to ARRA funding recipients
- Close to automotive manufacturing hub.

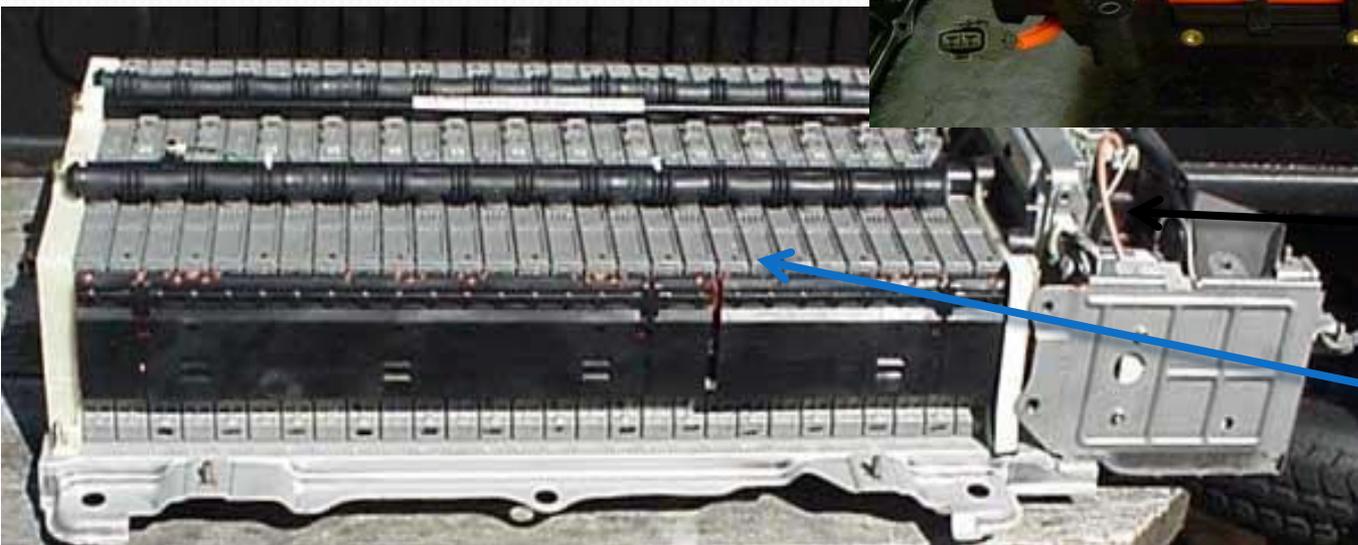
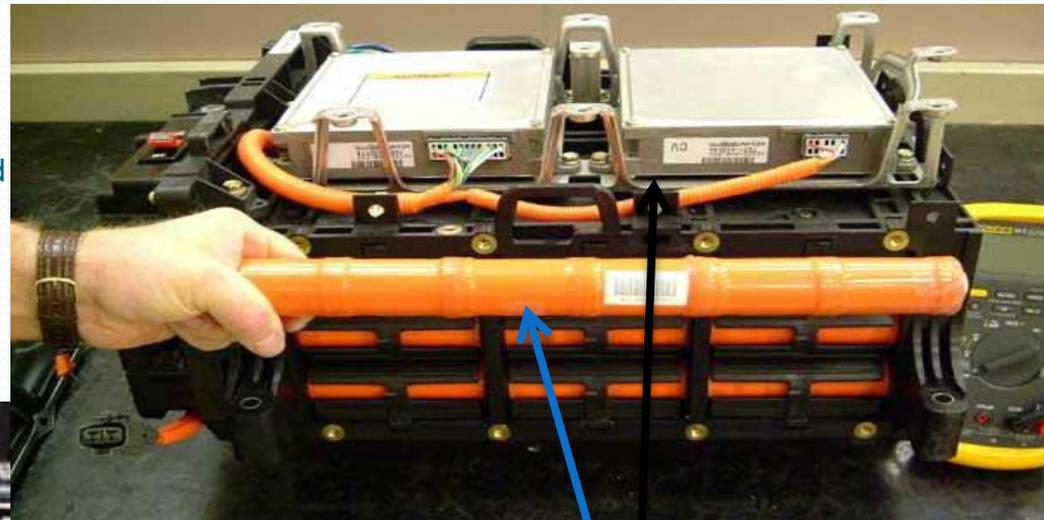
Lithium Ion, the emerging battery technology to power PHEV and EV

- By 2015 the target is to have 1,000,000 vehicles on the market.
- Energy Density demands strongly suggests that the “Li Ion” will be the battery of the future for electrified vehicles (certainly for pure EV and Plug in Hybrids like the Chevy Volt) currently there are three possibilities for Li Ion and each have their own value drivers:
 - CoOH Cobalt and Graphite as the active materials-well defined technology, works well for this application.
 - Mixed Metal Oxides Ni, Co, Al, as active materials-potential cost savings while maintaining performance
 - FePO₄ Iron Phosphate-Safety, lower incidence of a thermal event

...But, Nickel Metal Hydride will remain the chemistry for HEV-relevant from a recyclers perspective...what has been on the market...

Target for EV's 1,000,000 by 2015, this will include Li Ion. What to do in the interim? The plant is being designed to manage NiMH batteries:

- Renewable source of Ni
- Renewable source of Rare Earth elements (La and Ce and possibly renewable Ab5 Alloy).



BMS Electronics

NiMH Cells (prismatic and cylindrical)

Novel Approach

- By using a combination of mechanical processes and proprietary chemistry Toxco will be not only providing an answer to the environmental issues associated with the batteries as they reach the end of life, by using technology and innovation this plant will be a source of valuable renewable resources for the battery industry supply chain.
- Potential products from the anticipated Li Ion batteries;
 - Anode materials, LiCoO₂, LiFePO₄ etc...Recycled Graphite, we are also evaluating the value of distillation and recovery of the materials in the electrolyte (EC, EMC, DC)
- In the interim, the plant will process NiMH batteries currently being used in HEV applications. (Recovery of Ni and Mischmetal alloy as well as plastics and ancillary metals Cu, Al).

Former Ohio Gov. Ted Strickland touring the facility in 2009



Contact Information

Thank you for your time and attention, please don't hesitate to contact me if you need additional information and or you would like to visit one of our facilities

Kinsbursky Brothers, Inc. / Toxco Inc.

67761 Mills Road, Saint Clairsville OH, 43130

Tel. 740-526-0334

Fax 740-526-0335

E-mail sthompson@kinsbursky.com

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Many suitcases look alike.