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2013 DOE VEHICLES TECHNOLOGIES PROGRAM REVIEW PRESENTATION LITHIUM-ION BATTERY RECYCLING FACILITIES

PROJECT ID: ARRAVT020

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Organization: Toxco, Inc.

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This Presentation does not contain any proprietary, confidential,
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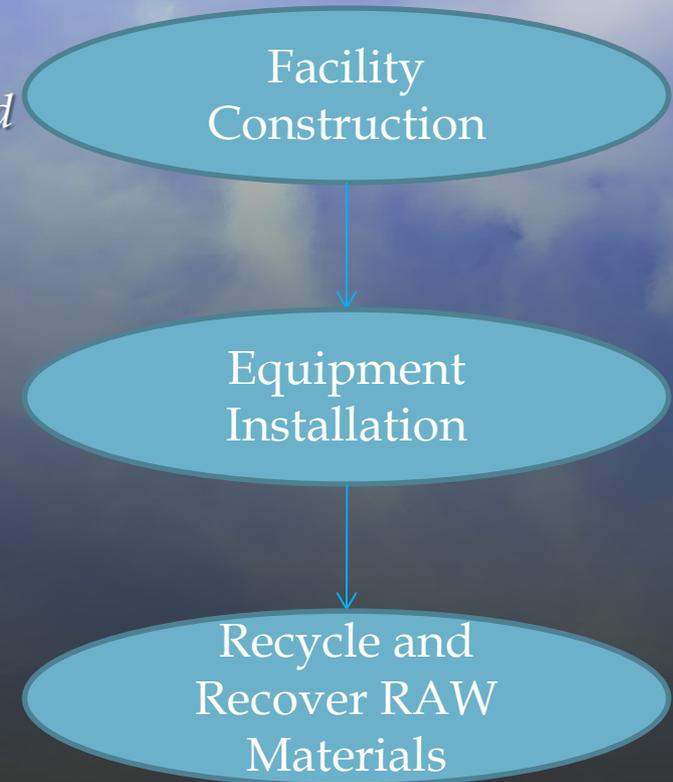
- *Toxco Inc., was the sole recipient of DOE funding under DE-FOA-0000026- Area of Interest 4 (Advanced Lithium ion Battery Recycling Facilities)*
- *Expanded facility to manage End of Life Hybrid and Electric Vehicle Batteries currently under construction in Lancaster Ohio*
- *Facility to utilize advanced recycling technologies to recover active battery constituents for “Battery to Battery” recycling.*
- *Construction project is contiguous to Toxco’s existing battery recycling facility in Ohio.*
- *Dedicated large format advanced battery recycling facility to provide long term services and solutions to burgeoning HEV/EV industry.*



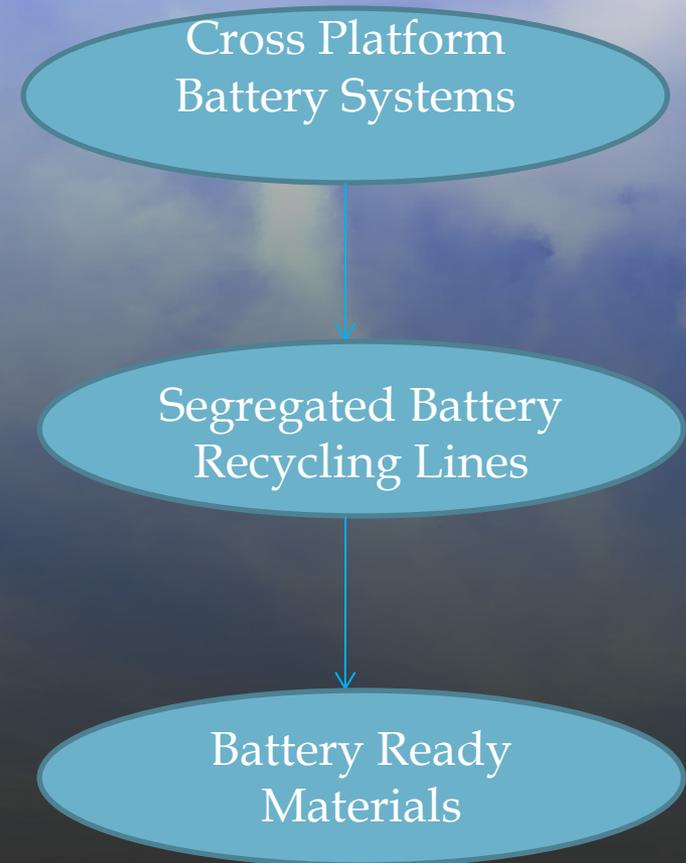
DOE MERIT REVIEW		OVERVIEW	
		TIMELINE	BARRIERS
Start Date	4/1/2010	End of Life Vehicle Batteries Timeline	Sustainability in Processing Materials
Finish Date	12/31/2014	U.S. Battery Production Timeline	Managing Materials Through Pre-Production
Funding To Date	Budget	Cell Chemistry Identification	Working Groups within Industry (i.e. USABC)
Total DOE Project Funding	\$9,552,551.00	RISKS	
Total Contractor Cost Share Funding	\$9,553,708.00	Consumer Confidence in New EV Technology	Market Conditions Apply
		Unsuccessful Deployment of EV Technology	Market Conditions Apply
Program Outlay as of 12/31/2012	\$6,735,134.07	New Battery Technology Developments	Flexibility in Recycling Technology
Total DOE Funds Expended as of 12/31/2012	\$3,367,567.03		
Total Contractor Funds Expended as of 12/31/2012	\$3,367,567.04		
		PARTNERS	RESPONSIBILITY
Overall Project Completion	More than 50%	Electricore, Inc.	DOE Outreach, Industry Education, Reporting.



- *Toxco Inc.'s objective is to construct a battery recycling facility dedicated to the recycling of large format high energy batteries used in hybrid and electric vehicles.*
- *Toxco's prime objective is to solve for various chemistries used in OEM vehicle and grid application platforms;*
- *Recycle and Recover battery constituents for "Battery to Battery" recycling*
- *Recover strategic metals such as Rare Earth Lanthanides from batteries to secure valuable resources.*
- *Provide economic growth through the creation of new jobs in high tech recycling.*



- *Establish a sustainable business model in preparation for long term solution for EV/HEV batteries.*
- *Adaptable technological interface between multiple battery chemistries.*
- *Create industry partnerships to provide Battery Ready Materials to achieve low cost battery production for HEV/EV's.*
- *Hire leading technologists to strive for continued improvements to meet the varied challenges in a rapidly changing environment.*
- *Creation of sustainable jobs in Ohio.*



- *As Toxco's challenge in this space is unique among all ARRA recipients, due to the life cycle of HEV/EV batteries, Toxco has developed and fostered a collaborative approach with key industry players to build on business relationships and sustainable modeling with respect to End of Life Battery Recycling:*
 - *Manage and recycle industrial battery waste from large OEM battery manufactures.*
 - *Established recycling contracts and relationships with many OEM automotive manufacturers.*
 - *Provide key recycling services to industry sponsored programs for end of life collection and recycling.*
 - *Continue to enhance and improve recovery technologies in advance of completed construction.*
 - *Continue industry outreach through presentations at various conferences and technical programs.*



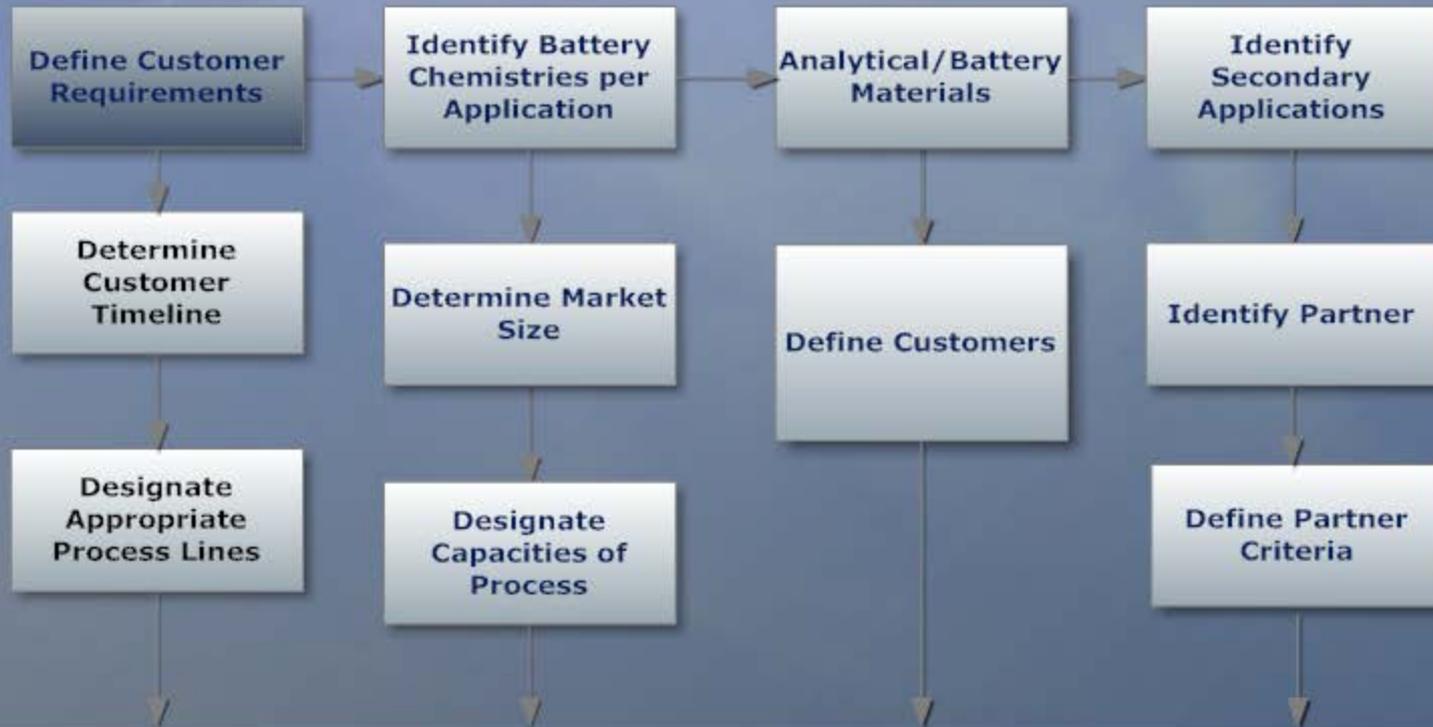
- *Environmental Standards*
 - *Toxco is a fully permitted facility in Ohio.*
 - *OHIO EPA PERMIT - OHD071654958*
 - *ARRA project is an expansion of an existing, successful, permitted battery recycling operation in Ohio.*
 - *The New facility was chosen due to close proximity to ARRA funding recipients and U.S. automotive manufacturing hubs*

- *NEPA Findings*
 - *Toxco's NEPA audit has been completed.*
 - *A Finding of No Significant Impact was issued April 2010.*

- *Go / NO Go Criteria*
 - *Environmental Assessment - Completed*
 - *Validation of Recycle process - Completed*
 - *Facility Build (Construction) – 95% Completed (as of March 2013)*
 - *Battery Recycling Processing Lines – 25% Completed (as of March 2013) with 60% of equipment at facility and awaiting installation*



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Facility design, layout, construction, and processing

Battery Materials

Secondary Batteries

Technical Accomplishments and Progress

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- *Toxco has achieved recovery of rare earth metals in metallic form (third party validation) from recycled NiMh batteries.*
 - *Validation of recovery technologies in pre-commercialized system.*
 - *Relevance to Go/No Go Milestone – Success.*
- *Facility Construction is near completion -- First battery Lines to be implemented shortly.*
- *Recovered battery materials have been submitted to 3rd party battery manufacturer for test cell production.*
- *Continued enhancement of separation of cathode/separator/anode from LiB's in advance of plant build out.*



Technical Accomplishments and Progress

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- *Since 2010 Toxco has created or sustained at least 10 FT jobs in relation this project.*
- *Toxco expects to add at least 15 new positions by end of 2013.*
- *Currently engaged in discussions with multiple ARRA stakeholders on sustained recycling programs for batteries and materials.*



- *Continued support and participation for industry led initiatives such as Recycling Task Force – Society Automotive Engineers*
- *Continue to participate in industry collaboration via Vehicle Recycling Partnership - USCAR*
- *Provide Education outreach on End of Life Battery Management through Trade Groups – Automotive Recyclers Association, and International Scrap Recycling Institute (ISRI)*
- *Education through presentations and technical conference attendance.*
 - *SAE – Vehicle Technology Symposium*
 - *ISRI Annual Conference*
 - *Automotive Battery Recycling Association*
 - *PRBA*



- ❑ *Toxco will continue with the construction of the Ohio expansion. Estimated construction completion – May 2013.*
- ❑ *Equipment placement of the first battery recycling line expected complete June 2013.*
- ❑ *Toxco will continue efforts in customer outreach and promotion of Toxco expanded service areas.*
- ❑ *Development and continued validation of Battery Ready Materials to be used in the manufacturing of new battery products.*
- ❑ *Begin interviews and hiring of initial staff for new operations May 2013 for the upcoming line.*



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Future work

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Toxco's Construction Progress



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Future work

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