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Celgard US Manufacturing Facilities Initiative for Lithium-ion Battery Separator

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

■ Timeline

- Start date: 02/01/2010
- End date: 02/01/2013
- Percent complete*: 15%

**As of June 07, 2010*

■ Barriers

- Low risk due to proven technology
- No EPA issues with locations or technology

■ Budget

- Total project funding: \$49M
 - DOE share: 48.4%
 - Celgard share: 51.6%

■ Partners

Collaboration for advanced separator testing with:

- Savannah River National Laboratory (SRNL)
- North Carolina State University (NCSU)
- ESim LLC

- Objectives – Celgard Advanced Battery Separator Manufacturing Facilities:
 - Develop domestic separator manufacturing capacity in support of the DOE Advanced Battery Manufacturing Initiative
 - Create long-term American manufacturing jobs starting within three (3) months of the award
 - Install phased separator production capacity to match domestic lithium-ion battery market requirements
 - Minimize project risk by utilizing:
 - Qualified and trained personnel
 - Proven processes for manufacturing lithium-ion battery separators

- Leverage proven product technologies
 - Existing portfolio of Celgard® products are suitable for all lithium-ion battery chemistries
 - Commercially-available products are being targeted for EDV lithium-ion battery applications:
 - Celgard® 2500 PP Monolayer Battery Separators
 - Celgard® 2320 PP/PE/PP Trilayer Battery Separators



- Replicate proven manufacturing technology to efficiently produce EDV separator products
 - Celgard expansion is being executed in a two-phase approach to meet market needs:
 - Phase 1: Expand existing Charlotte, NC site to meet commercial scale operation starting mid-2010
 - Phase 2: Develop new site in Concord, NC to meet increasing commercial demand starting mid-2012
- Share expertise between Charlotte, NC and Concord, NC facilities (45 minutes apart)

- Minimize environmental impact of expansion sites
 - Phase 1: Charlotte Site
 - Received categorical exemption for pre-existing certifications
 - Phase 2: Concord Site
 - Certified NC-EPA site
 - NEPA review complete – Initial finding: No significant impact (FONSI)
 - NEPA public review period ended April 2010
 - Certified to ISO 14001 Environmental Management Systems

- Adoption of commercialized Celgard® products in EDV applications, including the Mercedes S400 Hybrid and Hyundai Avante
- Project milestones on-pace with projected timelines
 - Phase 1: On schedule for completion in late 2010
 - Phase 2: Groundbreaking scheduled for September 2010
- Creation of U.S. jobs (North Carolina)
 - Celgard has created 60 positions since receiving notification of the DOE grant award
 - Since January, Celgard has added 38 full-time equivalent (FTE) positions*
 - Celgard sub-recipients have already added 43 FTEs

**As reported by Celgard, LLC in documents submitted to FederalReporting.gov for the period ending March 31, 2010.*

- **Expected U.S. job creation over project term:**
 - Celgard should create more than 200 positions by 2012

Cumulative Celgard Job Creation through 2012	
By YE 2010	77
By YE 2011	169
By YE 2012	226

- Sub-recipient job growth is expected to track projected Celgard numbers
- Celgard contractors and suppliers are expected to create more than 1,000 additional jobs over the project term

- **Sub-recipients:**
 - **SRNL (Federal Lab):**
 - Celgard will work with SRNL, utilizing the national lab's material testing capabilities for separator quality control
 - SRNL is located in Aiken, SC

 - **ESim LLC (Industry):**
 - ESim and Celgard will work on performance measures associated with manufacturing separators for the EDV market
 - ESim is located in Columbia, SC

 - **NCSU (University):**
 - Celgard will work with NCSU to better understand product quality protocols and to establish quality assurance methods
 - NCSU is located in Raleigh, NC

- Continue Phase 1 tasks for 2010 completion:
 - Building up-fit – *Complete*
 - Order and install equipment – *30% Complete*
 - Labor force hiring and training – *50% Complete*
 - Qualify total capacity – *Begin April 2010; Complete December 2010*

- Begin Phase 2 tasks for 2012 completion:
 - Land purchase – *Complete*
 - Begin construction – *September 2010*
 - Order and install equipment – *October 2010*
 - Labor force hiring and training – *Begin April 2010 (Management & Professional); Complete December 2011 (Entire Labor Force)*
 - Qualify total capacity – *Complete October 2012*

- Celgard® lithium-ion separators are proven in EDV battery applications and have already been adopted in commercial EDV applications
- Celgard manufacturing technology is well demonstrated and is being replicated for capacity expansion project
- Celgard capacity installations are on schedule and on track to meet market needs
- Celgard has already begun hiring to support the expansion and will add more than 200 U.S. jobs by 2012
 - Celgard contractors and suppliers will also add over 1,000 jobs as a result of the expansion project