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Celgard US Manufacturing Facilities Initiative for Lithium-ion Battery Separator

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Project ID# ARRAVT009

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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*: 53%

**As of May 5th, 2011*

■ 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 – *Completed and qualified in March 2011*
 - Phase 2: Develop new site in Concord, NC to meet increasing commercial demand – *Construction in 2011 and manufacturing starting in mid-2012*
- Share expertise between Charlotte, NC and Concord, NC facilities (45 minutes apart)

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

- Celgard® lithium battery separators are currently utilized in multiple vehicles on the road around the world
- We are actively engaged in the development of battery packs for over 20 EDVs that will be launched between now and 2013



- Project milestones on-pace with projected timelines
 - Phase 1: Completed and qualified in March 2011
 - Phase 2: Building on schedule for COO in July 2011
- Creation of U.S. jobs (North Carolina)
 - A total of 148* jobs have already been created as a result of the DOE-related expansion project
 - Celgard has added 119* full-time equivalent (FTE) positions
 - Celgard sub-recipients have already added 29* FTEs

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

- Celgard has been honored to host President Obama and other key members of his administration



U.S. Energy Secretary Steven Chu visits Celgard to announce the DOE grant award in August 2009



President Obama tours the Charlotte (Phase 1) expansion area in April 2010



U.S. Labor Secretary Hilda Solis meets with Celgard employees during a plant tour in July 2010

- **Phase 1: Expansion at Existing Charlotte, NC Facility**

Existing warehouse space was upgraded / remodeled

Warehouse inventory relocated to offsite storage

New production lines installed and qualified



■ Phase 2: New Construction of Concord, NC Facility



Groundbreaking for the new site was held in September 2010

Pictured from left: Gerry Rumierz (Celgard), Bryan Moorehead (Celgard), Concord Mayor Scott Padgett, NC Commerce Secretary Keith Crisco, Mitch Pulwer (Celgard), Robert Toth (Polypore), U.S. Congressman Larry Kissell, DOE Program Supervisor Edwin Owens, Cabarrus County Commissioner Grace Mynatt, Marcus Childs (Celgard), and Charlie Steenrod (Celgard)

■ Phase 2: New Construction of Concord, NC Facility



*Completion of
grading and site work*

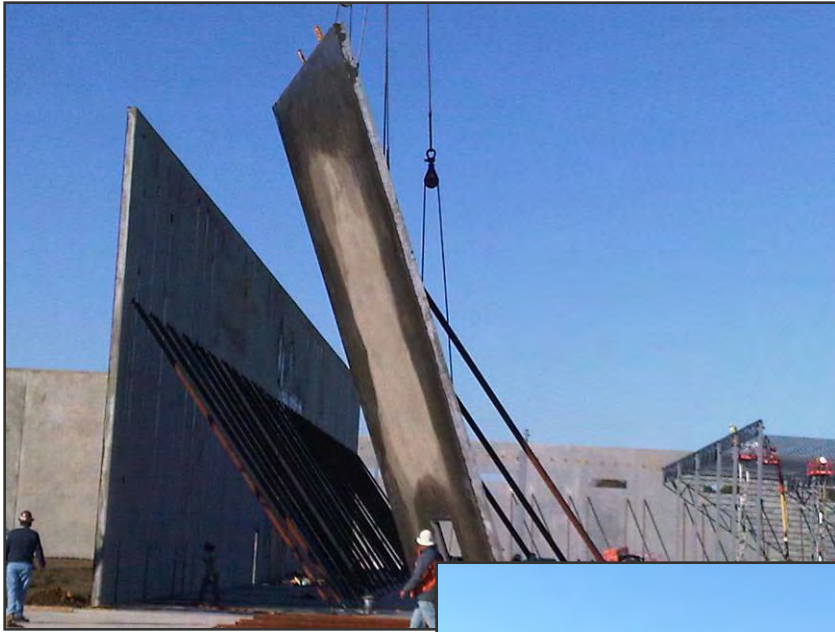


*Installation of
building perimeter
footings*



Pouring the concrete slab

■ Phase 2: New Construction of Concord, NC Facility



*Exterior wall panels
are erected*



*Crews begin installation of the
roof steel and structural
supports*

- Expected U.S. job creation over project term:
 - Celgard is on track to create more than 200 positions by 2012

Cumulative Celgard Job Creation through 2012	
Actual YE 2010	81
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 is working 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 are working on performance measures associated with manufacturing separators for the EDV market
 - ESim is located in Columbia, SC
 - NCSU (University):
 - Celgard is working with NCSU to better understand product quality protocols and to establish quality assurance methods
 - NCSU is located in Raleigh, NC

- Continue Phase 1 (Charlotte, NC) tasks for 2010 completion:
 - Building up-fit – *Complete*
 - Order and install equipment – *Complete*
 - Labor force hiring and training – *Complete*
 - Qualify total capacity – *Completed March 2011*

- Begin Phase 2 (Concord, NC) tasks for 2012 completion:
 - Land purchase – *Complete*
 - Begin construction – *Started September 2010*
 - Order and install equipment – *Completed 2010*
 - Labor force hiring and training – *Started 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