Overview

- **Timeline**
  - Phase 1 consists of preparing commercial EV (eStar™) for on road use and deploying to various customer locations and regions.
  - Phase 2 Navistar will gather comprehensive vehicle data and analyze to gain a detailed understanding of vehicle in-use performance. This will support future vehicle development.

- **Budget**
  - Government share $39,200,000, Navistar cost share $39,858,466

- **Barriers**
  - Locally sourced increased kW battery pack integration with existing vehicle systems.
  - Implementing a new product at the leading edge of supplier developed technologies. i.e. J1772, HVAC, high voltage vehicle systems
  - Achieving major vehicle level cost reduction targets due to limited supply base and industry volumes.
  - Grant requirement of 100 mile range excludes customers with limited budget and range requirements.

- **Partner**
  - DOE (NREL) analysis of fleet data
  - A123, battery pack manufacturer
Objective and Relevance

The objective of this project is to manufacture and distribute a zero tailpipe emission light-duty commercial electric vehicles (EV) in the United States. Navistar shall deploy at least 950 commercial medium duty EVs (Class 2c/3 trucks) in the U.S. market.

Specific objectives include demonstrating the applicability of EV technology for commercial transportation applications, demonstrating reliability in geographically and climatically diverse locations, and addressing the needs of the customers while enhancing the EV attributes to achieve mass market penetration in the future.

This project is creating and sustaining American jobs in support of the ARRA initiatives. This ARRA grant will advance and support the creation of new product and industry going forward.

It is estimated that each vehicle deployed will reduce carbon emission by at least 10 tons per annum, compared to ICE delivery vehicle.

It is estimated that each vehicle deployed will displace 1250 gallons per annum of fuel with domestically produced electricity.

This project has had a positive impact on the barriers by introducing increased volumes into the development markets.
# Milestones

<table>
<thead>
<tr>
<th>Month/Year</th>
<th>Milestone or Go/No-Go Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oct-2010</td>
<td>Milestone: Complete transition to CKD (complete knockdown) units, with increased US manufacturing content. Due to component availability and pre-ordered product, this milestone slipped to 5/2011.</td>
</tr>
<tr>
<td>Sep-2011</td>
<td>Milestone: Complete/deploy all production units. This schedule is under review due to market introduction not progressing at planned rate.</td>
</tr>
</tbody>
</table>
Approach / Strategy – Jobs Created / Retained

**Navistar and Supplier Manufacturing Jobs Created / Retained**

- Actual jobs referenced in Progress Reports
- Plan reported at 2010 Merit Revue

**Navistar and Supplier Support Functions**

- Actual jobs recorded in Progress Reports
- Planned Jobs
## Approach / Strategy - 2011 eStar participation at industry launch events

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Location</th>
<th>City State</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/1/2011</td>
<td>Smart Grid/Smart Energy</td>
<td>Prairie Convention Center Plaza</td>
<td>Springfield, IL</td>
</tr>
<tr>
<td>3/7/2010 - 3-10</td>
<td>NTEA™</td>
<td>Indy Convention Ctr</td>
<td>Indianapolis, IN</td>
</tr>
<tr>
<td>3/28-30, 2011</td>
<td>Beverage World</td>
<td>M Resort</td>
<td>Las Vegas</td>
</tr>
<tr>
<td>3/31-4/2, 2011</td>
<td>MATS</td>
<td>KY Fair &amp; Expo</td>
<td>Louisville, KY</td>
</tr>
<tr>
<td>April 4-6, 2011</td>
<td>2011 Fortune Brainstorm Green</td>
<td>Ritz-Carlton Laguna Niguel</td>
<td>Laguna Niguel, CA</td>
</tr>
<tr>
<td>5-Apr-11</td>
<td>EarthDay</td>
<td>Chicago</td>
<td>Chicago</td>
</tr>
<tr>
<td>9-Apr-11</td>
<td>NYCC Symposium</td>
<td>Anheuser Busch Facility</td>
<td>NYC</td>
</tr>
<tr>
<td>April 9-12, 2011</td>
<td>NAFA</td>
<td>Rosen Shingle Creek</td>
<td>Charlotte, NC</td>
</tr>
<tr>
<td>April 9-11, 2011</td>
<td>Parts Expo</td>
<td>Orlando, FL</td>
<td>Orlando, FL</td>
</tr>
<tr>
<td>21-Apr-11</td>
<td>2011 DATTCO Expo</td>
<td>Mohegan Sun Resort &amp; Casino</td>
<td>Uncasville, CT</td>
</tr>
<tr>
<td>May 9-11, 2011</td>
<td>Canadian Flt Main. Sem (REGISTRATION FORM SENT TO ACCOUNTING 3/115/11)</td>
<td>Hilton® Suites, Toronto</td>
<td>Toronto</td>
</tr>
<tr>
<td>May 19-20, 2011</td>
<td>eStar Dealer Event</td>
<td>Radisson Plaza Lord Baltimore</td>
<td>Baltimore, MD</td>
</tr>
<tr>
<td>18-May-11</td>
<td>Center City Event</td>
<td>OSU Fairgrounds</td>
<td>Columbus, OH</td>
</tr>
<tr>
<td>June 2-3, 2011</td>
<td>Green Fleet Expo</td>
<td>Court Hamilton</td>
<td>Hamilton, Ontario</td>
</tr>
<tr>
<td>June 19-22, 2011</td>
<td>EUFMC</td>
<td>Williamsburg Lodge</td>
<td>Williamsburg, VA</td>
</tr>
<tr>
<td>July 18-21, 2011</td>
<td>Plug IN</td>
<td>Raleigh Conv. Ctr.</td>
<td>Raleigh, NC</td>
</tr>
<tr>
<td>July 25-27, 2011</td>
<td>FedFleet</td>
<td>Shingle Creek Conv. CTR</td>
<td>Orlando, FL</td>
</tr>
<tr>
<td>Sept 26-29, 2011</td>
<td>EV2011</td>
<td></td>
<td>Toronto, CA</td>
</tr>
</tbody>
</table>
Initial Dealers have been trained in customer and product support. Additional training will be conducted as the eStar expands within Navistar’s extensive dealer network.
Technical Accomplishments

• Prior Accomplishments
  – Vehicle meets FMVSS requirements
  – 80 kW battery pack integrated (to achieve 100 mile range objective)
  – On board charger integrated
  – Delivery vehicle body integration
  – Drive motor and battery pack synchronized
  – EPA and CARB certified for on road use

• 2011 Accomplishments
  – FRP battery pack enclosure/ increased kWh charger
  – Air conditioning option available
  – Enhanced windshield defrost / demist to expand geographic markets for cool / cold zones
  – We have completed vehicle life durability testing to confirm product application.
  – We have embarked upon R&Q fleet to ensure product integrity has been achieved.
Collaboration

• Reporting of deployed vehicle performance data to the DOE

• Integration of A123, battery pack manufacturer
  – In conjunction with their DOE project to develop domestic production
  – The critical system supplier

• Developing relationships with;
  – Utility companies  (For example; Regional Leadership Council meeting conducted March 10-11th, Indianapolis, IN)
  – Local suppliers
  – Local and state governments
Proposed Future Work

• Cost reduction
  – TFT / Instrument cluster
  – Center IP and switch pack
  – Continued localization

• Localization activities
  – Height adjustment seats/belts
  – Electrical harnesses
  – Tubing/hose assemblies (brake lines)
  – Cab in White (panels)
  – Cab steel structure
  – Frame
  – Radiator
  – Brackets
  – Speakers

• New functionality
  – Integrated HVAC
  – Integrated Van body 16'
  – Motor / Inverter / DC to DC / HV Distribution box upgrade
  – Canadian Homologation
  – Door - back of Cab (FMVSS 206)
  – Possible drop side body
  – Ergonomics
Summary

- US homologation completed
- Product launched with units sold
- Integration of key system, A123 battery pack

Technical challenges remain:
- Continue to identify qualified domestic suppliers while simultaneously reducing product cost
- Vehicle range alternatives (increased and decreased range options)
- Availability of charging stations for utilization by commercial vehicles. Integration into the electronic grid.