**Why Electrification?**

Ford’s electrified vehicles are part of the company’s broad commitment to delivering affordable, best-in-class fuel efficiency to the masses.
More than 150,000 on the road

First hybrid SUV introduced (Escape Hybrid)

Highly fuel-efficient mid-size sedan (Fusion Hybrid)

Escape Hybrid Battery Field Data vs. KLT

San Francisco Taxi Vehicle Battery (June 2011)
Field Return Batteries (Aug 2004 thru Dec 2010)
RELIABILITY NOT AN ACCIDENT

Researching and developing modern electrified vehicles for more than 10 years

- Choose the best parts
- Simulate their use with computer modeling
- Test the actual parts on bench and in-vehicle
- Correlate the two and then verify with real prototypes
Electrification Strategy

- The Ford Electrification Strategy includes six new electrified vehicles in North America by 2012 and in Europe by 2013:
  - Focus Electric
  - C-MAX Energi
  - C-MAX Hybrid
  - Fusion Hybrid
  - Fusion Energi
  - Lincoln MKZ Hybrid

- Ford is planning for hybrid and electric vehicles to make up 10% to 25% of Ford’s vehicle fleet by 2020.

Global Electrification Product Plan

- Portfolio Approach = HEV/PHEV/BEV (customer-driven)
- Global Flexibility = Electrify Highest Volume Platforms
- Best Value = HEVs Remain Highest Volume
- Affordability Remains Key = Sharing Common Components
**Ford is actively involved in the development of Electrified Vehicle Regulations and Standards.**

Ford NHTSA RESS Safety: Overview

<table>
<thead>
<tr>
<th>Scope</th>
<th>Electrified Vehicle Li-Ion Battery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose</td>
<td>Develop Safety Test Methods &amp; Performance Safety Metrics</td>
</tr>
</tbody>
</table>
| Tasks       | • Single Failure  
              • Single Failure + Loss of Control System |
| Candidate Faults | • Mechanical: Crush, Penetration, Vibration, etc.  
                  • Electrical: Overcharge, Short Circuit, Overdischarge, etc.  
                  • Thermal: Fire Resistance, Thermal Control, etc. |

**Ford Approach**

- BEV Cells, Modules and Packs
- Subcontract with Ricardo
- Fault Tree Analysis
- Focus on Overcharge & Mechanical Crush
Battery Standards Committees

- Started – Nov. 2009
- Membership
  - 462 Representatives
  - ~150 companies
- Specific Topics
  - 18 Committees
- Steering Committee
  - Initiated July 2011
  - Strategic move for organization
  - All Committees report to Steering Committee

Battery Safety Research Activity

- Mechanical: Ford-MIT Alliance
  - Prof. Wierzbicki (2yr)
  - Lithium ion battery mechanical crush modeling and prediction.
- Thermal: URP – Univ. Maryland
  - Prof. Sunderland (3yr)
  - Lithium ion battery thermal hazard assessment and comparison.
- Electrical: Ford-UM Alliance
  - Prof. Mi (2yr)
  - Battery management system controls & requirements.
In summary.....

- Ford is committed to be fully engaged in support of the EV GTR development.

- Benefits will result from truly common requirements.

END