



Sustainable Mobility Technologies



ONE FORD
ONE TEAM • ONE PLAN • ONE GOAL

Michigan Opportunities – Electrified Transportation



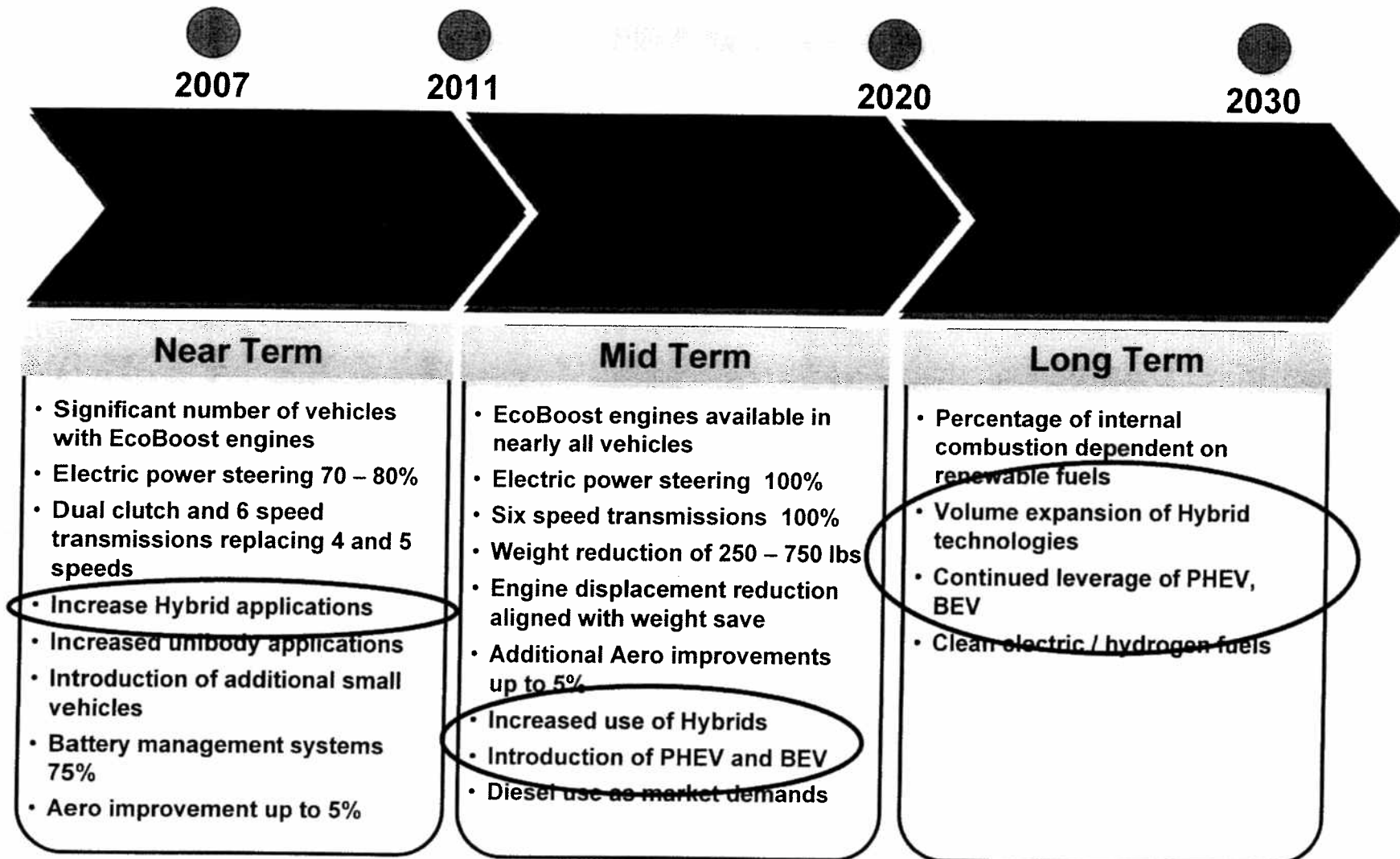


Agenda

- Ford Team
 - Ford's Michigan presence
- Ford Electrification Growth Strategy
 - Strategic Plan
 - Platform Strategy
- Battery Pack – Value Add Analysis for HEV Packs
 - What's in a pack
 - Strategic drivers to designing packs / systems in-house
 - Battery system business model –growth opportunity
 - Value add analysis
- What's needed to realize this opportunity in Michigan
 - Size of opportunity – investment / job opportunities
 - Enablers
 - Competitive Advanced Li ion Battery Pack Credit
 - Multi-site Technology MEGA



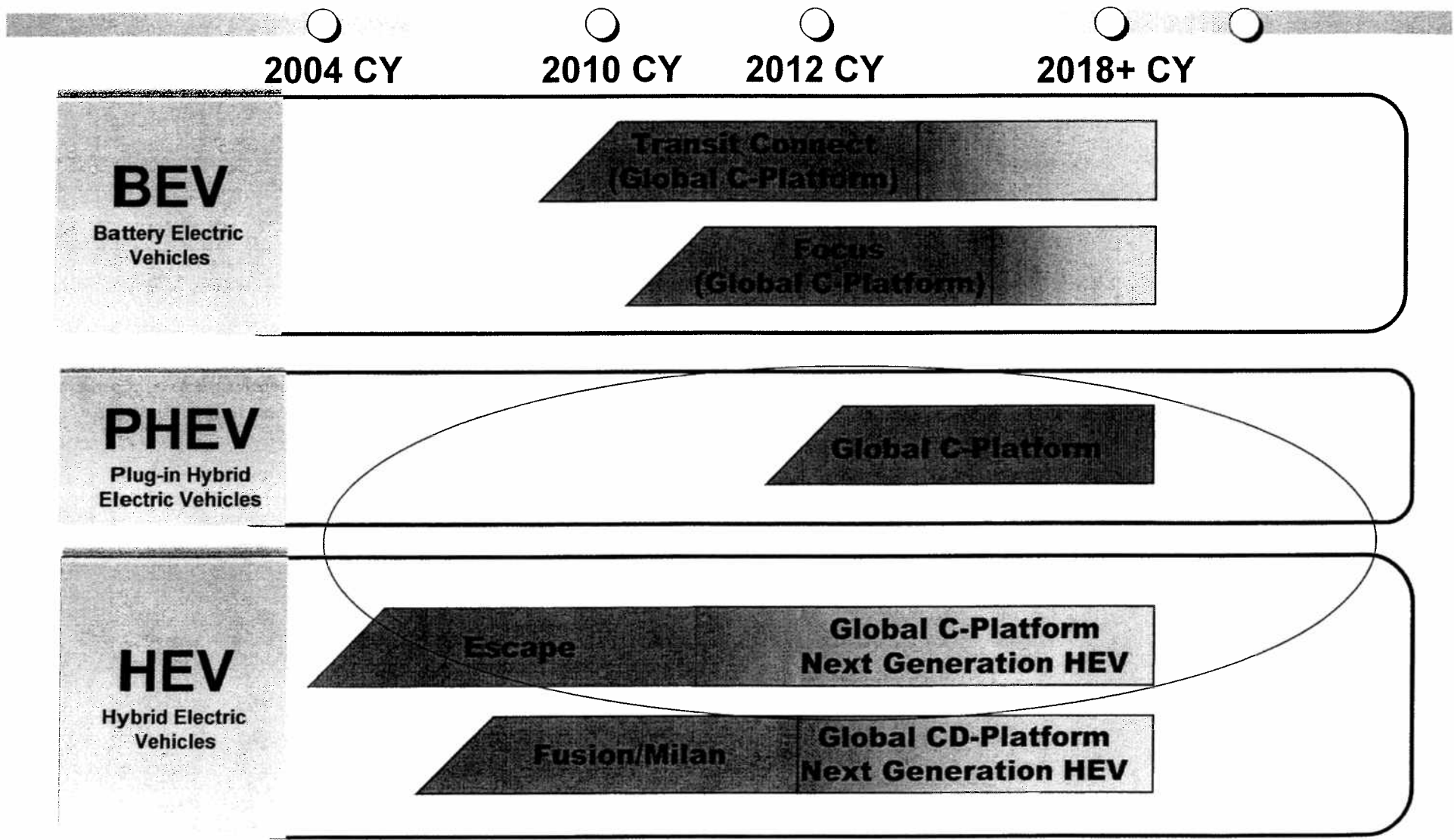
Sustainability Strategy – Technology Migration





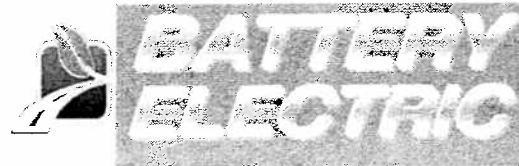
Announced Ford Electrification Projects:

Key is Leverage of High Volume Global Platforms



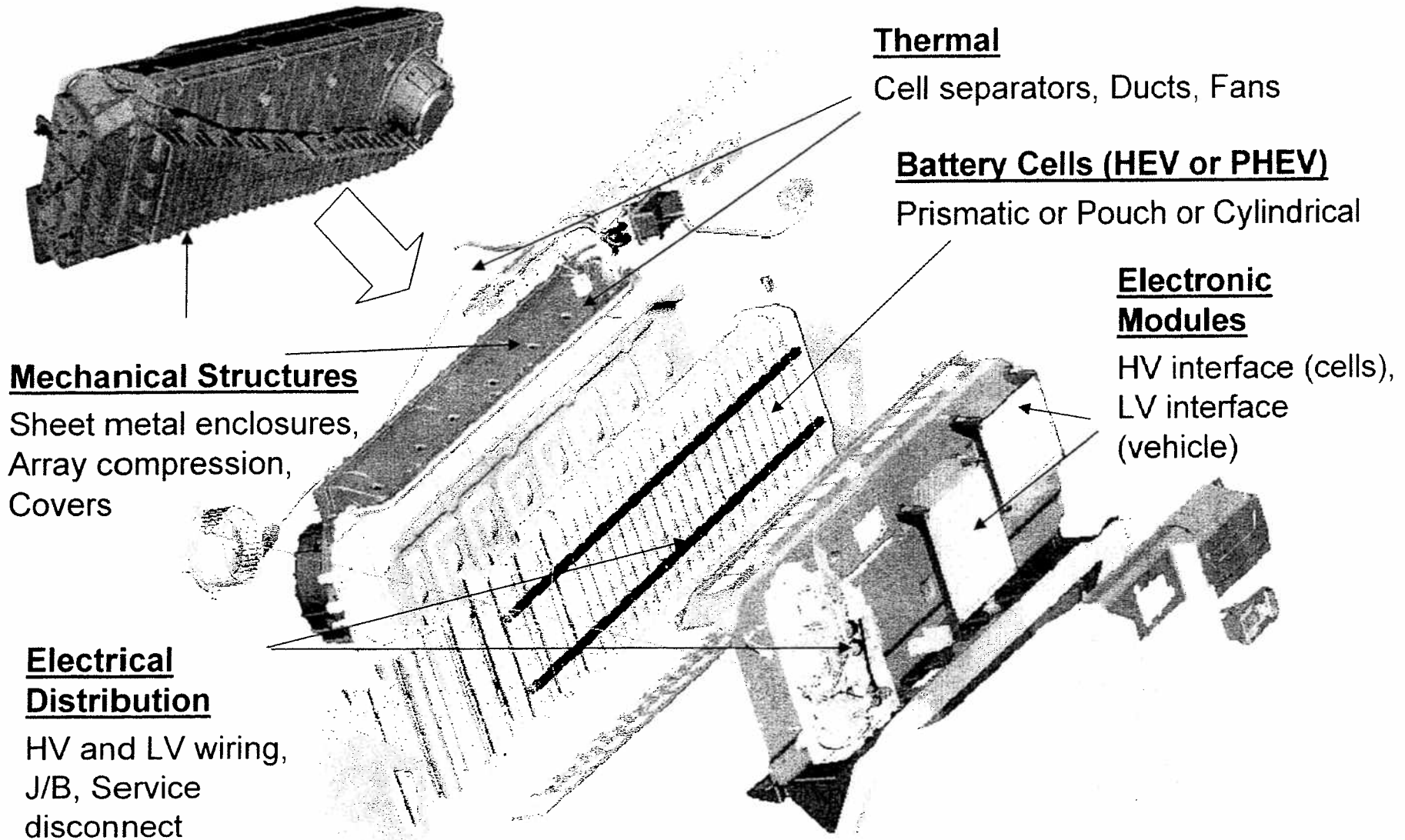


Sustainable Mobility Technologies
Comprehensive Climate Change & Energy Strategy
Fuel Efficiency Solutions Affordable for Millions of Customers





Battery Hardware for HEVs and PHEVs





HEV vs. PHEV Battery System Engineering, Development & Testing

	HEVs	PHEVs
Battery Cells	Li-Ion Power Cells	Li-Ion Energy Cells
Battery Control Module	Same	Same
Battery Controls Software	Same/ Unique Calibration	Same/ Unique Calibration
Electrical	Sized for HEV duty cycles	Sized for PHEV duty cycles
Mechanical		Larger than HEV Battery
Thermal	Air-cooled	Air-cooled/Larger Fan
Testing	Same/ different limits (e.g.SOC)	Same/ different limits (e.g.SOC)

Engineering Effort required is the same for HEV and PHEV Battery System Development



Enablers to Realize the Opportunities

Ford is considering a strategic consolidation of electrification programs in Michigan that could result in \$300-\$500 million in new investment and over 1000 direct jobs.

- Ford has announced the production of the battery electric Focus at the Michigan Assembly Plant but has not yet announced the location for production of the next generation hybrids (HEVs) and plug-in hybrids (PHEVs) with lithium ion batteries.
- Ford has taken a strategic decision that battery system design and development will be a future core competency.
- This opens up the opportunity of a strategic consolidation of electrification programs in Michigan including battery pack manufacturing, electric vehicle transmissions and future HEVs and PHEVs vehicle production
- *Due to capital constraints and the need for a long term viable business, Ford is considering a variety of manufacturing locations, export alternatives and investment options*

The proposed Battery Pack Assembly Credit will encourage Ford to consolidate their electrification plans in Michigan. Key elements of this legislation will:

- Expand definition of advanced lithium ion battery pack to include HEV applications with less than 4kWh included in previous legislation
- Define scaled incentives between \$400 and \$500 for advanced battery packs of 1 to 4 kW-hours
- Ensure performance based requirements are met
 - Up-front minimum investment levels of \$150 million (in related vehicle, electric component and pack manufacturing operations)
 - Battery pack incentives to be paid only after they are produced in Michigan.
- Provide up to \$85 million of advanced battery pack credits from 2012-2014 with the potential for an additional \$35 million beyond 2014 if lithium ion battery cells are sourced in Michigan



Michigan's Economic Impact

Builds upon Michigan's Future as the Center of Vehicle Electrification and Energy Storage

- Fully complements Michigan's vision and investment in a comprehensive electrification strategy
- Positions Michigan for expanding growth potential in electrification in 2015 to 2020 vision

Supports High Volume Use of Battery Cells Critical to the Future of Michigan's Investment in Cell Manufacturing

- Michigan's electrification incentives have leveraged \$1.3 billion in direct federal support

Drives High-Value New Jobs in Michigan

- Over 1000 new jobs directly tied to vehicle electrification
 - Relocates operations from Mexico to Michigan for battery pack manufacturing
 - Establishes next generation HEV and PHEV vehicle production in a Michigan facility
 - Leverages direct and indirect job growth in Michigan - - economist studies support a job multiplier ranging from 6 to 10 jobs for every OEM assembly job
 - Builds advanced manufacturing expertise and attracts skilled engineers and research scientists

Promotes Michigan Competitiveness as a Center of Excellence in Electrification

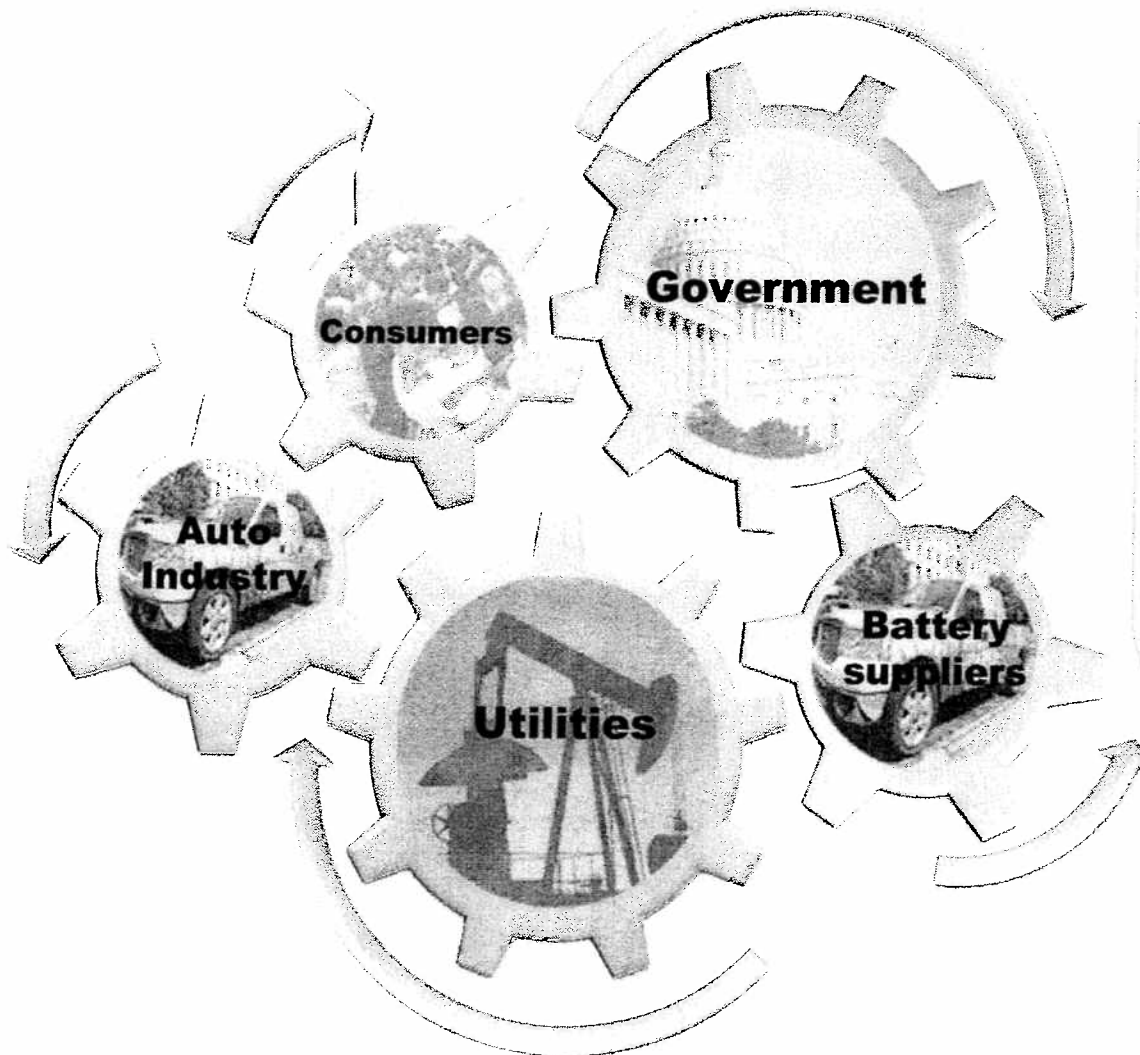
- Battery pack consolidation in Michigan becomes the global center for excellence including Ford exports
- Enhances and builds Michigan's employment focus in engineering expertise, next generation technology suppliers and University collaboration in technology and training
- Government support around the world is used to promote and accelerate electrification initiatives

Strengthens Michigan's Advanced Technology Manufacturing Base as an Engine For Economic Growth

- Vehicle electrification technologies are critical to competitiveness and growth
- Legislation requires sourcing from Michigan battery cell manufacturers once manufacturing capability is established to meet program timing commitments



Integrated Approach With Shared Responsibility



The development of a sustainable market will be dependent on close cooperation between

- **Product makers**
- **Fuel producers**
- **Researchers**
- **Policy makers**
- **Opinion shapers, and**
- **Consumers**

