Vision for the Future of Automotive Work in the US

CAR Event, May 4, 2011

# Key Trends and Drivers for the Future


## Nancy Gioia

**Director, Global Electrification**

**Ford Motor Company**


DRIVING CHANGE

*Greening the Automotive Workforce*

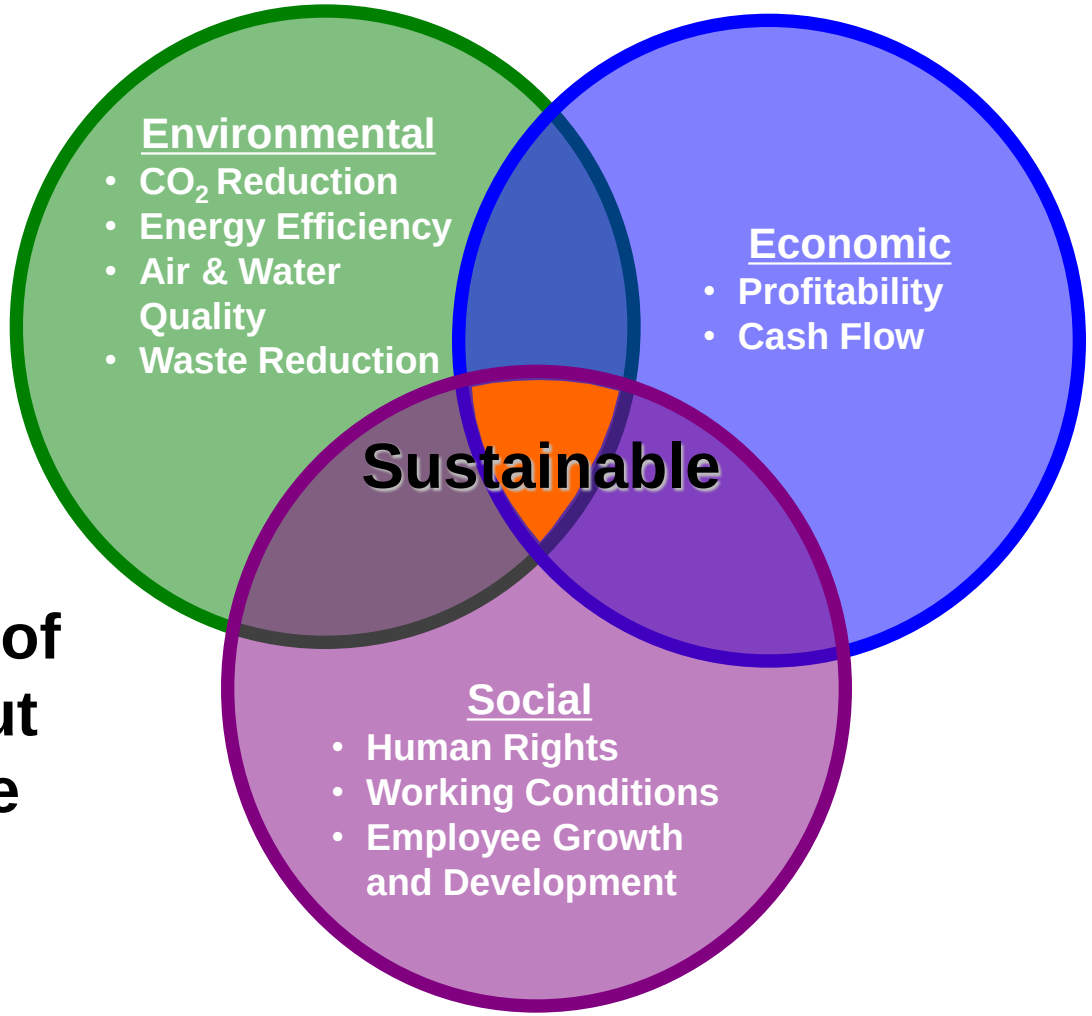
MICHIGAN | INDIANA | OHIO

"Improved sustainable performance is not just a requirement, but a tremendous business opportunity."
*- Bill Ford*

Our vision for the 21st century is to provide SUSTAINABLE transportation that is affordable in every sense of the word:

*Environmentally, Socially & Economically*

**Meeting the needs of the present without compromising the future.**



# Process to Manage Sustainability of Our Products

**SCIENCE**

Stabilization Approach

**GOVERNMENT**

Regulatory Trends

**CONSUMER**

Market Trends

**COMPETITIVE**

Industry Trends

**Product $CO_2$ Strategy**

Deliver Vehicle Contribution to $CO_2$ Stabilization

Sustainable Mobility Governance Team

- Technology Plan
- Policy Positions
- Cycle Plan
- Marketing and Communications Plan

**At Ford, sustainability is embedded into the fabric of our company**

**Consumer:**


Consumer:
china & india

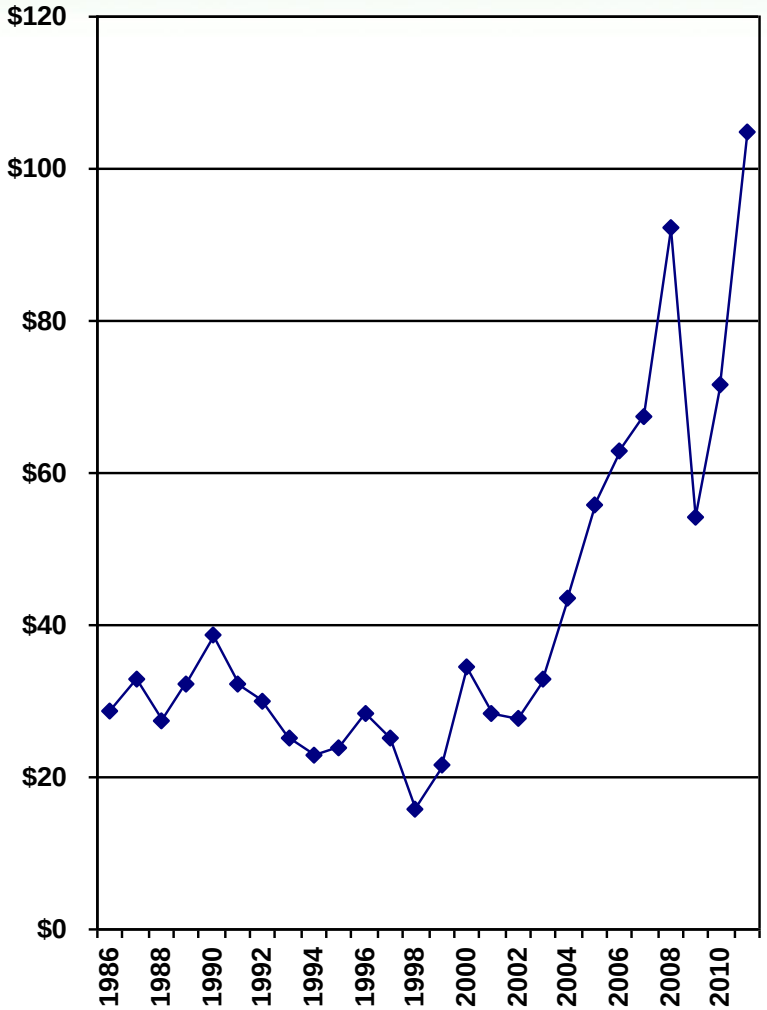

Consumer:
urbanization

**Consumer:**

falling fertility

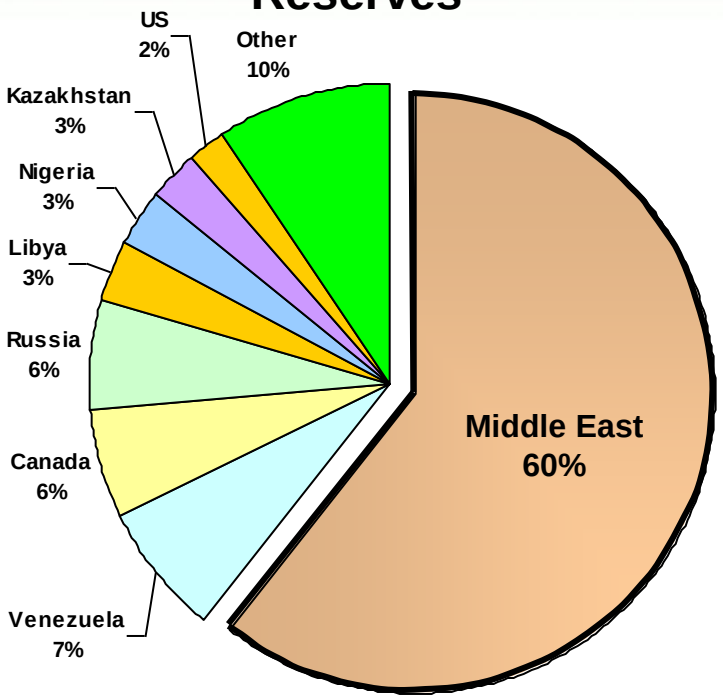

Consumer:
aging population

## Crude Oil Price ($ / barrel)



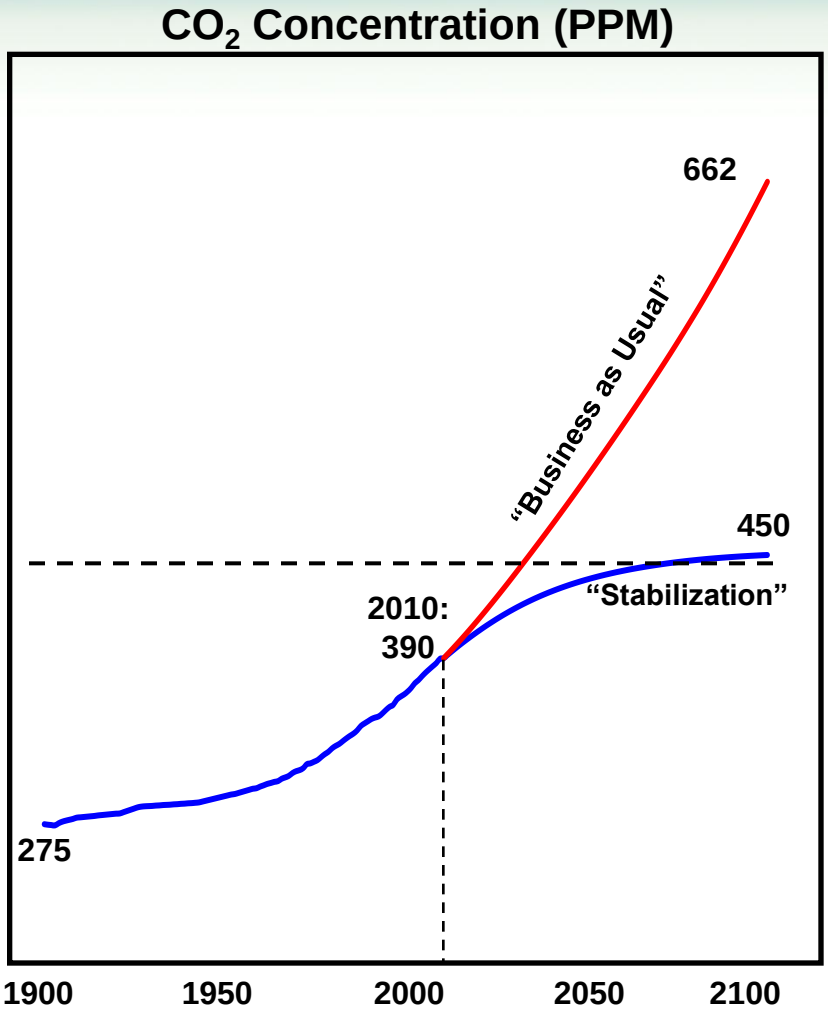

Source: U.S. Department of Energy, Energy Information Agency

## Concentration of Global Oil Reserves




**Over 60% Of Oil Reserves Are Concentrated In Middle East Nations**

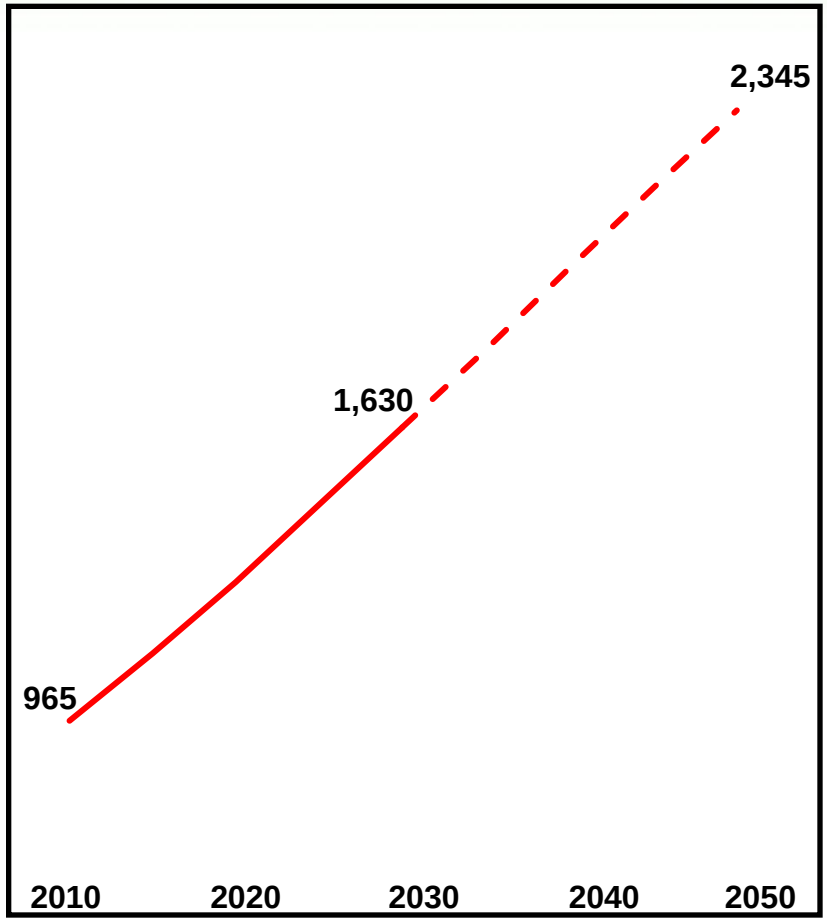
Sources:
BP Statistical Review of World Energy June 2008
PennWell Corporation, Oil & Gas Journal, Vol. 106.48 (December 22, 2008)
Gulf Publishing Company, World Oil, Vol. 229, No.9 (September 2008)



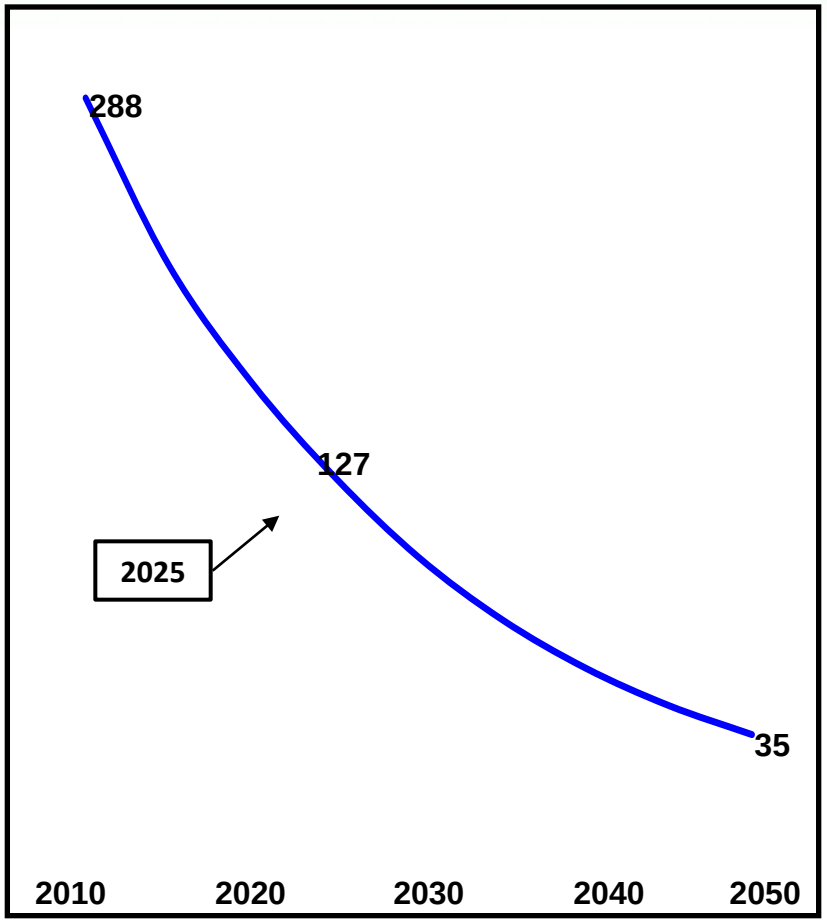

- $CO_2$ stabilization target at 450 ppm is required to limit global warming to 2.0 degrees C over pre-industrial levels
- This target has been endorsed by the United Nations Framework Convention on Climate Change
- Light Duty Vehicles are the source for 20% of $CO_2$ in the U.S.
- Ford is committed to doing its part of achieving a 450 ppm glidepath

**Ford Is Committed To Support $CO_2$ Stabilization At 450 PPM**

## Global Carparc
(millions of units)



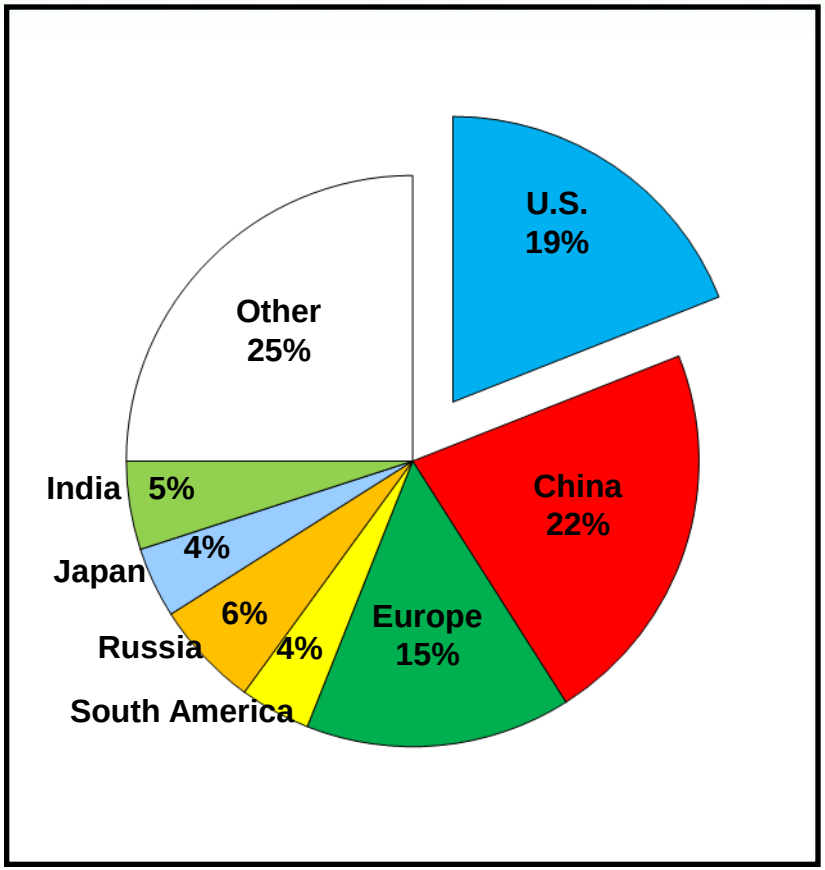

## Global Automotive $CO_2$ Objective
(avg. vehicle $CO_2$ emission g / km)



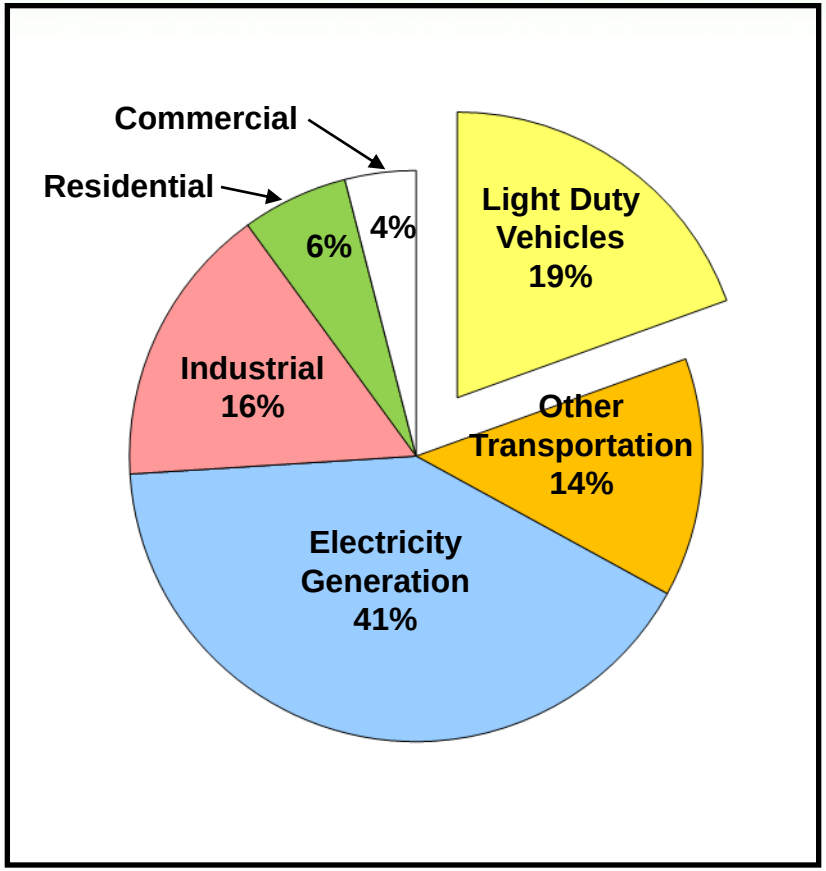

**Global Automotive Emission Objectives Reflect Growing Carparc**

*Source: IHS Global Insights*

## 2008 Global $CO_2$ By Market

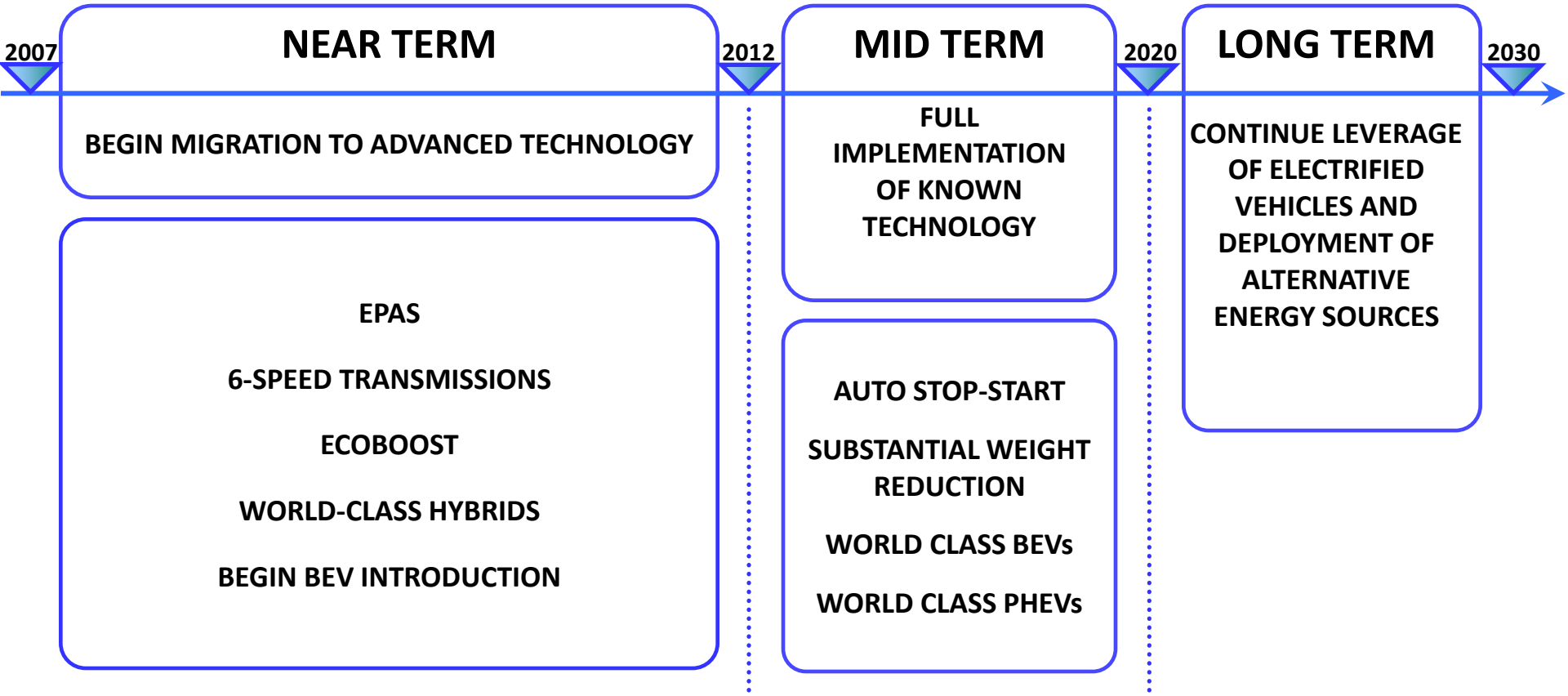



## 2008 U.S. $CO_2$ By Industry



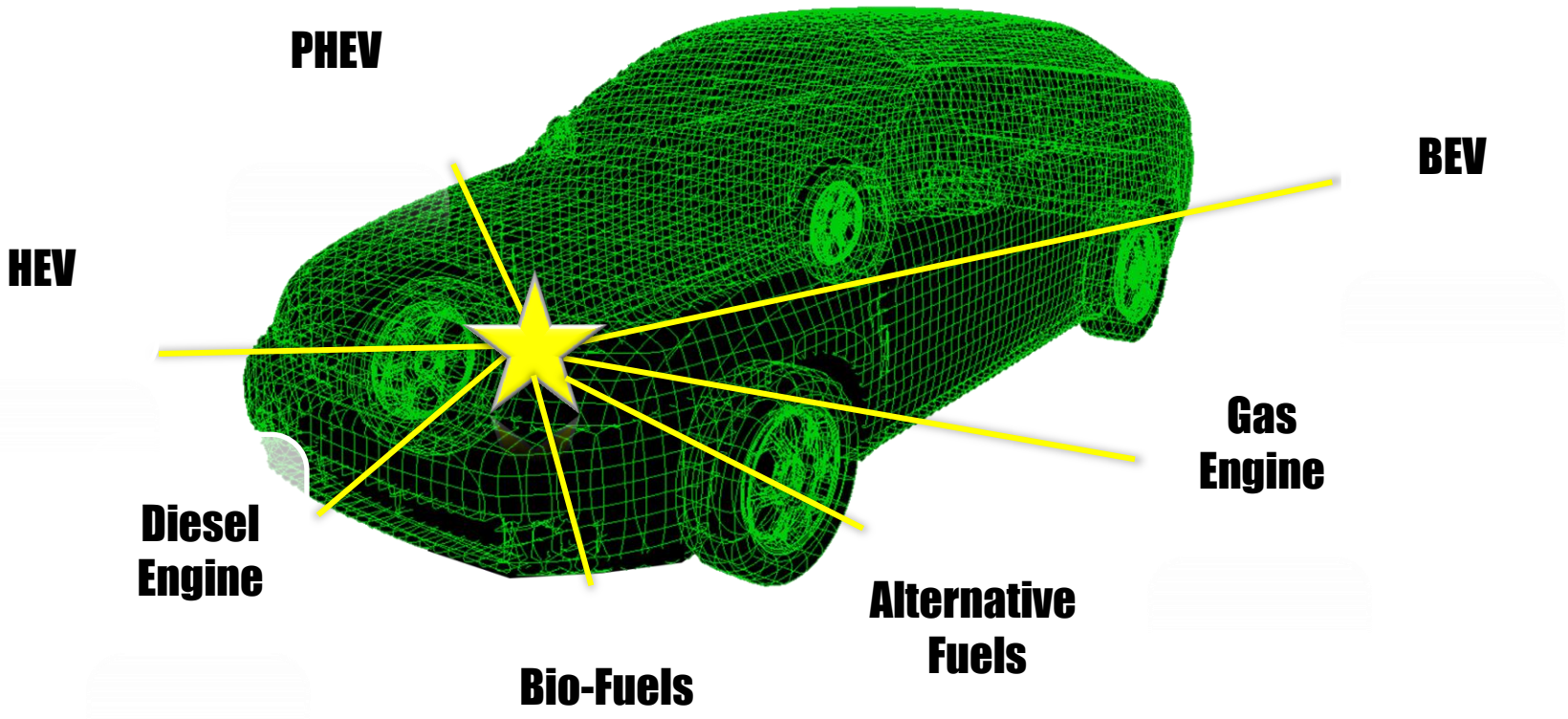

**Achieving the 450 ppm Glidepath Requires A Well-to-Wheel Focus**

## TECHNOLOGY MIGRATION




**Ford's sustainability strategy, founded on affordability for millions of customers, remains in place as we move to the mid-term.**

# Plug & Play into High Volume Platforms with Global Reach



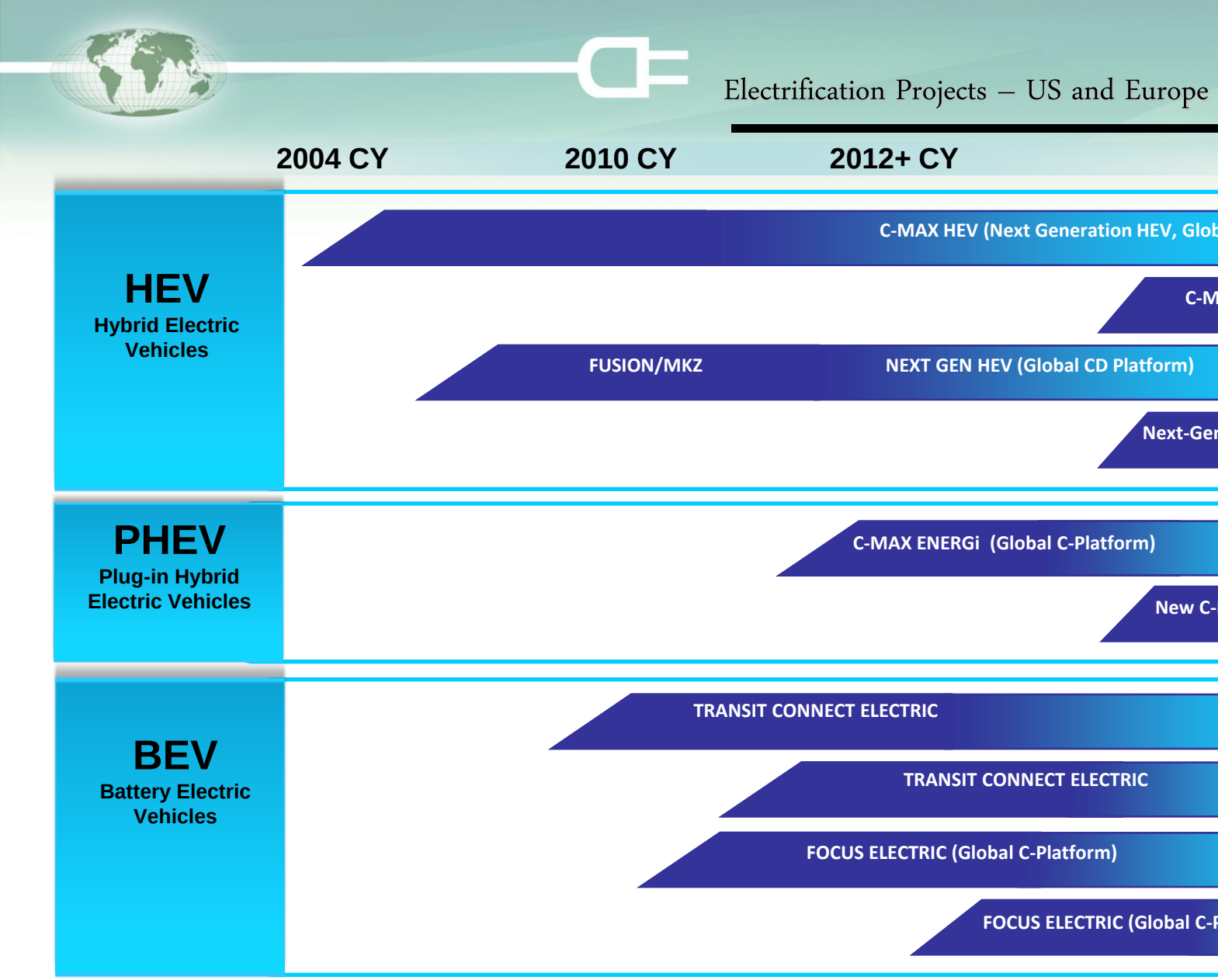

**Pragmatic, comprehensive, flexible approach to leverage global assets and get the product and cost right for profitable growth.**

# THE POWER OF CHOICE




**Ford's strategy is to electrify global platforms with all 3 electric solutions – to drive choice of top hats, scale and affordability**

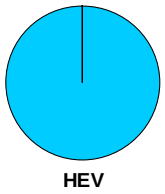
# Electrification Projects – US and Europe

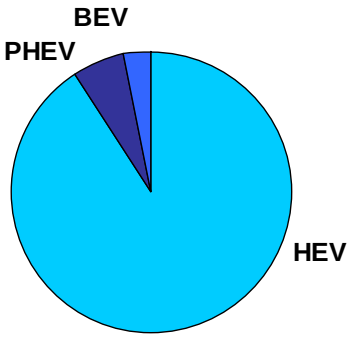


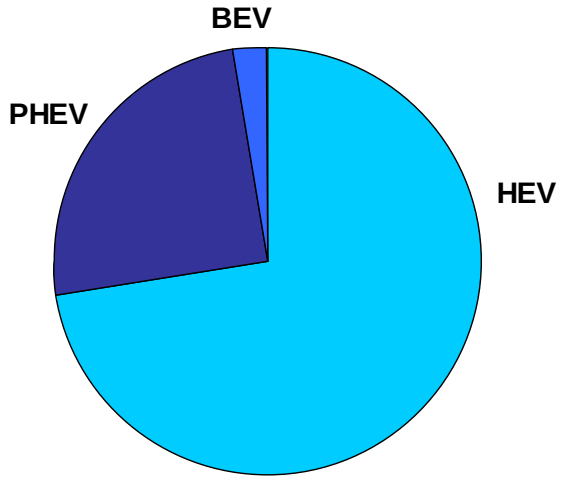

**Technology, platform and flexible manufacturing approach support efficient rapid global deployment**

2010 CY | 2015 CY | 2020

**Ford Global Volume**



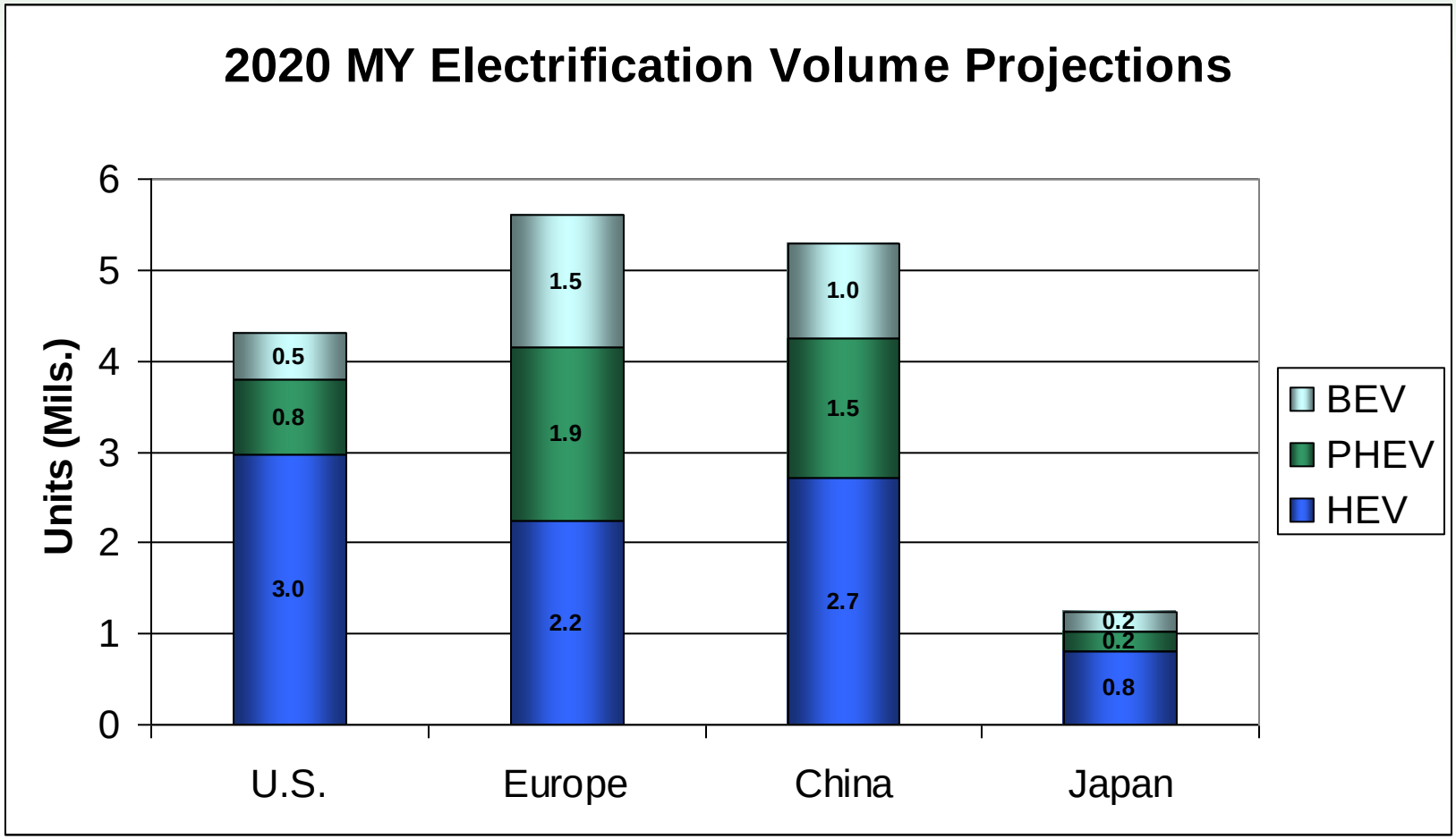

**% of total Ford volume**

**1%** | **2-5%** | **10-25%**

- **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's electrified platform strategy provides global flexibility**

# 2020MY Global Electrification Volume Projections by Region




Note: Volume projections are based on forecast data from the following 3rd party studies:
- Roland Berger - Powertrain 2020: China's ambition to become market leader in E-Vehicles (April, 2009)
- J.P. Morgan - Global Environmental Series Volume 3 - HEVs Potential Reconsidered in Economic Crisis (May, 2009)
- Credit Suisse - Electric Vehicles - Global Equity Research (October, 2009)
- A.T. Kearney - Retooling the Vehicle for 2020: How Advanced Technologies Will Radically Restructure the Automobile & Automobile Industry (March, 2010)
- J.D. Power - Drive Green 2020: More Hope Than Reality? (November, 2010)

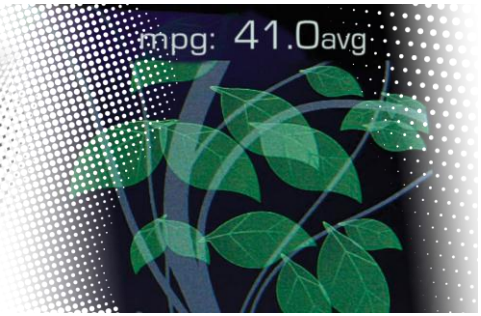
# What parts make up HEV, PHEV, and BEV Systems?

| Component | HEV | PHEV | BEV |
|---|---|---|---|
| High Voltage Battery | Power | Power/ Energy | Energy/Fast Charge |
| Traction Motor | | | Mod |
| Generator | | | N/A |
| Inverter(s) | | | Mod |
| Electric AC / Heater | | | Mod |
| DC / DC Converter | | | Mod |
| Regen Brake Hardware | | | |
| Transmission | | | N/A |
| Engine | | | N/A |
| Gear Box | N/A | N/A | |
| Charger & Wiring | N/A | | Mod |
| Electric Pumps / Cooling Circuits | N/A | Mod | Mod |

**Many new components and system interfaces!**

# SMARTGAUGE™ WITH ECOGUIDE






GRAPHICALLY TRACKS DRIVER'S EFFICIENCY


**In-Car Info with MyFord Touch™**

***Supporting increased in-vehicle data needs***

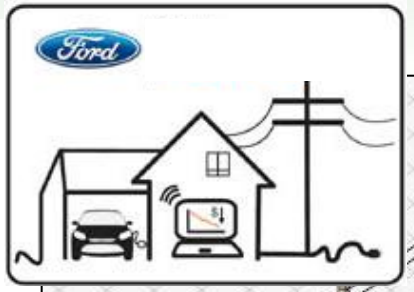
**At Home Charging**

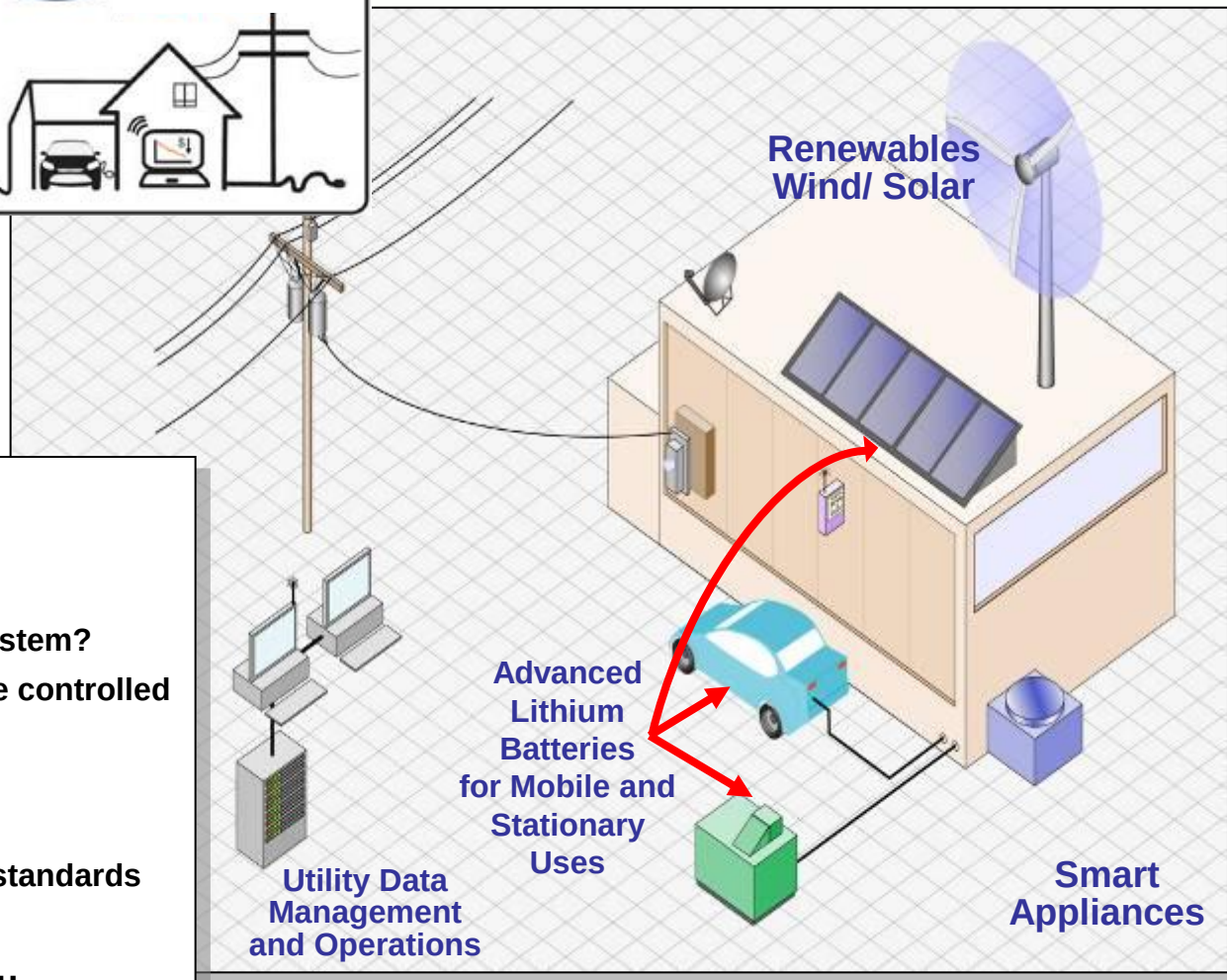
***Supporting home infrastructure and minimizing energy cost***


**Smartphone Access with MyFord Mobile**

***Supporting continual connectivity to vehicle (North America)***

**Plug-In vehicles require In-Vehicle, Charge-Point, and Remote communication and control**




## Exploring Value From "Plugging In"

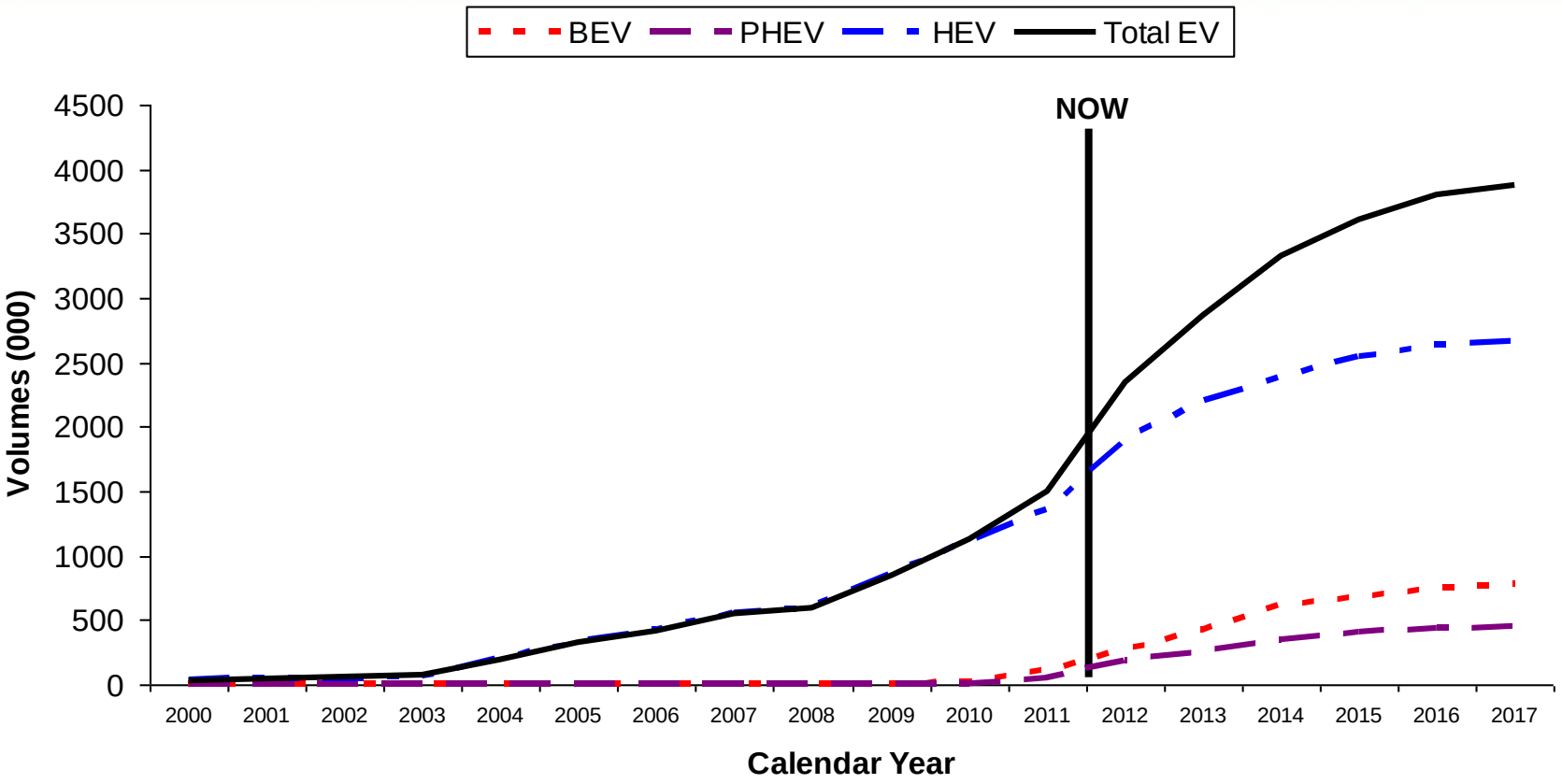
### All New System View:

- What components are in the new system?
- How will the grid and energy flow be controlled in the future?
- Who are the parties involved?
- What new integration is needed?
- What are the key technologies and standards needed?

**Many Open Questions…**

***Integrating a new energy eco-system***

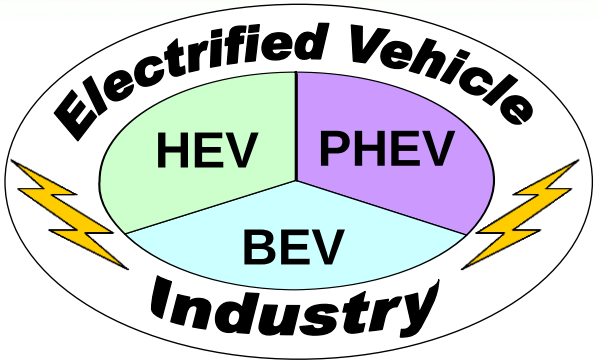
## Global EV Volumes: 2000 - 2017 CY




**U.S. must invest in installed capacity and R&D for global growth**
**Electrified Vehicle growth delivers high-value manufacturing jobs – now and in the future**



Source: CSM Global EV Data 2000-2017




# = U.S. JOBS and INNOVATION

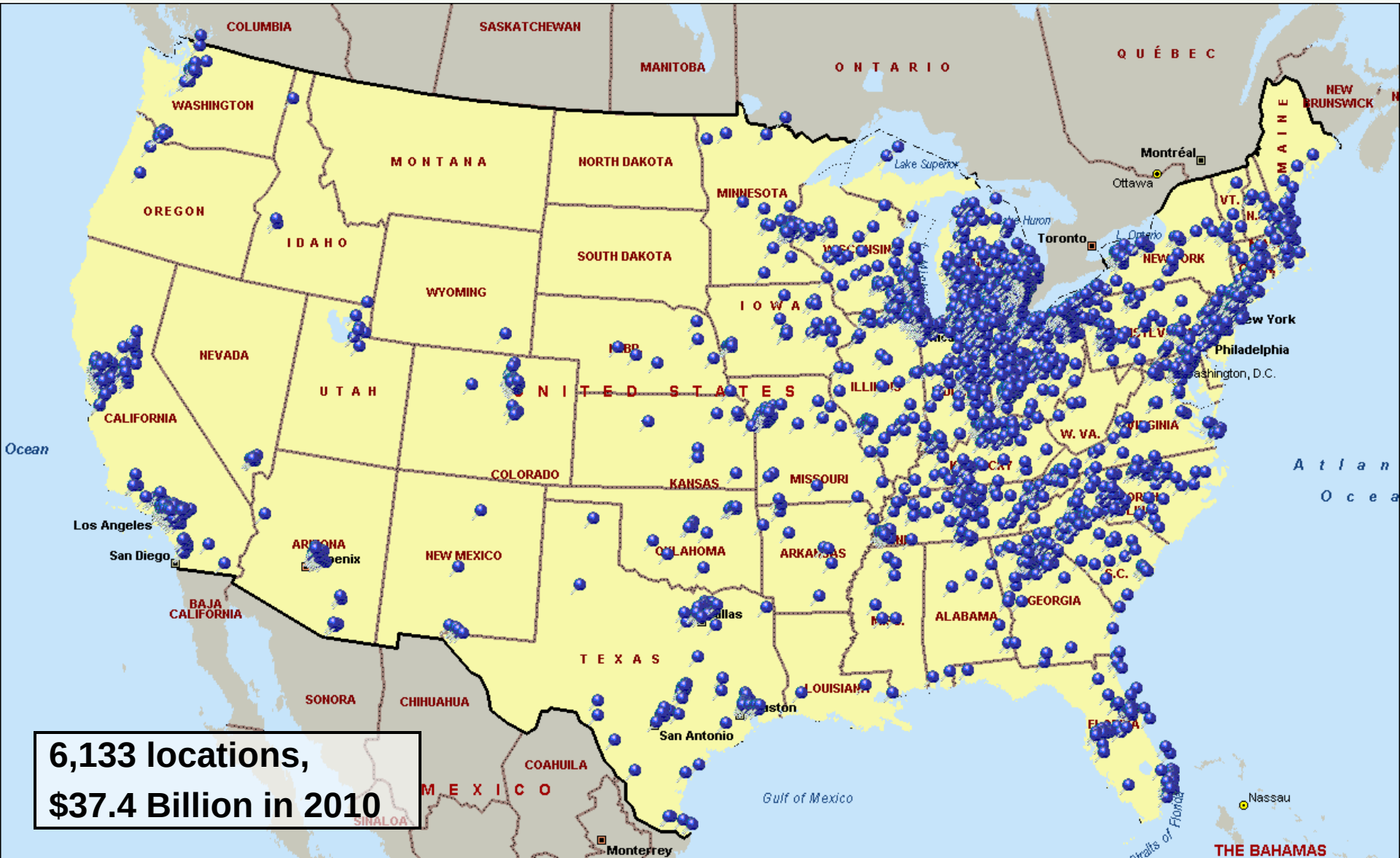
$1,000,000 Investment =

- 9.7 Auto assembly jobs
- 5.7 Auto parts manufacturing jobs
- 12.7 Chemical jobs
- 9.4 Industrial machinery jobs
- 15.6 Non-metallic mineral jobs
- 8.5 Metallic ore mining jobs

**The EV Industry can drive U.S. jobs and innovation.**

**Source: Updated Employment Multipliers for the U.S. Economy (2003)**

# Ford US Supplier Locations




**6,133 locations,**
**$37.4 Billion in 2010**

## Top 15 States by Purchased Value and All Others

| States | Employees Work Loc. (4Q 2010) | Retirees (4Q 2010) | All Suppliers (2010) | | Production Suppliers (2010) | | Non-Production Suppliers (2010) | | FLM Dealers (2010) | | FLM Registered Vehicles (July 2010) | 2000 - 2010 Ford Fund Contrib. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Count | Purchased Value | Count | Purchased Value | Count | Purchased Value | Count | Employees | | |
| Michigan | 39,400 | 78,500 | 2,613 | $ 15.8 Bil. | 410 | $ 9.8 Bil. | 2,203 | $ 6.1 Bil. | 146 | 6,700 | 2,064,400 | $ 344 Mil. |
| Kentucky | 5,200 | 7,400 | 180 | $ 3.8 Bil. | 76 | $ 3.7 Bil. | 104 | $ 77 Mil. | 51 | 2,300 | 764,700 | $ 13 Mil. |
| Indiana | 490 | 6,400 | 256 | $ 3.1 Bil. | 111 | $ 3 Bil. | 145 | $ 62 Mil. | 93 | 3,800 | 1,092,900 | $ 19 Mil. |
| Ohio | 7,200 | 26,300 | 510 | $ 3 Bil. | 7 | $ 2.7 Bil. | 503 | $ 329 Mil. | 162 | 6,700 | 2,117,500 | $ 16 Mil. |
| Missouli | 4,000 | 6,500 | 94 | $ 2.4 Bil. | 23 | $ 2.2 Bil. | 71 | $ 185 Mil. | 106 | 4,200 | 1,159,200 | $ 13 Mil. |
| Illinois | 3,700 | 4,000 | 356 | $ 1.4 Bil. | 75 | $ 1.3 Bil. | 281 | $ 137 Mil. | 163 | 6,200 | 1,965,100 | $ 40 Mil. |
| South Carolina | 300 | 1,100 | 47 | $ 1.1 Bil. | 33 | $ 1.1 Bil. | 14 | $ 2 Mil. | 50 | 1,900 | 641,100 | $ 700 K |
| North Carolina | 57 | 2,000 | 97 | $ 951 Mil. | 33 | $ 895 Mil. | 64 | $ 56 Mil. | 109 | 4,600 | 1,204,900 | $ 5 Mil. |
| Tennessee | 1,000 | 5,600 | 114 | $ 943 Mil. | 64 | $ 932 Mil. | 50 | $ 10 Mil. | 67 | 3,400 | 937,700 | $ 5 Mil. |
| New York | 760 | 4,800 | 307 | $ 887 Mil. | 167 | $ 571 Mil. | 140 | $ 316 Mil. | 143 | 5,800 | 2,112,600 | $ 39 Mil. |
| Wisconsin | 32 | 510 | 93 | $ 537 Mil. | 40 | $ 515 Mil. | 53 | $ 22 Mil. | 123 | 3,800 | 952,000 | $ 3 Mil. |
| Texas | 380 | 2,600 | 172 | $ 421 Mil. | 25 | $ 328 Mil. | 147 | $ 93 Mil. | 245 | 15,400 | 3,459,100 | $ 28 Mil. |
| Pennsylvania | 39 | 1,000 | 123 | $ 380 Mil. | 27 | $ 324 Mil. | 96 | $ 56 Mil. | 179 | 7,200 | 1,887,800 | $ 10 Mil. |
| Georgia | 99 | 4,700 | 106 | $ 321 Mil. | 26 | $ 276 Mil. | 80 | $ 45 Mil. | 107 | 4,600 | 1,546,800 | $ 33 Mil. |
| California | 240 | 4,600 | 256 | $ 298 Mil. | 12 | $ 156 Mil. | 244 | $ 142 Mil. | 170 | 12,500 | 4,730,200 | $ 35 Mil. |
| All Others | 3,100 | 29,800 | 809 | $ 2.1 Bil. | 133 | $ 1.6 Bil. | 676 | $ 471 Mil. | 1,453 | 67,300 | 18,450,400 | $ 251 Mil. |
| **Total** | **66,000** | **185,800** | **6,133** | **$ 37.4 Bil.** | **1,262** | **$ 29.3 Bil.** | **4,871** | **$ 8.1 Bil.** | **3,367** | **156,400** | **44,951,900** | **$ 855 Mil.** |

Announced Tuesday,

May 2, 2011:

## FORD TO ADD 7,000 U.S. WORKERS IN NEXT TWO YEARS;

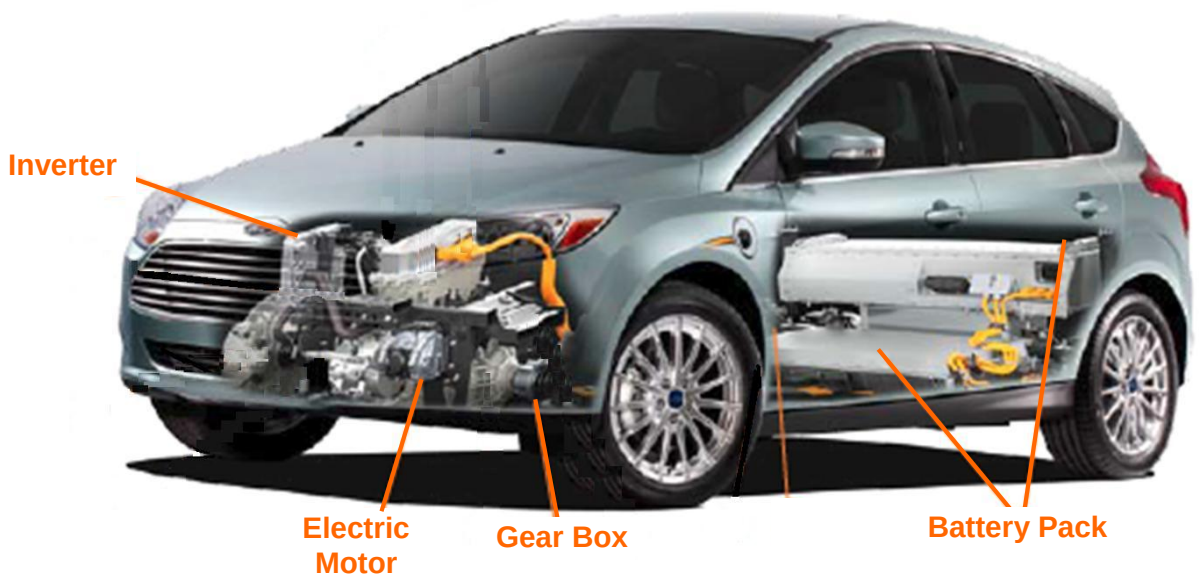
## EXPANDS COMMITMENT TO AMERICAN MANUFACTURING

- DETROIT, Jan. 10, 2011 – Ford Motor Company today announced it will add 7,000 new hourly and salaried jobs between this year and next in the United States.
- This year alone, Ford is adding nearly 4,000 hourly jobs at several of its U.S. plants, including 1,800 at Louisville Assembly Plant, which is preparing to launch the next-generation Ford Escape late in the year. Ford also **will add 750 salaried engineering jobs in product development and manufacturing**. Next year, Ford expects to add at least 2,500 more new manufacturing positions.
- Ford is recruiting salaried engineers specializing in **batteries, system controls, software and energy storage to work on electric vehicles in Detroit and eight other cities including Boston; Chicago; Cincinnati; Columbus, Ohio; Milwaukee; Raleigh and Durham, N.C.; and San Jose, Calif.**

***"Ford is committed to American manufacturing…," said Mark Fields, Ford president of The Americas. "Working with our partners, including the UAW, Ford is finding competitive ways to engineer and build even more high-quality, fuel-efficient vehicles with technologies American consumers really want."***

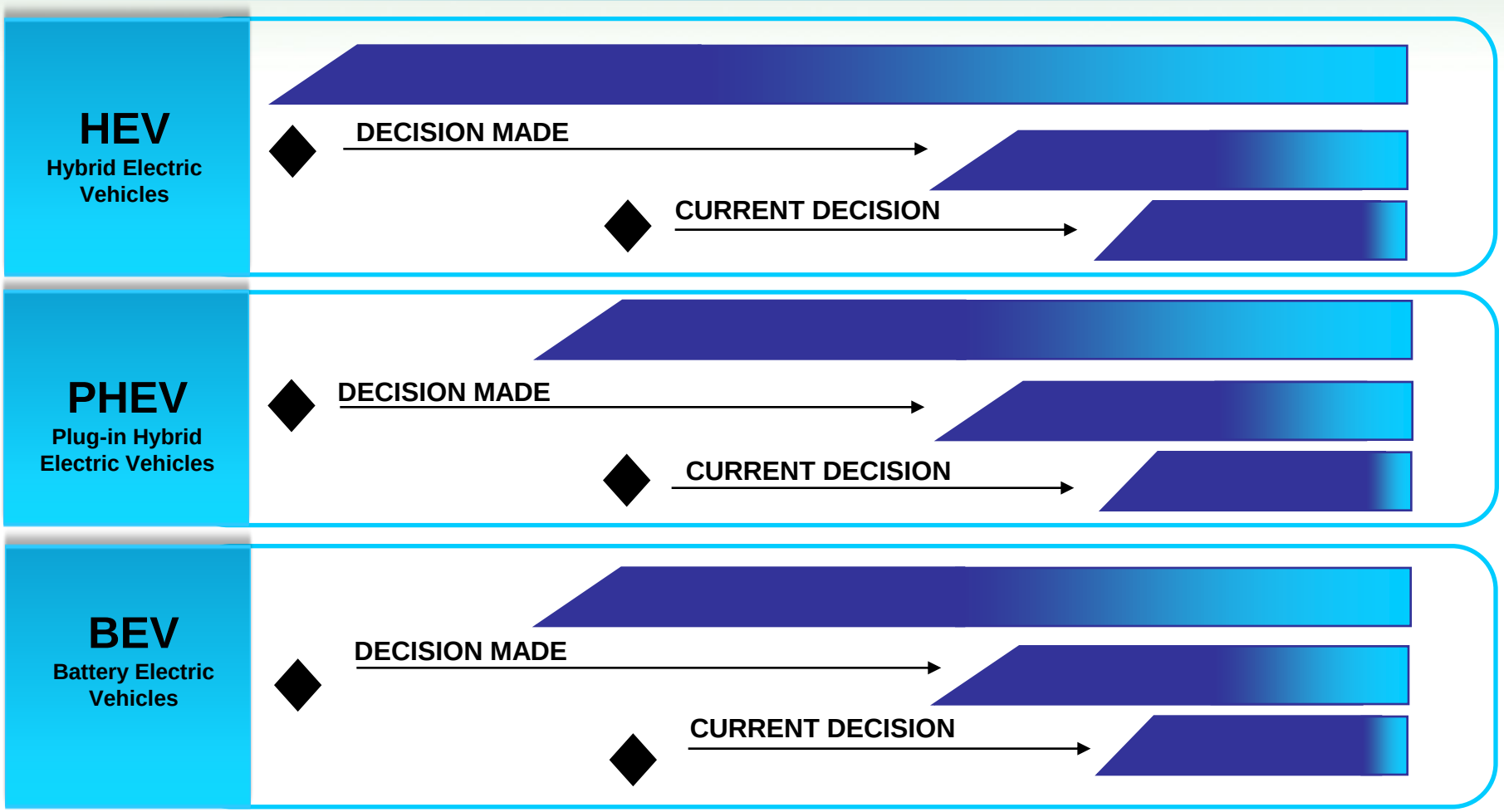
## VALUE CHAIN

Research and Innovation → Engineering & Development → Manufacturing & Raw Materials → Assembly



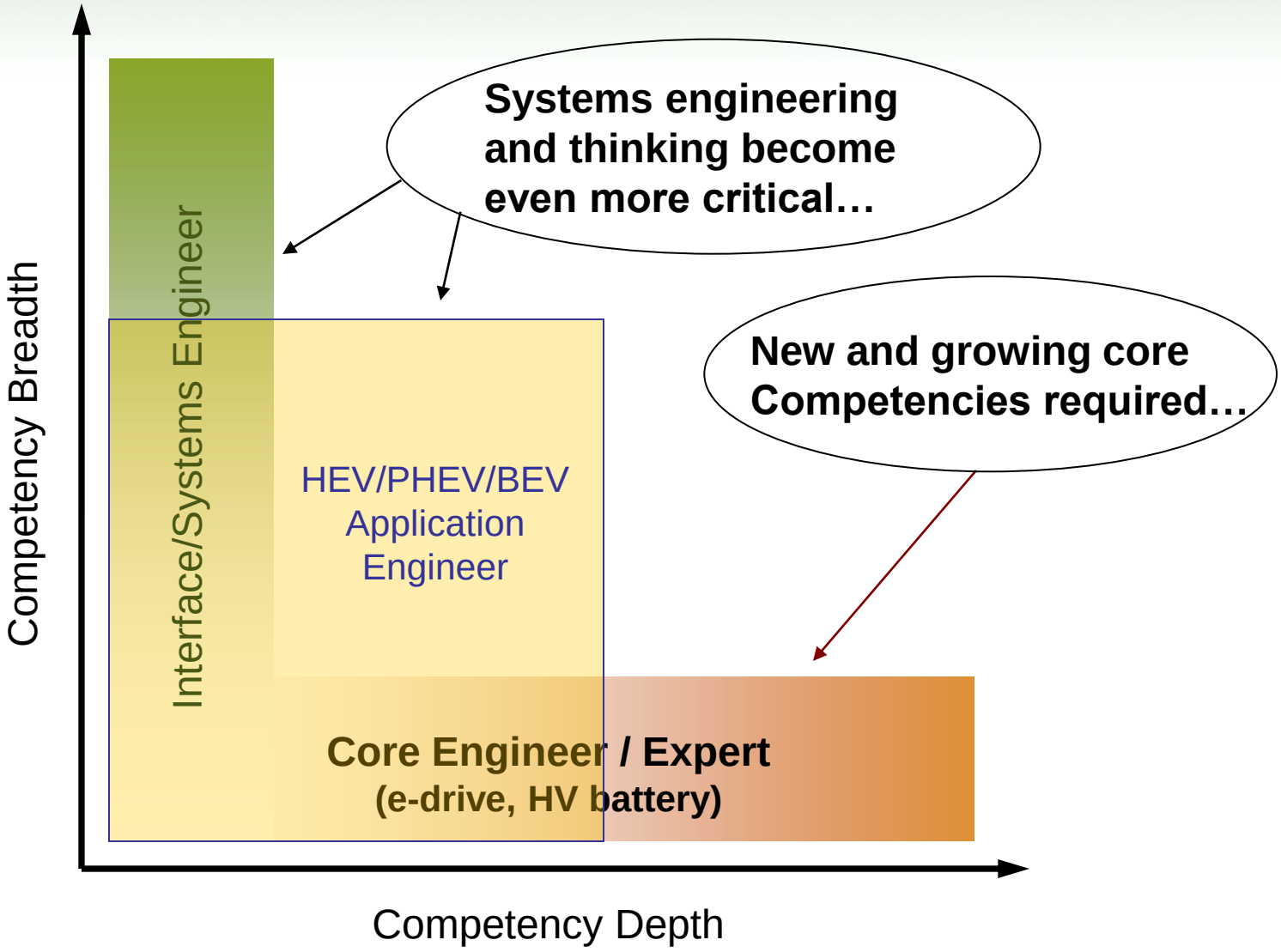

Marketing → Sales & Service → Financing → EOL & Recycling

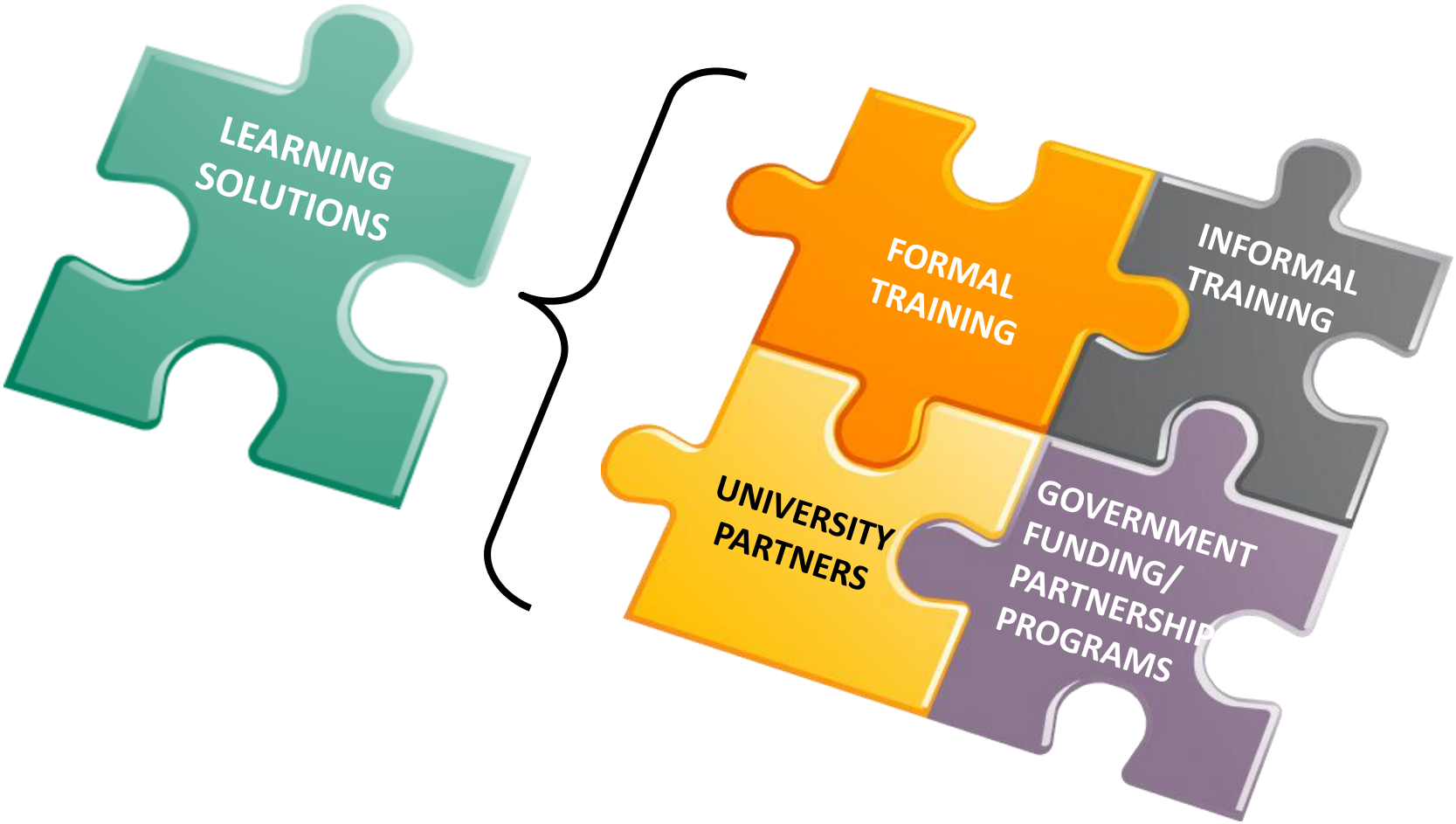
# Global Electrification Programs: Decisions For 2014+



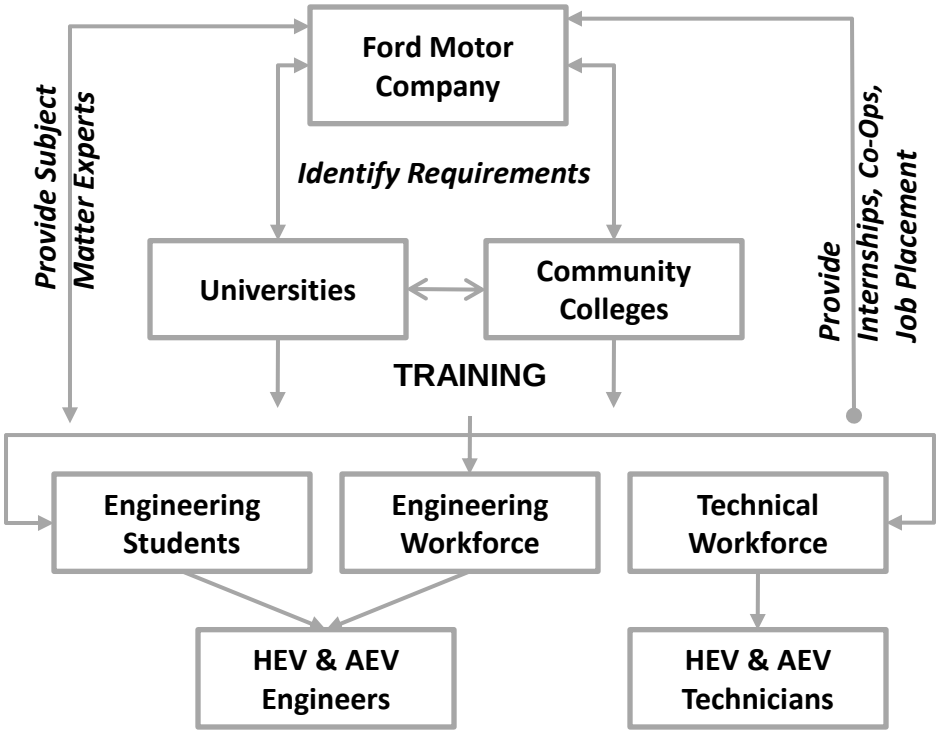

**Sourcing Decisions are being made today for 2014+ Global Programs**
**Resource Requirement and Competency Assessments Underway**


REQUIREMENTS
LEARNING SOLUTIONS
COMPETENCY GAPS
COMPETENCIES


Competency Breadth
Competency Depth
Interface/Systems Engineer
HEV/PHEV/BEV Application Engineer
Core Engineer / Expert
(e-drive, HV battery)
Systems engineering and thinking become even more critical…
New and growing core Competencies required…


LEARNING SOLUTIONS
FORMAL TRAINING
INFORMAL TRAINING
UNIVERSITY PARTNERS
GOVERNMENT FUNDING/ PARTNERSHIP PROGRAMS

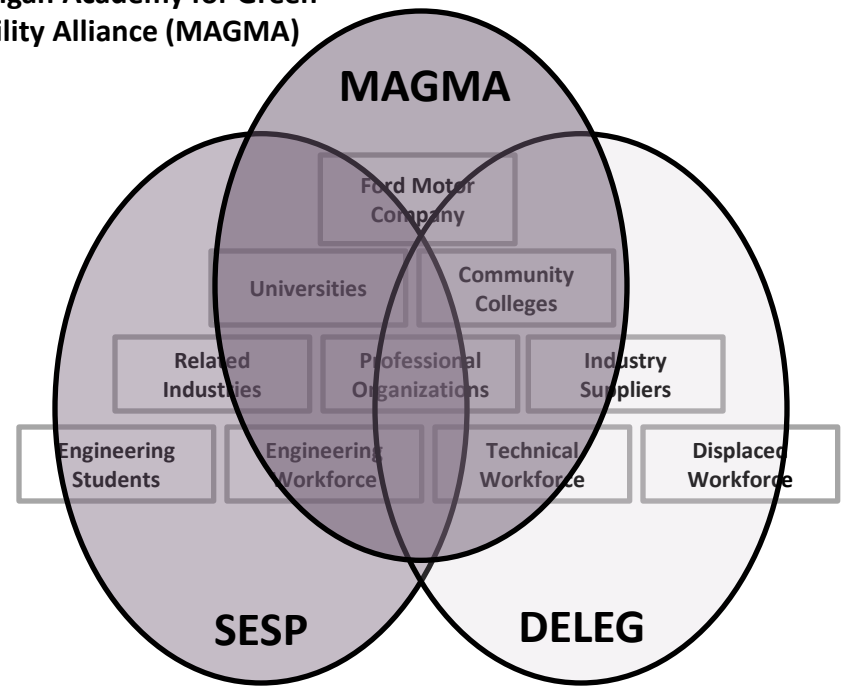
# University Partnerships


**Examples: University of Detroit Mercy Advanced Electric Vehicle (AEV) Graduate Certificate Program, Wayne State University & Michigan Technological University xEV specific programs**

# Government Partnerships

**Michigan Academy for Green Mobility Alliance (MAGMA)**





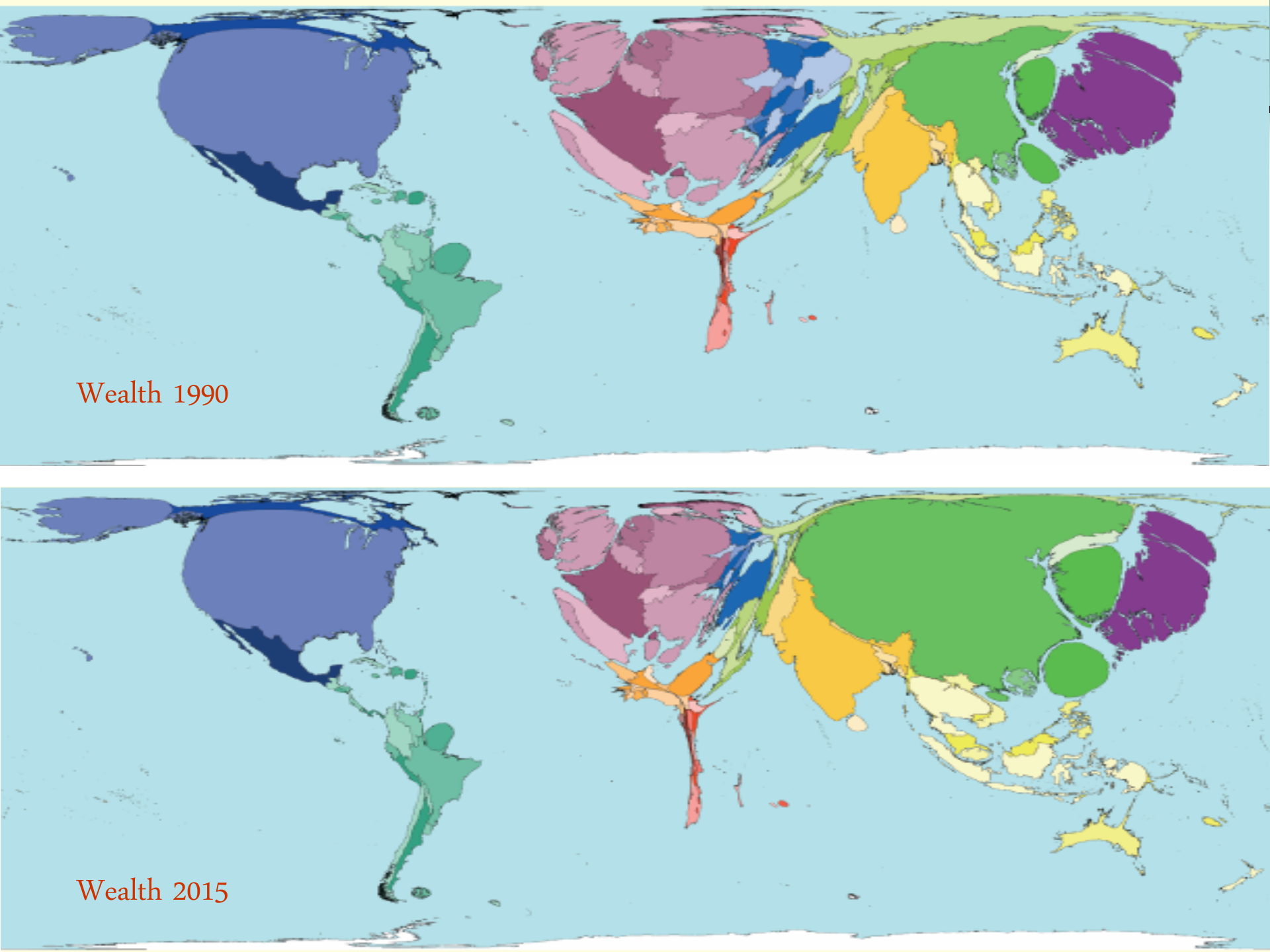
**State Energy Partnership Grant (SESP)**

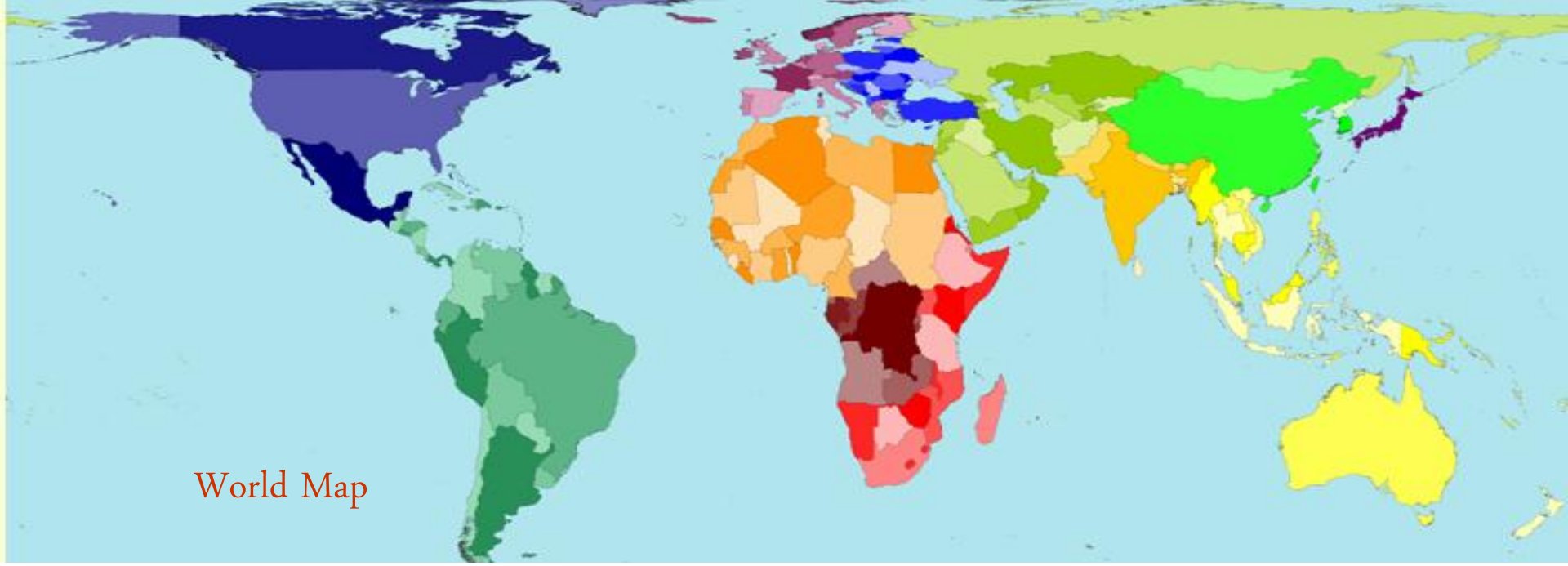
**Michigan Department of Energy, Labor & Economic Growth (DELEG)**

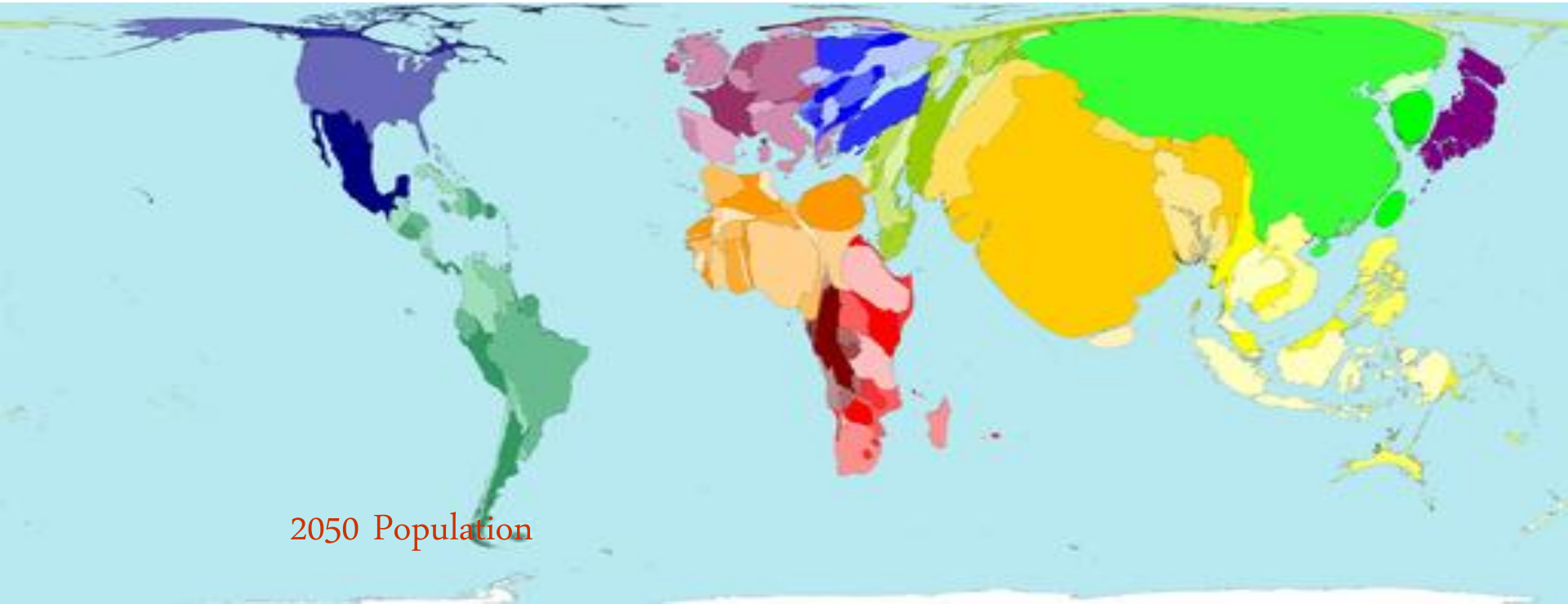
# Integrated Approach With Shared Responsibility


**A sustainable electrified market depends on close cooperation between all stakeholders**

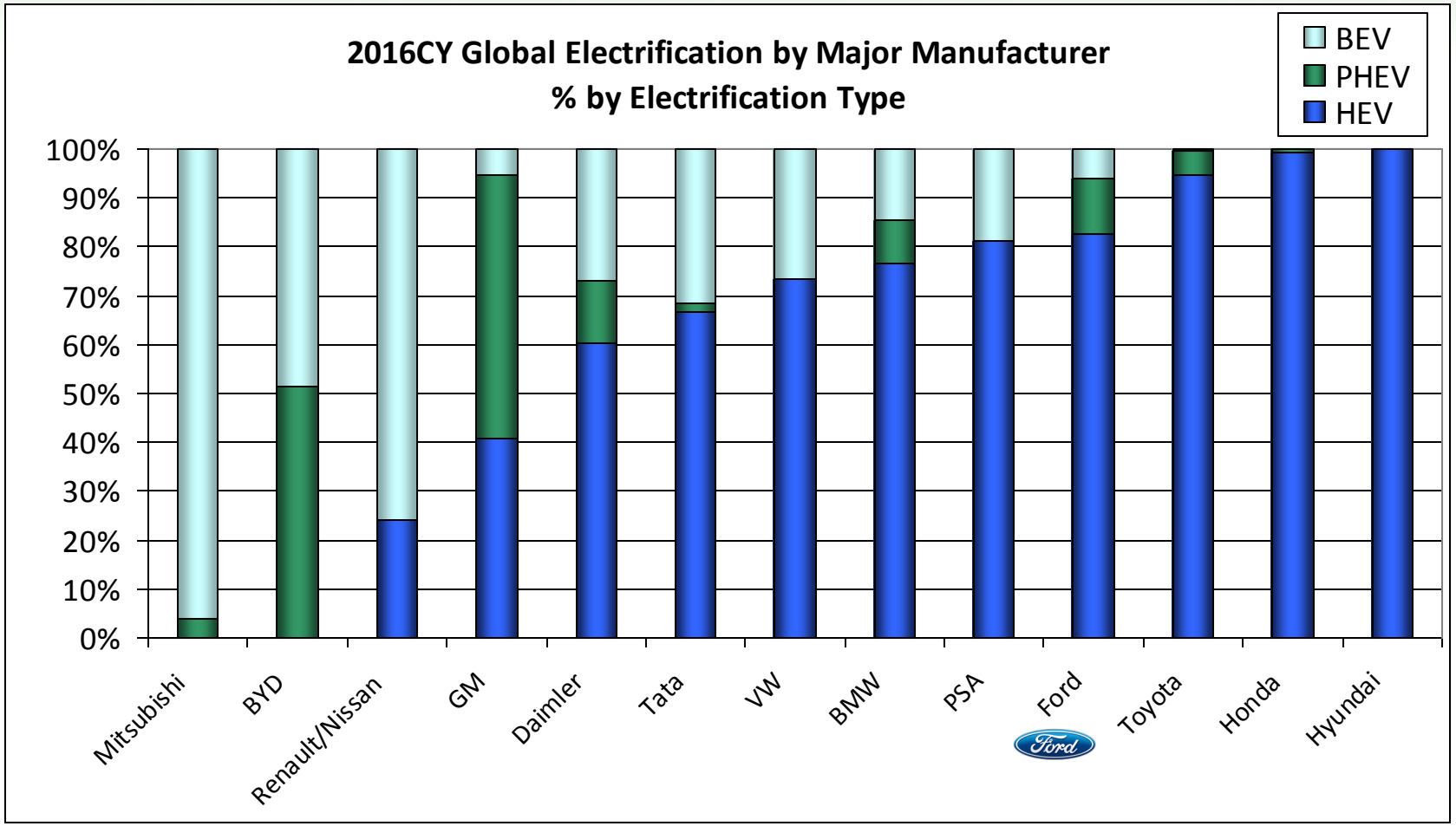

Ford


Wealth 1990
Wealth 2015


World Map


2050 Population

# 2016CY Global Electrification Volume Projections by Manufacturer (>35K)




Note:
- All data is from CSM Worldwide global comprehensive vehicle production forecasts as of 11/16/10.
- Major manufacturers are those with >35,000 electrified vehicle sales projected in 2016CY