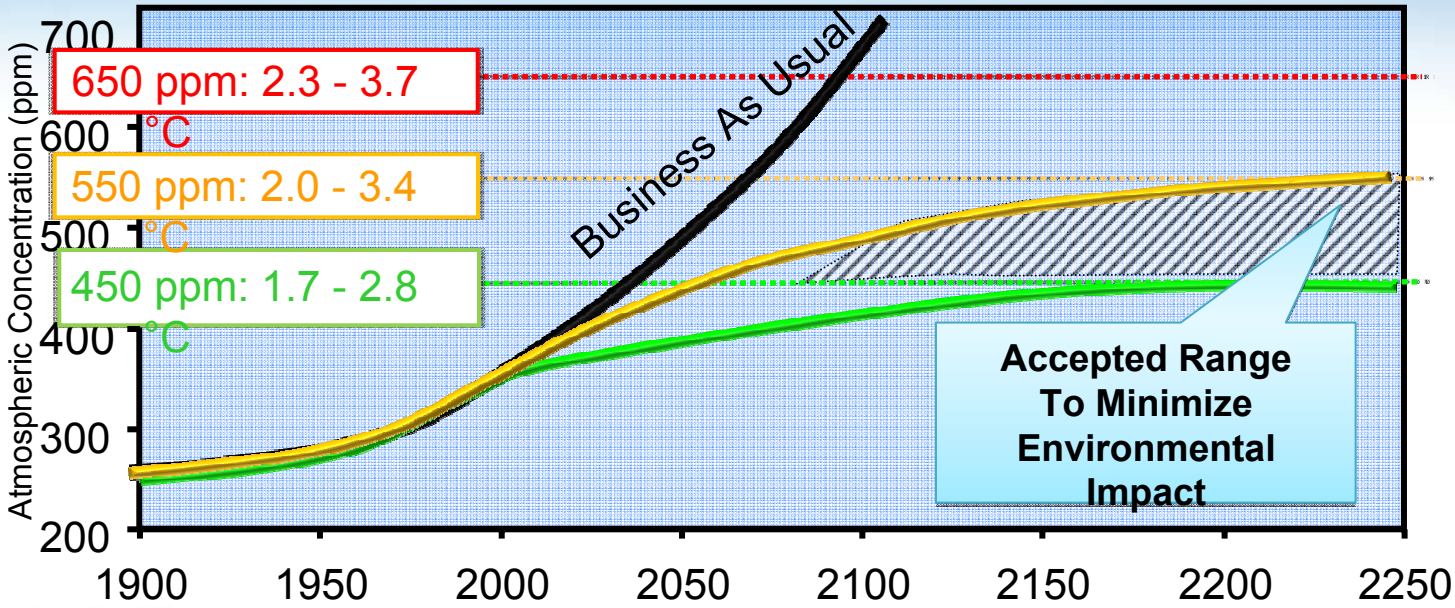
Drive green.

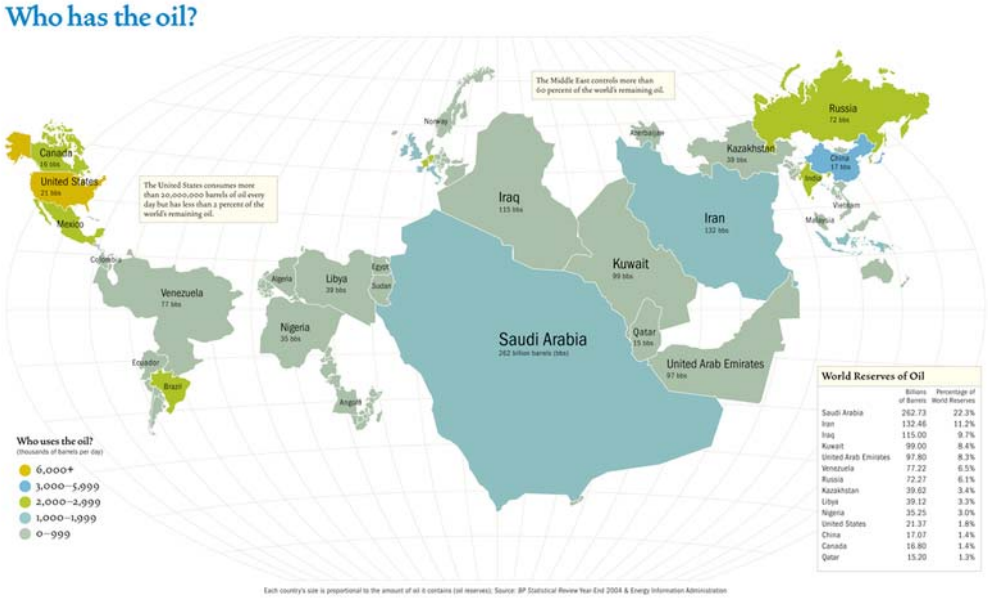
Missouri Technology Conference

June 28, 2010

Tony Reinhart

Why Electrification?





Sustainability Strategy – Technology Migration

Near Term

- Significant number of vehicles with EcoBoost engines
- Electric power steering 70 – 80%
- Dual clutch and 6 speed transmissions replacing 4 and 5 speeds
- Increase Hybrid applications
- Increased unibody applications
- Introduction of additional small vehicles
- Battery management systems 75%
- Aero improvement up to 5%

Mid Term

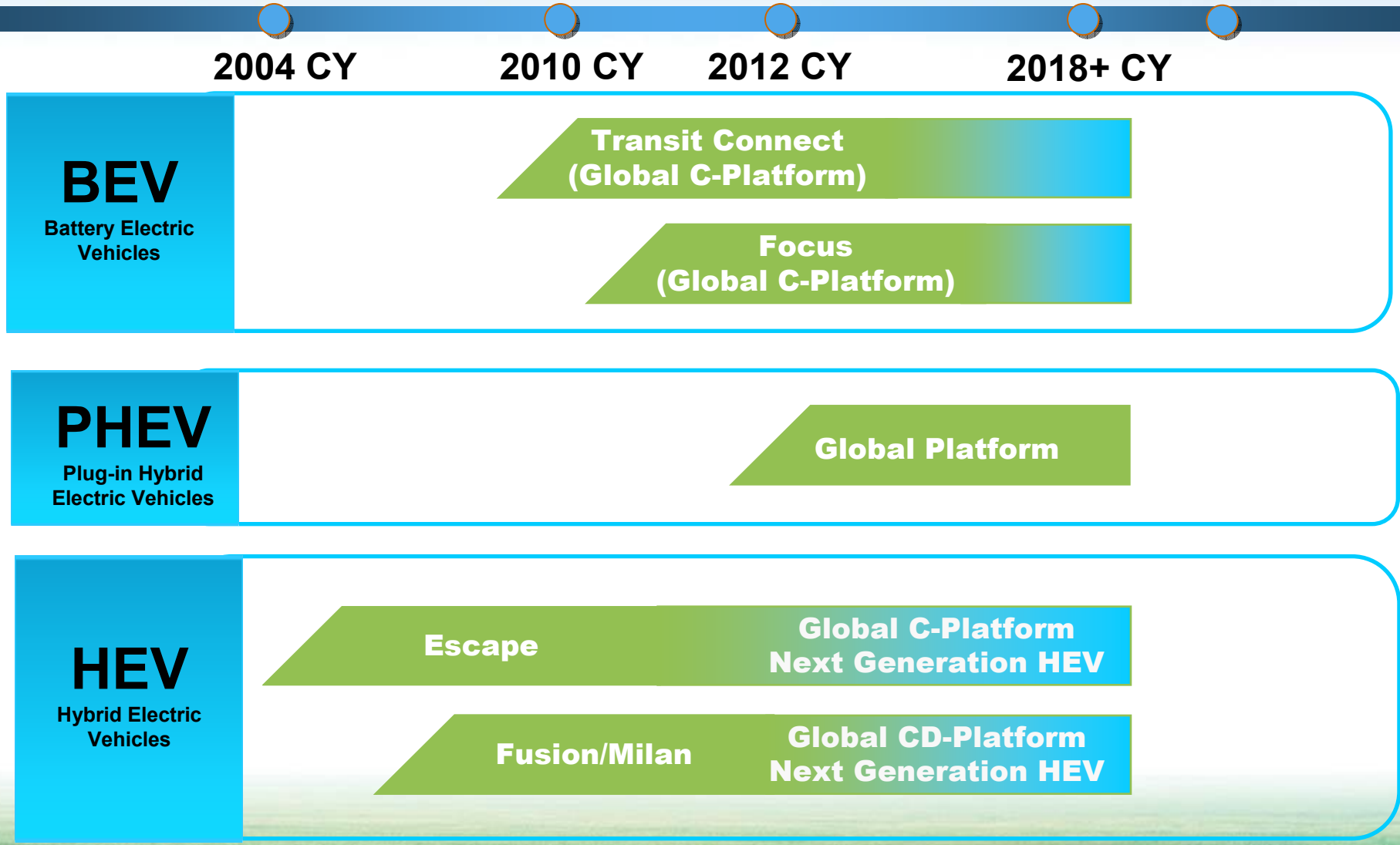
- EcoBoost engines available in nearly all vehicles
- Electric power steering 100%
- Six speed transmissions 100%
- Weight reduction of 250 – 750 lbs
- Engine displacement reduction aligned with weight save
- Additional Aero improvements up to 5%
- Increased use of Hybrids
- Introduction of PHEV and BEV
- Diesel use as market demands

Long Term

- Percentage of internal combustion dependent on renewable fuels
- Volume expansion of Hybrid technologies
- Continued leverage of PHEV, BEV
- Clean electric / hydrogen fuels

Announced Ford Electrification Projects:

Key is Leverage of High Volume Global Platforms



2011 | Mid Term | 2020

TRANSIT CONNECT BEV 2010

2011 | Mid Term | 2020

PASSENGER CAR BEV 2011

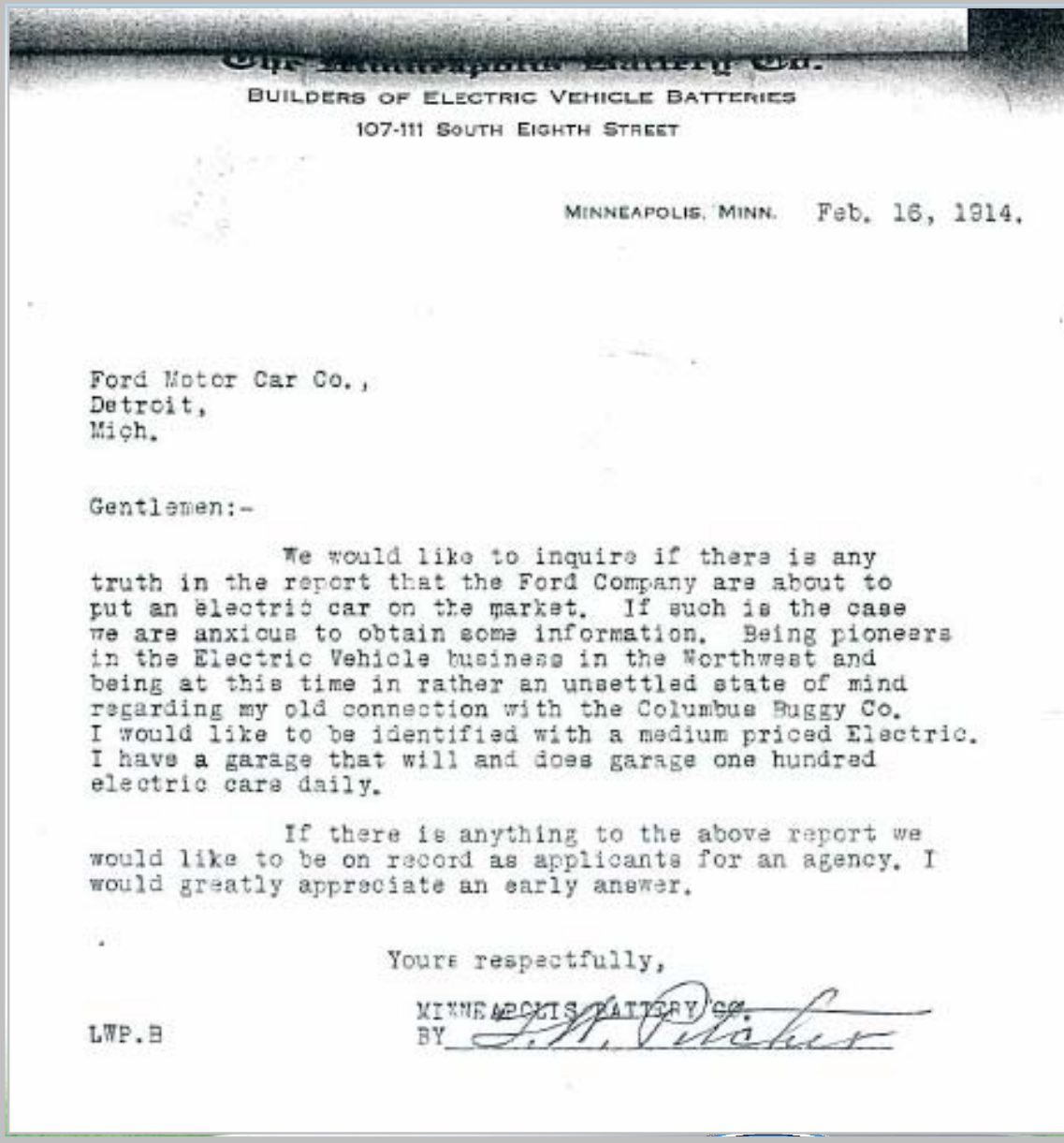
2011 | Mid Term | 2020

PRODUCTION PLATFORM NOT YET ANNOUNCED
EARLY/DEVELOPMENT WORK WAS DONE ON THE ESCAPE

PLUG-IN HYBRID 2012

Electrification of vehicles: not a new idea …..

- In the early 1900's more than 27 companies were building electric cars
- In 1914, Henry Ford and Thomas Edison experimented with an electric car using by Edison Batteries
- In 1915 the Ward Motor Vehicle Company offered an electric wagon for $875 on an 1yr installment plan for the vehicle and a $10.50/month rental fee for the Edison Storage battery



The Minneapolis Battery Co.
BUILDERS OF ELECTRIC VEHICLE BATTERIES
107-111 SOUTH EIGHTH STREET

MINNEAPOLIS, MINN. Feb. 16, 1914.

Ford Motor Car Co.,
Detroit,
Mich.

Gentlemen:-

We would like to inquire if there is any truth in the report that the Ford Company are about to put an electric car on the market. If such is the case we are anxious to obtain some information. Being pioneers in the Electric Vehicle business in the Northwest and being at this time in rather an unsettled state of mind regarding my old connection with the Columbus Buggy Co. I would like to be identified with a medium priced Electric. I have a garage that will and does garage one hundred electric cars daily.

If there is anything to the above report we would like to be on record as applicants for an agency. I would greatly appreciate an early answer.

Yours respectfully,

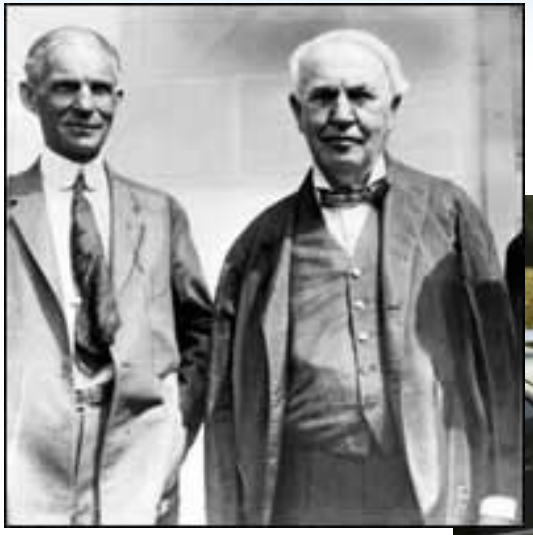
MINNEAPOLIS BATTERY CO.
BY

LWP.B

Challenge: Moving from Niche to Mainstream

- *How to get electrified vehicles on "cost-parity" with traditional technology?*
- *How will customers react to the new technology?*
- *How will they access recharging infrastructure?*
- *How will they know what they are paying?*
- *How will charging impact the local, region or national power supply and distribution?*

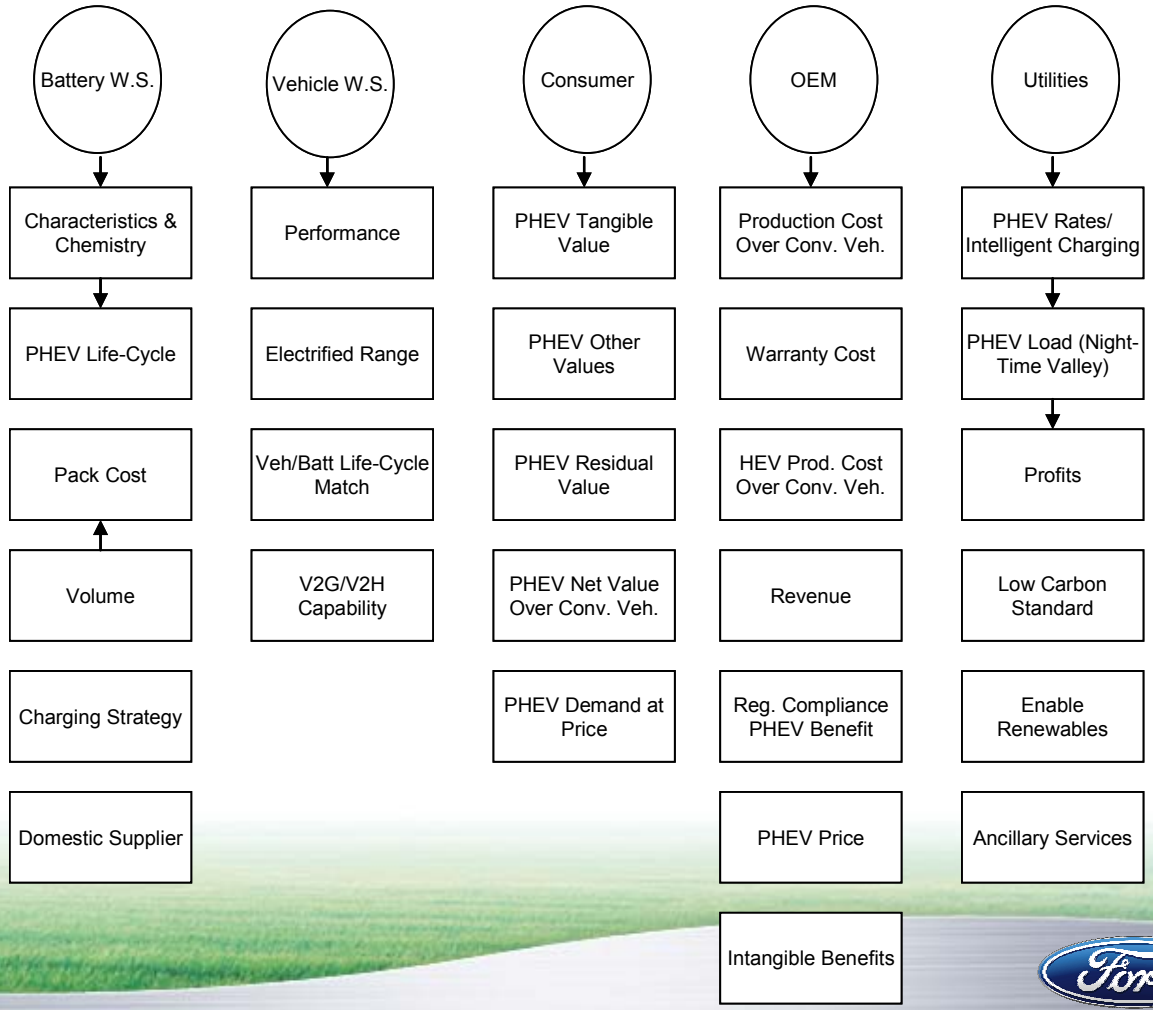
The Key is Partnerships



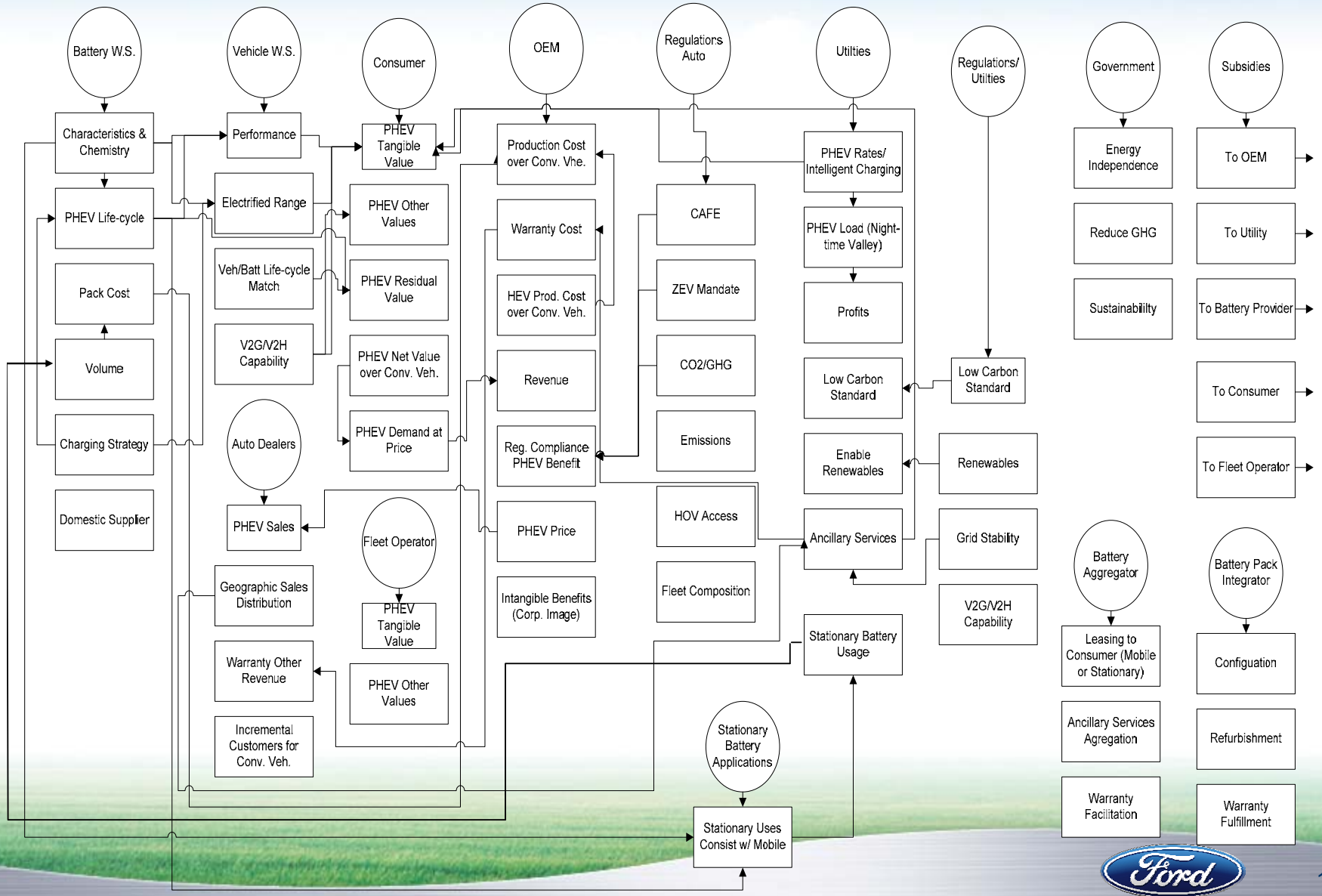
Understanding the Business of Electrification

One of the PHEV collaboration goals is the creation of new business models to support a sustainable business case for all PHEV stakeholders

The study started with an initial flowchart involving the following workstreams…



With the realization that this needs to be thought about in a broader context … there are many aspects to the study that are interconnected and complex and require multiple partners to develop the solutions.



Moving Forward: Concentrate on the Customer

- Educating our common customer, ensuring they:
  - Understand EV options: HEV, PHEV, EREV, BEV
  - Know how to pick the best technology for their transportation needs, climate and driving style
  - Can plan ahead to ensure access to charging
  - Understanding the costs – purchase and operation
- Making it as easy as possible to charge
  - Residential permitting
  - Solutions for multi-family residential
  - Access to data on charging rates and options
  - Seemless infrastructure from service region to service region

Moving Forward: Concentrate on the Customer

- Address potential concerns over "*range anxiety*"
  - Higher levels of electrification require more than 120V
  - Uniform standards: SAE standards are not mandatory
  - Encourage infrastructure proliferation by allowing 3rd party providers to recover their investments
  - Provide enforcement to ensure access to plugs
- Provide additional value through the charging experience
  - Rate knowledge to make the best charging decisions
  - Assess utility revenue neutrality requirements (TOU, etc.)
  - Development of common communication protocols

Conclusions

- Global goals for CO_2 reductions are aggressive, and will impact both to car manufacturers and utilities.
- Dependence on petroleum consumption has increasingly proven to be unsustainable – socially, environmentally and economically.
- Electrification in key to meeting long term goals for CO_2 reduction, air quality improvement and energy security.
- Niche markets will not provide a solution.
- Electric vehicles – in many shapes and flavors – are coming; we need to make sure the market is ready for them.


Ford