



Eaton PHEV Program

HTUF Conference – Atlanta
October 28th, 2009

EPR2

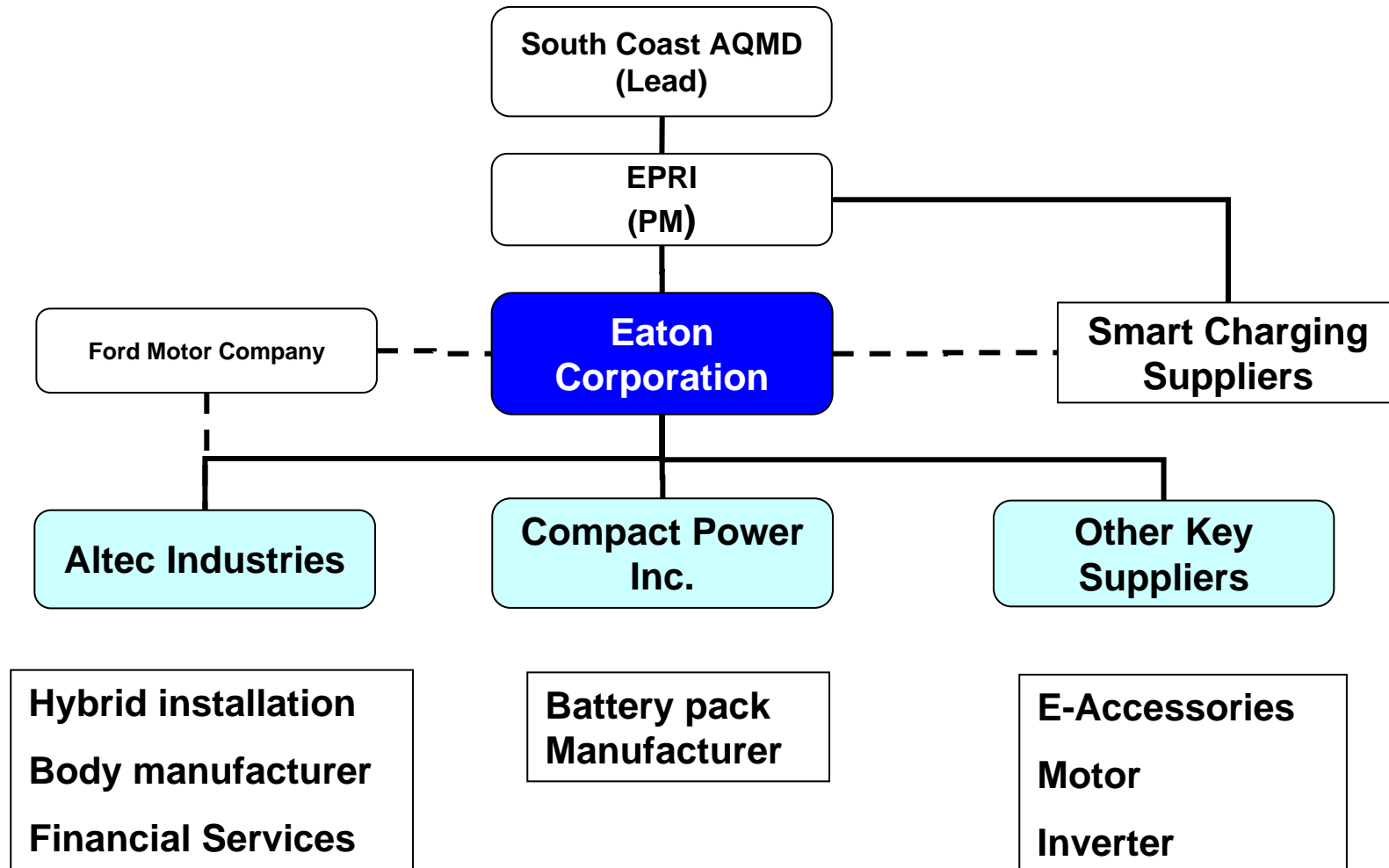
ELECTRIC POWER
RESEARCH INSTITUTE

DOE Synopsis



- Eaton, in partnership with SCAQMD, EPRI and SCE were awarded \$45.4M by DOE to demonstrate plug-in capabilities in the commercial vehicle market.
- 50 fleets committed to purchase 378 vehicles under this program for the field evaluation phase
- 1st vehicle will be deployed 12 months after contract is awarded (estimated Nov 2010)
- 378 vehicles will be deployed 18 month after contract is awarded (estimated May 2011)
- General PHEV SOP targeted 2012

Eaton's Key partners



Program Scope



PHEV Includes the Following:

- Eaton Hybrid AMT Unit – 6 speed
- High energy Lithium-Ion battery
- On-board (>3kW charger)
- 120V – 240V charging (levels 1 & 2)
- Electrified accessories (steering, brakes and HVAC)
- Auxiliary Power Generator (APG)

PHEV Performance Specifications:

- ePTO operation (5-6 Hours Engine-Off)
- Up to 10 miles pure electric mode (30mph average)
- Up to 300 miles range between refills
- Levels 1 and 2 EVSE and FMVSS compliant

Base Vehicle offering



2011 F550 chassis

- New Diesel (6.7L)
- New 4X2 Chassis Cab
- 19,500 GVWR
- 141" WB (68" CA)
- Automatic Transmission
- Utility body and boom
- Manufacturing: Altec (KY)

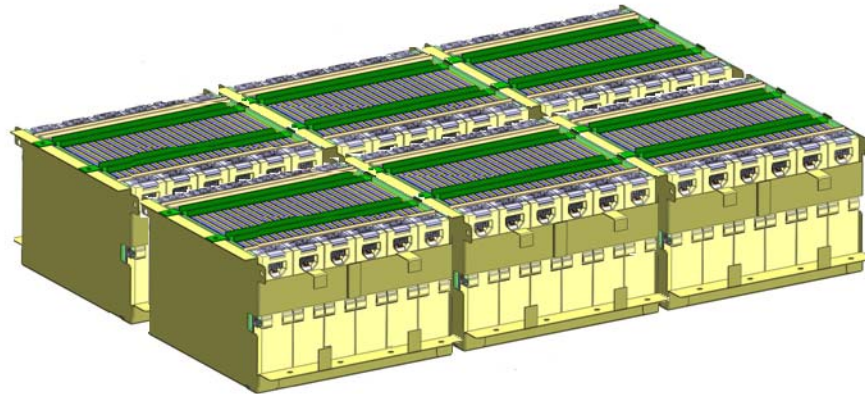


2011 E450 chassis

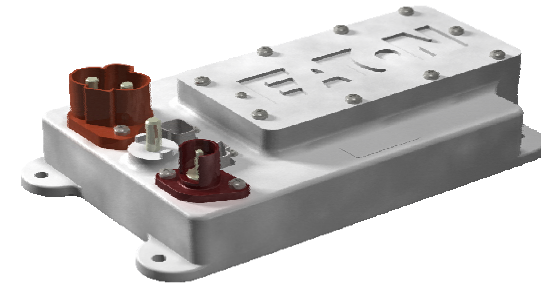
- Gasoline (5.4L)
- Shuttle bus application
- 14,050 GVWR
- 176" WB
- (Body TBD)
- Manufacturing: TBD



PHEV major components



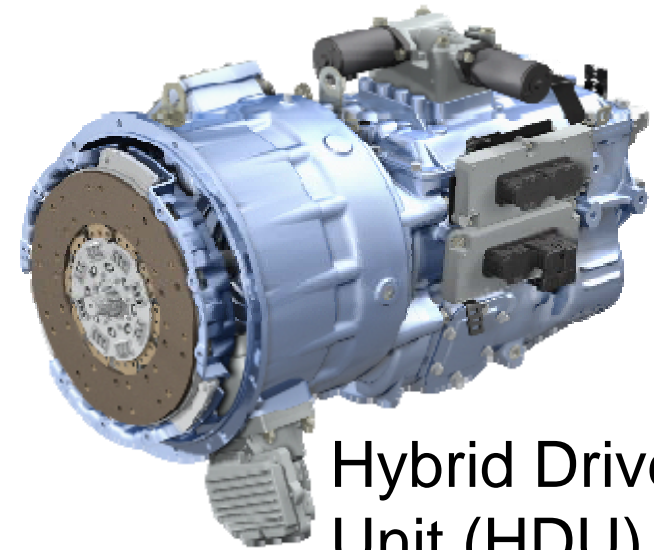
Power Electronics
Carrier (Battery Box)



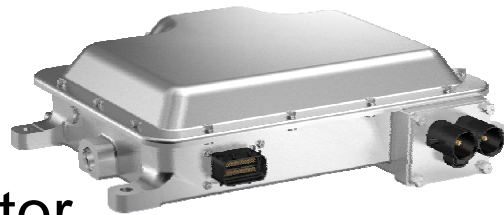
DC/DC Converter



Auxiliary Power
Generator (APG)




Hybrid Drive
Unit (HDU)




Motor
Inverter/Controller

PHEV major components - electrification

Air conditioning system

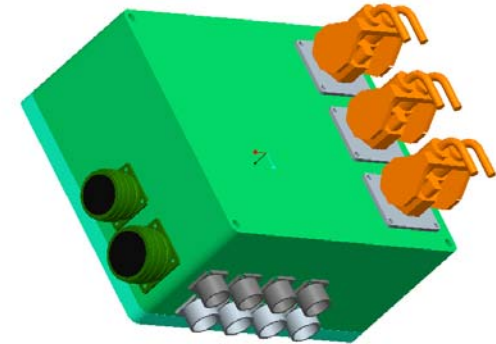
 MITSUBISHI HEAVY INDUSTRIES CLIMATE CONTROL, INC.
EV30AN Compressor and Inverter

Items	EV30AN
Compressor Type	Scroll, 30 cc/rev, with rare earth PM motor
Dimensions and Weight	Diameter 108mm, Length 251mm, Weight 8.2 kg
Lubricant & Refrigerant	POE (Polyol-ester), HFC134
Inverter	Integrated, refrigerant cooled, Full function 250-400 Volts
Rated Capacity	4.7kW @ 7200 rpm
Maximum Capacity	7.4kW @ 10080 rpm
Communication	High Speed CAN
Operating Temp Range	-10 to 125 degree C




EMP F-11 fan

Flexible Junction box



Electric power steering and brake system

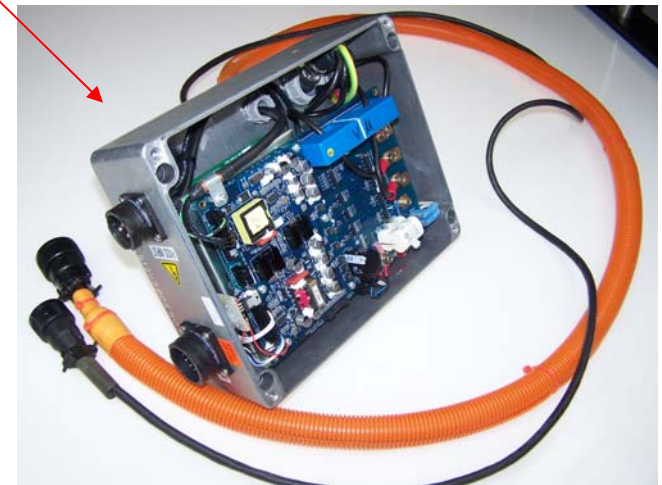


IPM Servo Motor

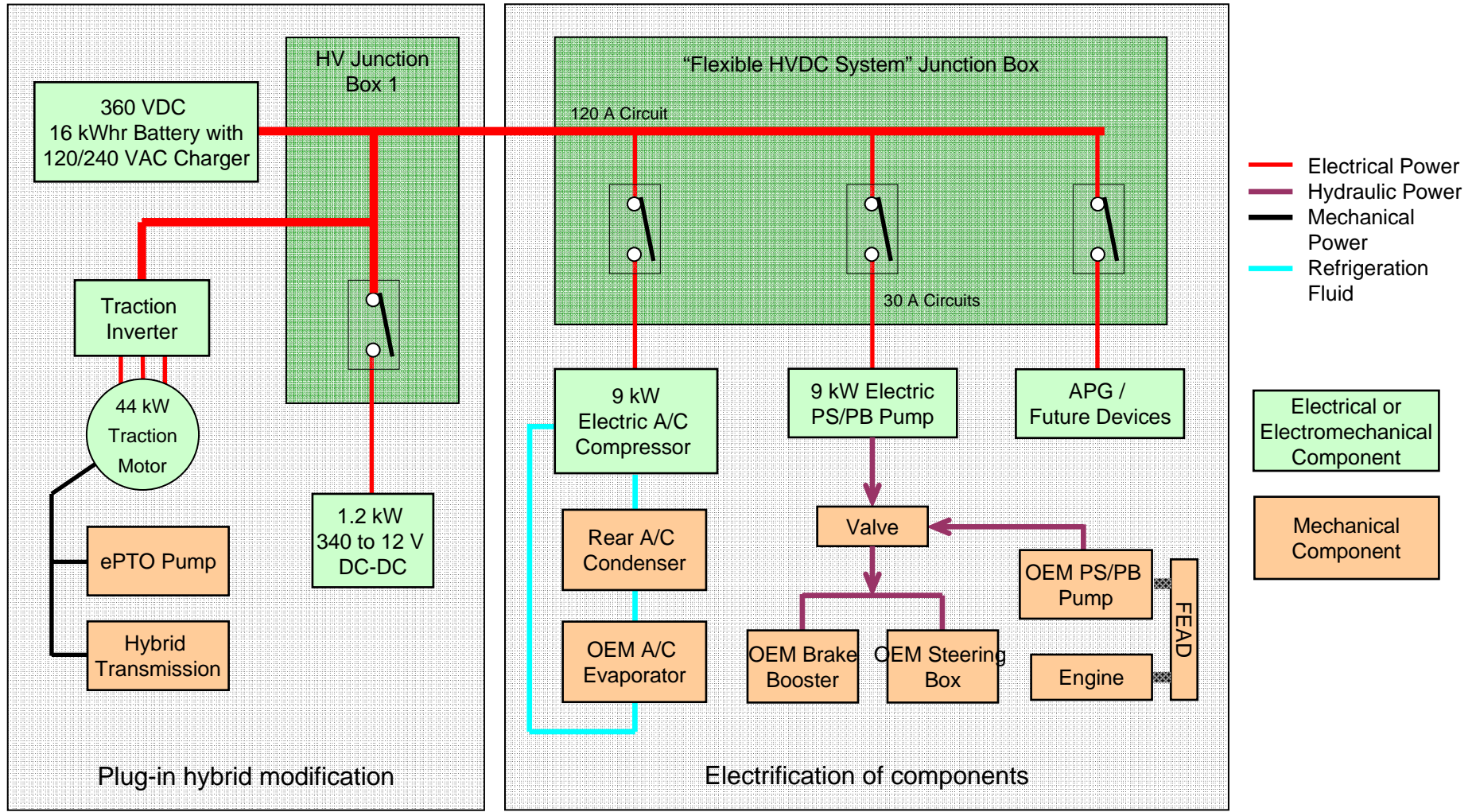
Coupling

TRW Pump

Water cooled motor controller installed in a prototype enclosure.



Electrification to enable EV mode driving



Eaton Pow-R-Station™ Product Offerings



- Eaton's Pow-R-Stations™ meet both levels 1 (120V / 15-20A) and 2 (240V / 30-80A)
- Many mounting solutions:
 - Wall-mount (garage or parking deck)
 - Pedestal (public street or parking lot)
 - Cordset (convenience charging)
- **Already meets** SAE J1772™ Connector standard **and** National Electric Code Article 625



F550 PHEV overview



Questions?





Powering Business Worldwide

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