



# Eaton Hybrid Power Systems

An overview of Eaton's capabilities, technologies, goals and progress





# Eaton Hybrid Program Goals

Provide cost-effective, reliable hybrid power to targeted commercial vehicle fleets that can create the greatest benefit.

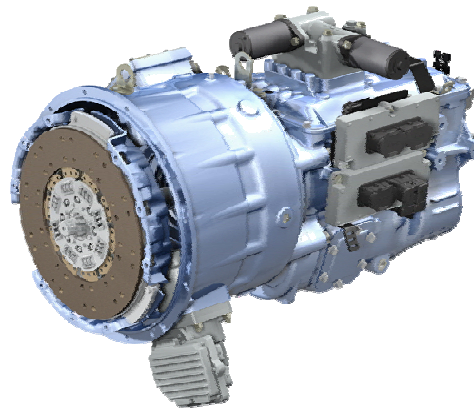
- Aim for maximum practical improvements in fuel economy
- Aim for maximum practical reductions in emissions
- Prove positive R.O.I. for hybrid power solutions in commercial vehicles
- Develop hybrid component suppliers with volume capability
- Develop production programs with OEMs
- Develop future hybrid technologies on commercial path

# Foundational Technologies: Diesel-Electric Hybrid Power



## Diesel-Electric Hybrid for Motive Power

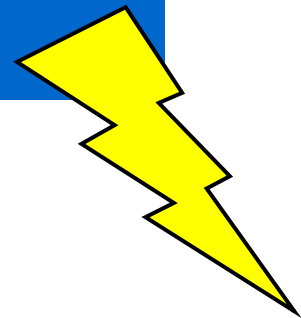
Parallel direct diesel-electric power system provides a blend of diesel & electric power as demanded by application and system design



**Hybrid Drive Unit:**  
AMT with  
Motor/Generator

## Diesel-Electric Hybrid For Motive & Auxiliary Power

Parallel direct diesel-electric power system provides motive power **plus auxiliary power** for non-motive work



# Hybrid Power Value Propositions: Utility & Telecomm



## Utility & Telecomm

- Fuel costs
- Idle reduction
- Auxiliary power
- Noise
- R.O.I.

Save money on fuel,  
generate power and reduce  
work site noise & emissions



Eaton hybrid-powered vehicles delivering up to 60 percent fuel savings, cuts work site idle time up to 87 percent

# Hybrid Power Value Propositions: City Delivery and Medium-Duty P&D



## City Delivery



- Fuel
- Emissions
- Reliability
- R.O.I.

Save on soaring fuel costs and meet evolving local pollution and noise regulations – while maintaining reliability

## Medium-Duty P&D



- Fuel
- Productivity
- Noise
- R.O.I.

Save money on fuel, improve productivity & reduce residential noise

Eaton Hybrid-equipped vehicles delivering up to 50% improvement in fuel economy & significantly reduced emissions



# Hybrid Power Value Propositions

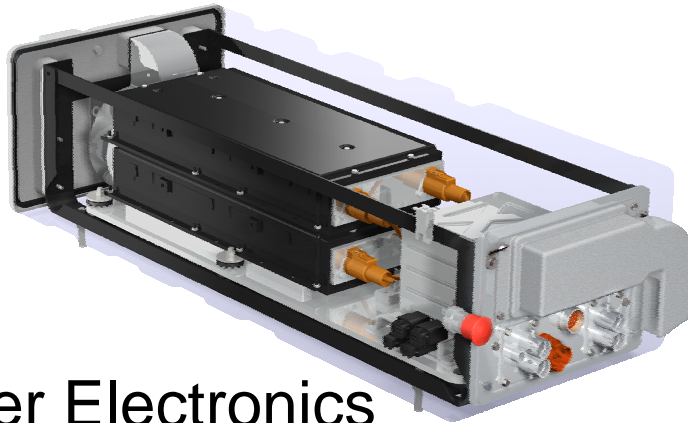
- The Common Denominator:

## Return On Investment!

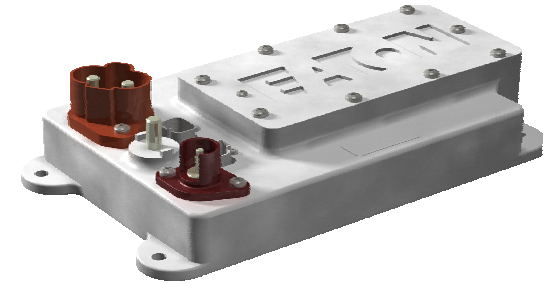
- As “hot” as hybrid is today, the value premise and promise must outlive the hype
- Hybrid Power must prove out its savings over the life of the vehicle
- Volume production must drive per unit costs down to achieve acceptable R.O.I.
- Tax incentives and credits are accelerating early customer acceptance & volume growth
- Eaton is currently in production with Medium Duty (2007) and Heavy Duty (2009) Commercial Truck Platforms



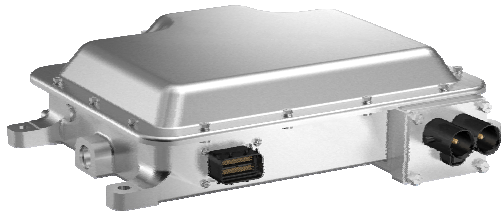
# Commercial Products for Eaton HEV



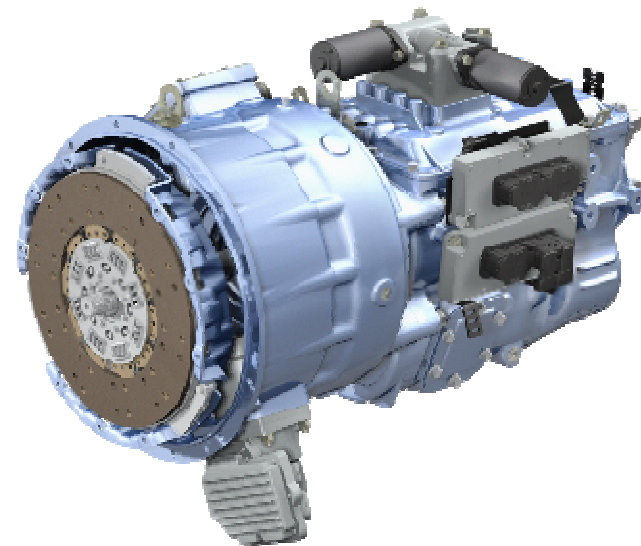
Power Electronics  
Carrier (Battery Box)



DC/DC Converter



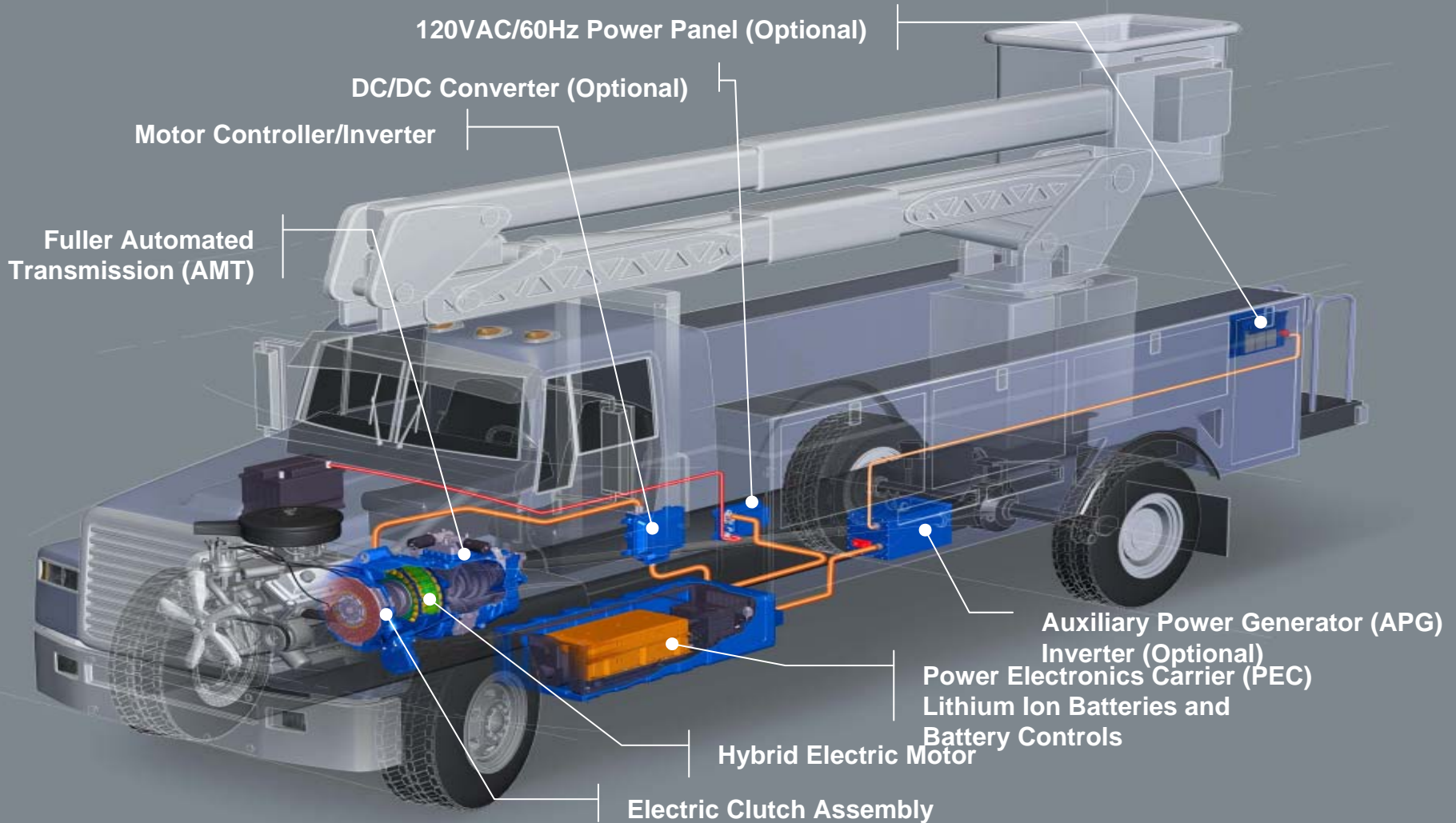
Motor  
Inverter/Controller



Hybrid Drive Unit (HDU)



# Commercial Hybrid with DC/AC APG







# Eaton's Electrical Power Distribution



- APG and Battery Pack Supplier
- Integrated Facility Systems



# Eaton/EPRI PHEV Market Entry Vehicle



# Eaton/EPRI PHEV with Ford F550 Chassis and Altec Work Body

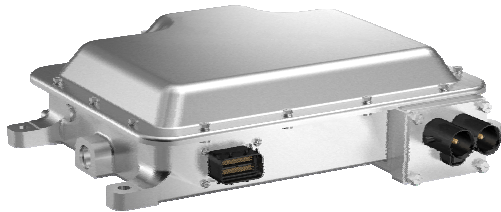




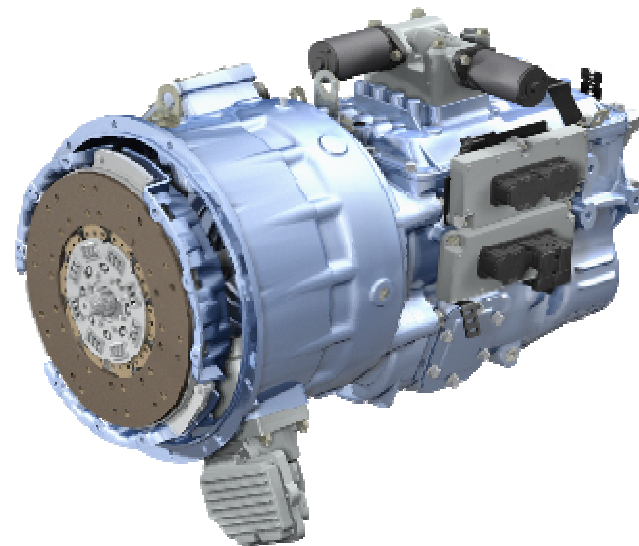
# Commercial Products for Eaton PHEV

Insert Plug In  
Charger and High  
Energy Battery  
Here

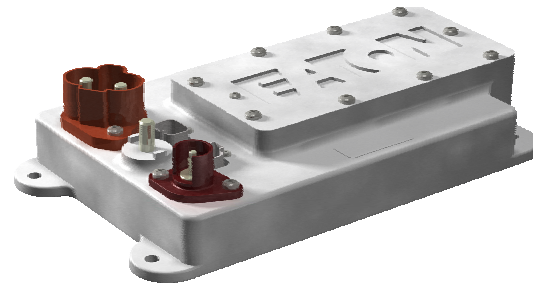
Power Electronics  
Carrier (Battery Box)



Motor  
Inverter/Controller



Hybrid Drive Unit  
(HDU)



DC/DC Converter



# Eaton/EPRI LMD Utility PHEV

- Eaton/EPRI Hybrid LDM Utility Test Vehicle 2007
- Electric over Hydraulic Bucket Operation (ePTO)
- PHEV Integration Begins in 2008
- Subtract Power Battery from Eaton's Production Hybrid System
- Add Lithium Ion High Energy Battery
- Add Plug In overnight battery charge capability
- Exportable Power Capability (5kW APG)
- Multi-vehicle test fleet release in 2009

# Questions?

