



Zero Emission Bus Infrastructure & Fuel: Challenges & Opportunities

John Wirtz
 Business Unit Manager – Electrical Transportation
 Infrastructure
 Eaton Corp



© 2010 Eaton Corporation. All rights reserved

Eaton Corporation: Providing reliable, efficient and safe power management

Eaton's 2012 Financial highlights

Eaton Corporation \$21.8 billion (Pro Forma)

Sales	\$16.3 billion
Net income	\$1.22 billion
Operating Earnings per share (EPS)	\$3.46
Revenue	Electrical: \$13.1b Hydraulics: \$3.0b
Eaton Corp. = \$16.3 b	Automotive: \$1.6b
Cooper Industries = \$5.5 b	Truck: \$2.3b
Total Sales = \$21.8 b	Aerospace: \$1.8b

45%

U.S.A.

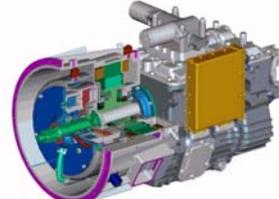
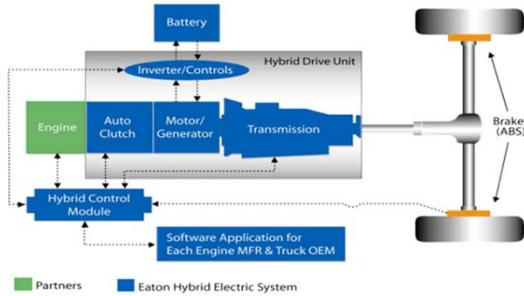
55%

International



© 2009 Eaton Corporation. All rights reserved

Eaton Hybrid Electric Powertrain



Eaton Hybrid Drive Unit



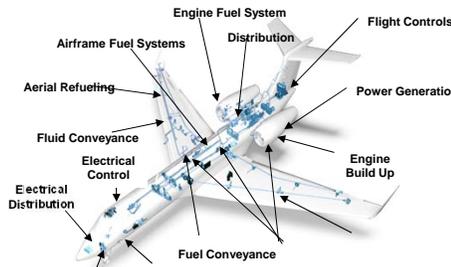
Hybrid Bus in Guangzhou with Eaton Hybrid Powertrain

Hybrid Electric Powertrain Systems

- Brake Energy Regeneration
- High Energy Capacity Li-Ion Battery
- Engine OFF Operation When Vehicle Stops
- Improves Fuel Economy While Reducing Noise And Emissions

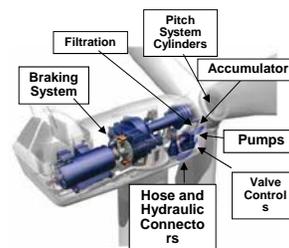
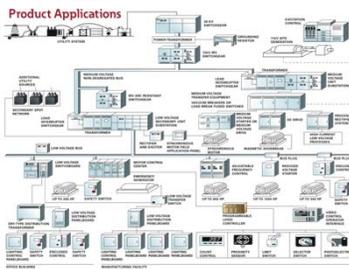


Eaton's Power Management Portfolio



Includes:

1. Electrical
2. Aerospace
3. Hydraulics
4. Automotive
5. Truck & Bus (Not shown)



Eaton's Quick and HyperCharging: Built on Proven Technology

Water / Wastewater:

- Precise control of Medium Voltage Motors up to 6000 HP / 4,400 KW
- Major Customers include:
 - Water/Waste Water, Petro-Chem, and HVAC Chiller Manufacturers..



Information Technology:

- Efficient, reliable Uninterruptible Power Supplies (UPS)
- Major Customers include
 - Banks, Data Centers and Internet Providers



5

Transit Bus Segment: Quick / HyperCharging



Transit Bus Segment:

- Charge Profile:
 - On route charging while passengers are loading/unloading:
 - 4 to 5 minute charge profiles @ 100% KW capacity
 - Off route charging at lower levels:
 - Typically 50 - 100 KW
- Standards
 - Need to drive industry standards
 - Power: Voltage
 - Communications: Standard Can message packages

6

Eaton HEV/EV Heritage

