Eaton Hybrid Power Systems

An overview of Eaton’s capabilities, technologies, goals and progress
The Eaton Hybrid Power Story

- Voice of The Customer
- Eaton Hybrid Power Program Goals
- Foundational Technologies
- Value Propositions by Vocation
- Market Readiness
- Customer Vocations: Applications & Value
In 1899 Dr Ferdinand Porsche, then a young engineer at Jacob Lohner & Co, built the first hybrid-powered vehicle, with a constant speed gasoline engine powering hub-mounted electric motors.

Credits: www.hybrid-vehicle.org
Voice of the Customer

- Improved Fuel Efficiency
- Reliability
- Auxiliary Power
- Productivity
- Driver Ease and Safety
- Noise

- Durability
- Serviceability
- Reduced Emissions
  - Meet local, regional & EPA emissions regulations
  - Do the “right thing”
  - Sustainability message as a marketing tool

These attributes and benefits are valued differently by customers, depending upon their application
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
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
Foundational Technologies: Hydraulic Hybrid Power

Hydraulic Launch Assist™ – HLA®

Parallel hydraulic power supplements the conventional powertrain for high-intensity stop & go applications

Series Hydraulic Hybrid

Direct series hydraulic power system replaces conventional drivetrain with diesel power converted to hydraulic motive power

HLA System
Hybrid Power Value Propositions: 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: Buses & Shuttles

Buses & Shuttles

- Fuel economy
- Emissions reduction
- Noise
- R.O.I.

Save on soaring fuel costs, improve productivity and meet evolving local pollution and noise regulations.

Testing reveals 20% to 37% reduced fuel consumption
Hybrid Power Value Propositions: Class 8 Linehaul & Refuse

**Class 8 Linehaul**
- Fuel
- Emissions
- Idling
- R.O.I.

Improve MPG & save fuel while idling – will be impacted by EPA emissions regs & anti-idle laws

Lab and road testing indicate a $9,800 savings per truck per year.

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

Save money on fuel, improve productivity, reduce brake service costs, reduce residential noise

Lab & road testing indicate a $5,000 to $10,000 increased profits per truck per year
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 needed to accelerate early customer acceptance & volume growth
Market Readiness

Feasibility  Prototype  Field trials  1st Production  Full Production

Wal-Mart HD Hybrid  UPS HHV  Kenworth MD  Coke  UPS HEV

Peterbilt Refuse  Freightliner  Foton  HTUF Utility  FedEx
## Customer Vocations: Applications & Value

### Value Criteria:
- **F** = Fuel
- **P** = Performance
- **B** = Brake Life
- **EO** = Engine Off Power
- **L** = Limited Value

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<th>MD Utility</th>
<th>HD Refuse</th>
<th>HD Linehaul</th>
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What Hybrid system is best for you?

• It’s not that simple – you can’t pick a hybrid power system out of a catalog

• Hybrid technologies continue to mature & improve. New technologies are being investigated and incorporated.

• It’s a partnering process that begins with an in-depth investigation into a customer’s needs & values.

• A combination of simulation, prototype and field trial will yield the most cost-effective, reliable solution with the highest R.O.I. for the customer.
Why should Eaton be your hybrid power system supplier?

• Eaton. We’re the acknowledged global leader in hybrid power systems for commercial vehicles

• Eaton. We’re focused on total customer value. We seek to create value in the most cost-effective manner.

• Eaton. We know trucks and commercial vehicle drivetrains like no one else, with almost 100 years of commercial vehicle experience.

• Eaton. Unparalleled application expertise and global after-sale support
See You at HTUF!

- **Hybrid Truck Users Forum**
  - South Bend, IN
  - 14-16Oct08
  - [http://www.calstart.org/programs/htuf/](http://www.calstart.org/programs/htuf/)
  - Educational Forums
  - Industry Speakers
  - Commercial Vehicle Ride & Drive
Eaton Hybrid Power Systems

Thank You!

Questions?