



ELECTRIC DRIVE TRANSPORTATION ASSOCIATION
**CONFERENCE
& EXPOSITION**

DECEMBER 2-4
WASHINGTON DC
CONVENTION
CENTER • USA

battery • plug-in • hybrid • fuel cell

Plug-in Hybrid Medium and Heavy Duty Trucks

Joseph T. Dalum
DUECO, Inc.

Hosted By:



In partnership with:

SAE International

Plug-in Hybrid Medium and Heavy Duty Trucks

DUECO, Inc.

- One of the largest final stage manufacturers of aerial devices and digger derricks in the country.
- Produce vehicles for utilities, telecommunications, other industries and government.
- Over 50 years of experience



- 2007 Introduced utility industry's first commercial plug-in hybrid medium duty truck
- Medium and Heavy duty trucks (> 14,001 pounds) manufactured in multiple stages



U.S. Truck Market



- More than 6 million trucks (excluding road tractors)
- High fuel consumption:
 - 90,000 refuse collection trucks in the U.S.
 - roughly equivalent to 2.5 million passenger vehicles in collective fuel consumption (based on 10,000 gallons/year per truck), per Oshkosh Truck Corp.
- High idle time
 - Average of 1830 hours per year, per DOE

Why interest in Plug-in Trucks?

- Energy Security
- Reduced emissions (GHG) & other pollutants (Nox, particulate)
- Reduced fuel consumption

Plug-in Hybrid Truck:



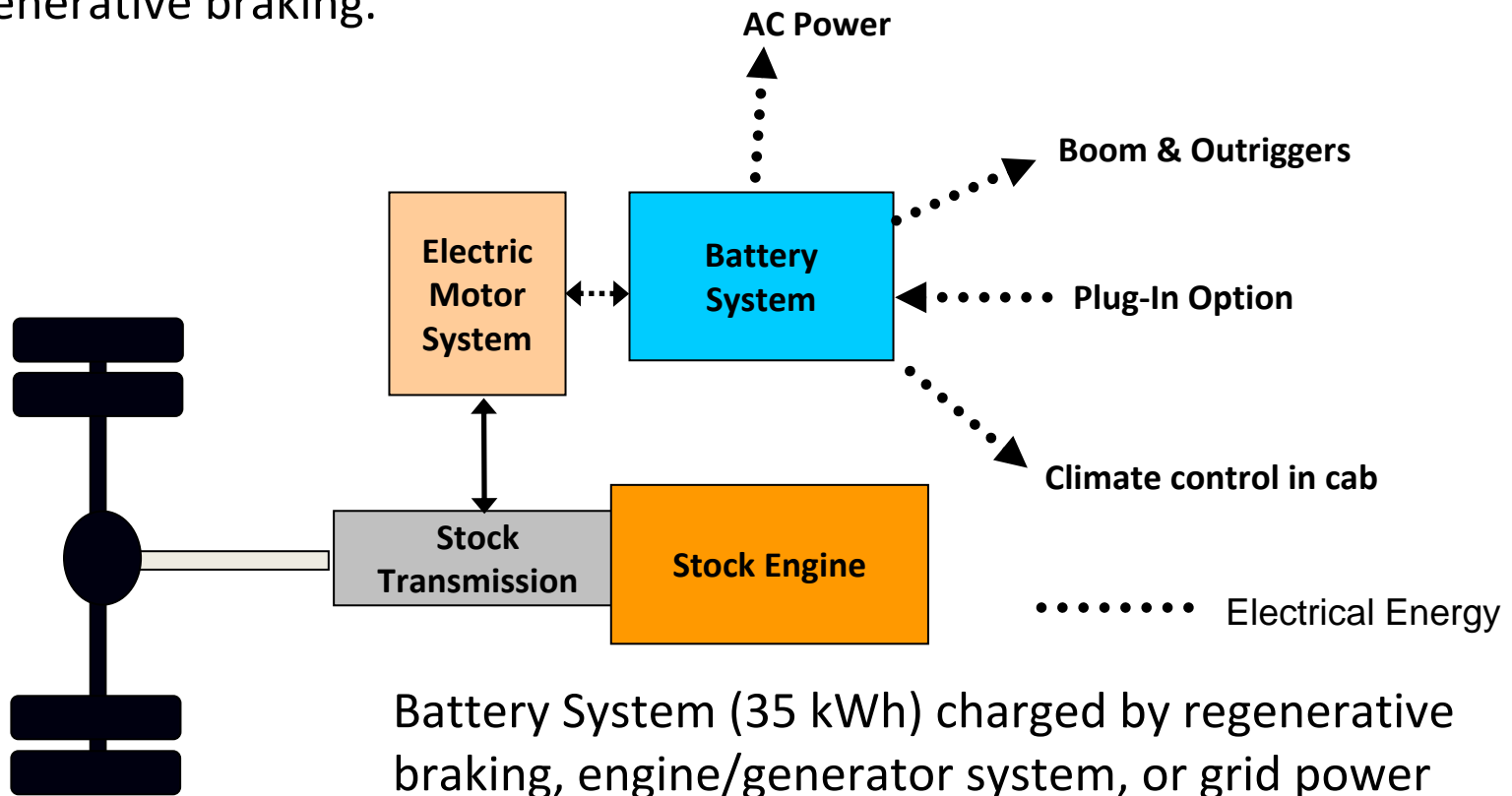
- Two sources of energy used to propel the vehicle.
 - Greater efficiency: launch assist, regenerative braking
 - Plug-in Hybrid may power equipment, eliminate idling and emissions at job site.
- Large battery system.
 - Recharged through the grid, or through the engine.
 - Domestic electric power offsets use of petroleum.
- Fuel consumption depends upon drive cycle & use.
 - Reductions of 50% or greater are possible.

Various manufacturers: DUECO/Odyne, Eaton, Enova

DUECO Plug-in Hybrid



Electric Traction Motor/Generator provides propulsion assist and regenerative braking.



Battery System (35 kWh) charged by regenerative braking, engine/generator system, or grid power through a charging station.

Benefits of DUECO Plug-in Hybrid:



- Reduced Fuel consumption
 - approximately 100% at Job Site, 15% driving
 - estimated 1400 gallons per year, duty cycle dependent
- Lower emissions
- Quieter operation at job site
- Design suitable for wide variety of applications and truck sizes
 - Class 5 – 8
 - Work trucks with equipment
- Retro-fit existing trucks, or installed on new trucks

DUECO plug-in hybrid truck status:

17 units produced, 25 planned by Q1 '09, Testing since Oct. 2007

Several large utilities receiving units, expand production in 2009



Future Plug-in Hybrid Truck Development:

Expand applications and reduce costs:

- Tandem axle class 8 straight truck
- Advanced battery systems still maturing, no standardization
- Leverage automotive hybrid component volume

Develop retro-fit application:

- Smaller system, lower weight
- 1% of 6M = 60,000 retro-fit applications

Improve performance:

- Combine electric and hydraulic hybrid technologies
- Investigate series/parallel architecture



Plug-in Hybrid Medium and Heavy Duty Trucks

Policies to help accelerate deployment:

Grants

- Research, Development, Demonstration
 - Pass H.R. 6323 Heavy Duty Hybrid Vehicle Research, Development, and Demonstration Act of 2008

Loans

- Investment in new fuel saving technology for trucks
 - Section 136 of the Energy Investment and Security Act (EISA - H.R. 6 - P.L. 110-140) establishes the Advance Technology Vehicle Manufacturing (ATVM) – modify to include medium and heavy duty trucks and manufacturers
 - Fed. funding of loans for acquisition of plug-in hybrid trucks



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Policies to help accelerate deployment:

Enhance Tax Credits

- Double plug-in tax credit for trucks in response to collapse in fuel prices
- Extend credits to trucks over 33,000 pounds
 - Modify Tax Extenders Bill (H.R. 1424) \$40,000 for a plug-in

Increase Clean Cities funding

Purchasing policies to encourage acquisition of plug-in hybrids



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For Further Information

Please contact:

Joe Dalum or Bruce Balliet
DUECO, Inc.

Phone: 262-547-8500

Bruce.balliet@dueco.com

