

# Electric Vehicles for Mail Delivery: Identifying Key Issues

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Rutgers University –CRRI Workshop

Newark, New Jersey

April 3, 2009

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# Disclaimer

- This presentation and any views expressed herein are solely my personal opinions and do not represent the views of the Postal Regulatory Commission

Electrification of the Postal Service-owned vehicle fleet is practical, achievable and desirable and should be done now.

European posts are moving quickly toward procurement of electric delivery vehicles.

Physical conversion of some existing postal vehicles would help gain experience quickly.

# The Postal Service Delivery Fleet

- 142,000 Long Life Vehicles (LLV) – 1987-90
- 8-10 MPG - 68 million gallons/year
- 8,000 2-ton (walk in) type trucks
- 10,000 minivans
- Bulk of delivery fleet ready for retirement
- Largest civilian fleet with 219,000 vehicles

# The attributes of electric vehicles are well matched to the delivery needs of the U.S. Postal Service

- Stop-and-start driving
- “Last mile” delivery route costs
- Predictable routes
- Delivery obligations
- Daily usage cycle

# Stop and Start Driving Profile

- Postal delivery involves stop & start driving
- Inefficient for gasoline engines
- Well suited to EV with regenerative braking
- Modern power management permits new weight and performance efficiencies
- Ultra-capacitors may aid in regen. braking

# Electric Vehicles can reduce “last mile” delivery costs

- Volatile/high fuel prices
- Low mileage ratings for current fleet
- Maintenance
- Spare parts and consumables
- Need more data to pinpoint cost benefits

# Charging Facility Requirements

- Electric vehicles require charging facilities.
- The centralized aspects of the postal fleet will keep charging site costs to a minimum.
- Postal delivery vehicles return to a fixed base at the end of each delivery day.

# Reducing delivery costs is valuable to the Postal Service

- Worksharing/dropshipping /presorting reinforces “last mile” role
- Strengthens competitiveness of a Universal Service Obligation provider
- Annual increase in # of delivery points

# Electric vehicles reduce pollution

- EV removes non-point pollution and swaps it for point-source (generator stacks) where it can be reduced at lower cost

## Electric Vehicles Reduce Pollution (2)

- Reduced net emissions from fuel cycle
- Reduced emissions in urban areas
- Reduces overall use of petroleum
- Reduces employee exposure to pollutants
- Extensive literature exists on this topic

# Electric vehicles offer advantages for postal delivery over alternatives

- Fuel cells
- High efficiency diesel or gasoline
- Liquefied petroleum gas (LPG)
- Compressed natural gas (CNG)
- Hybrid gas/electric vehicles

In electric vehicles, the power source is largely distinct from the drive mechanism.

Therefore, there tends to be less risk of technological obsolescence despite steady advancement in batteries.

Batteries and charging software can be retrofitted given  $\geq$  energy density.

# Battery Requirements

- The most important battery qualities are:
- Energy density (miles)
- Power density (acceleration/braking)
- Cycle lifespan (charges)
- Calendar lifespan (years)
- Cost

# Additional Battery Requirements

- Fast recharge
- Low self-discharge
- Low maintenance
- Independence from ambient conditions
- Robust design
- Proven safety
- Environmentally friendly

Battery technology has achieved a performance level suitable for postal delivery vehicles

- Lithium-ion batteries
- Available with 130 W-h/kg energy density
- Safety design considerations

- Electric vehicles have lower fuel costs but higher upfront capital costs.
- This presents a difficulty to a financially challenged Postal Service.
- Partnering may overcome the difficulty of frontloaded electric vehicle costs.

# Off Peak Hours Battery Charging

- Offers price advantages to the Postal Service
- Offers predictable off-peak power usage to electric utilities and system operators

# Vehicle to Grid (V2G) Concept

- Kempton and Tomic describe V2G
- Supplies energy from vehicles to the grid
- Requires metering /structural upgrades
- Requires two way electrical connection
- Vehicles can “learn” the daily pattern
- Temporary driver override capability
- Useful in the regulation of renewable power

# Opportunities for Utilities/RTOs

- Providing Peak Power
- Providing Contingency /“spinning” Reserve
- Providing Regulation Service
- Down Regulation (dumping) only
- Up Regulation and Down Regulation
- Balancing Service
- Overall grid stability/inertia

# NYISO Energy Storage Filing

- March 11, 2009 Filing by New York ISO
- Proposed Tariff Revisions to Integrate Energy Storage Devices into NYISO-Administered Regulation Service
- Allows non-traditional resources (LESRs) to participate in the organized markets on fair terms, reflecting FERC policy - Order No. 890 (2007).

The electric industry should study the feasibility of using postal fleet battery capacity as a testbed for grid regulation, peak power, and contingency reserves.

The value of postal vehicle capacity may be constrained by the state of vehicle charge during peak periods and by seasonal effects.

The postal fleet can serve as a good test bed for V2G, metering, and interface/handshake standards.

It will be critical to establish robust utility interface/communications standards.

# Other Considerations

- Carbon credits?
- Cap and Trade opportunities?
- Pollution credits?
- Tax credits

As a government agency performing a constitutionally- mandated critical public service, the Postal Service should be a first mover on electric vehicles, and be aided in that effort by the federal government.

“Someone’s got to be first.”

Electrification of the postal fleet should be a part of the Nation's energy goals.