

# DAIMLER

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## **Daimler Buses North America**

### **Orion VII Hybrid Product Overview**

## Orion VII Hybrid Transit Bus



## Orion VII Diesel-Electric Hybrid

- Hybrid technology is more relevant today than ever before as it addresses both energy security and global warming.
- Daimler Buses North America is the world leader in hybrid buses deployed
  - 1,300+ units delivered, 1,500+ on order, 3 of 4 world's largest fleets, 50+ million miles (as of 12/31/07)

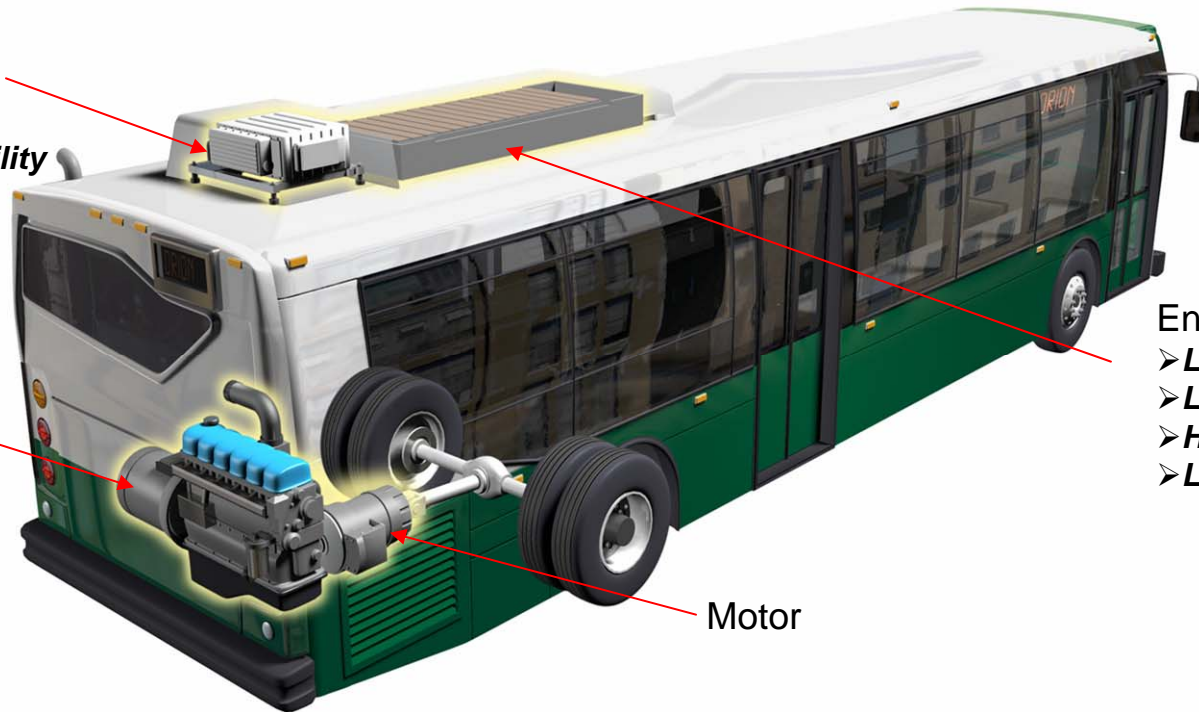


# Orion VII Series Hybrid System

## Power Control

- *Roof top mounted*
- *Improved thermal conditions & reliability*

## Generator



## Energy Storage

- *Long life*
- *Light weight*
- *High efficiency*
- *Low maintenance*

## Motor

Better fuel economy

Lower emissions

Reduced maintenance

Better reliability

Path to future

## History of Orion Diesel-Electric Hybrid Bus

- History 1996: Teamed with BAE Systems to develop
- Experience 1998 began daily revenue service
- Deliveries Over 1,300 units delivered and in service
- Mileage Over 30,000 million miles
- Sales Over 1,500 on order
- Largest hybrid fleets NYC, Toronto, San Francisco
- Current hybrid production > 70%
- Market share 60%





## New York City Transit

### World's largest hybrid fleet in New York City

- **500 Units in Service**
  - 850 units on order
  - Over 20,000,000 cumulative miles achieved
  - Adding 45,000+ miles per day
- **Savings over first 20 million miles**
  - 2,000,000 gallons of diesel fuel
  - 26,000 tons of CO<sub>2</sub>



*"We are extremely pleased with the performance of the Orion Hybrids... It is impressive that these buses generate lower levels of exhaust emissions while, at the same time, consuming less fuel."*

MTA Chairman Peter S. Kalikow, Nov 2005 Press Release



**Winner  
Blue Sky  
Merit Award**

## Orion VII Next Generation - Reliability

- New York City Transit, with 825 units in service, measures reliability by:  
**Mean Distance Between Failure (MDBF)**
- Orion Hybrid Buses achieve **2.6 times** higher reliability than the rest of NYCT's fleet
- Orion 2007 Hybrid Average: **10,343 miles**
- NYCT 2007 Fleet Average: **3,966 miles**

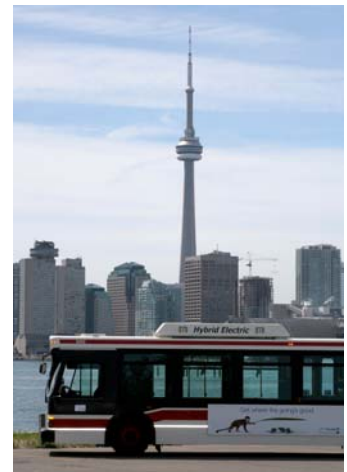


## Toronto Transit Canada's largest hybrid fleet

- 2nd largest hybrid fleet in North America
- 560 units ordered
- 150 units delivered
- 90%+ availability
- Helping Canada meet CO<sub>2</sub> reduction commitments

*“Toronto’s air quality and the health of Torontonians continue to be serious concerns. Adding hybrid buses ... is another example of how we are greening our fleet.”*

(Mayor David Miller, Earth Day 2006)





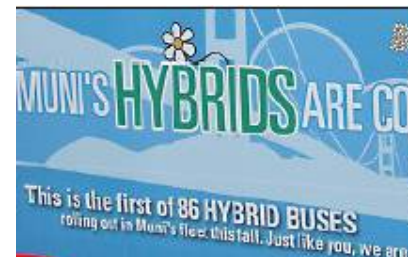
## San Francisco MUNI California's largest hybrid fleet

- 3rd largest hybrid bus fleet in the US
- 86 units in service
- Cleanest, quietest bus in the fleet after trolley buses
- Orion VII series hybrid deemed best hill climber in fleet



*“This clean air bus will bring us one step closer to reaching the SFMTA goal of being emissions-free in San Francisco by 2020.”*

(GM, Nat Ford, SF MUNI)



## Orion VII Lithium-Ion Batteries

- **Introduced into production in 2007 as the next generation of energy storage after lead acid.**
- **Customer benefits include:**
  - Less weight
    - Over 3,000 lbs less than previous design
    - Improved carrying capacity and fuel economy
  - 6 year design life – twice as long as the previous design
    - Backed by 2 year standard or 5 year extended warranty
  - Reduced maintenance
    - No conditioning required, thus no additional depot equipment needed
  - Lower lifecycle costs
    - Lower operating costs (fuel, brake life, maintenance & replacement costs)

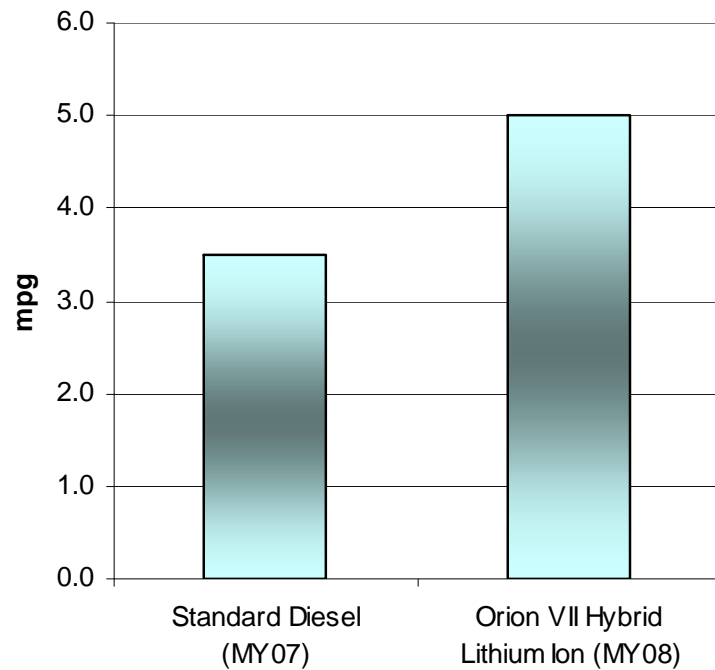


*Single air cooled enclosure  
84 x 41 x 10 inches  
16 individual modules each at 18lbs*

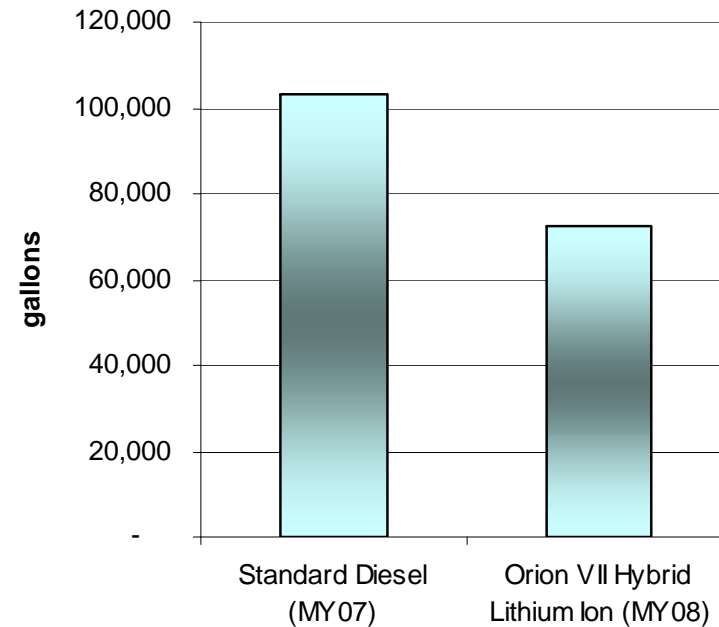
**Lithium-ion provides best power & energy density of battery technologies**

# Orion VII Lithium-Ion Batteries Reduced Fuel Consumption

Fuel Economy



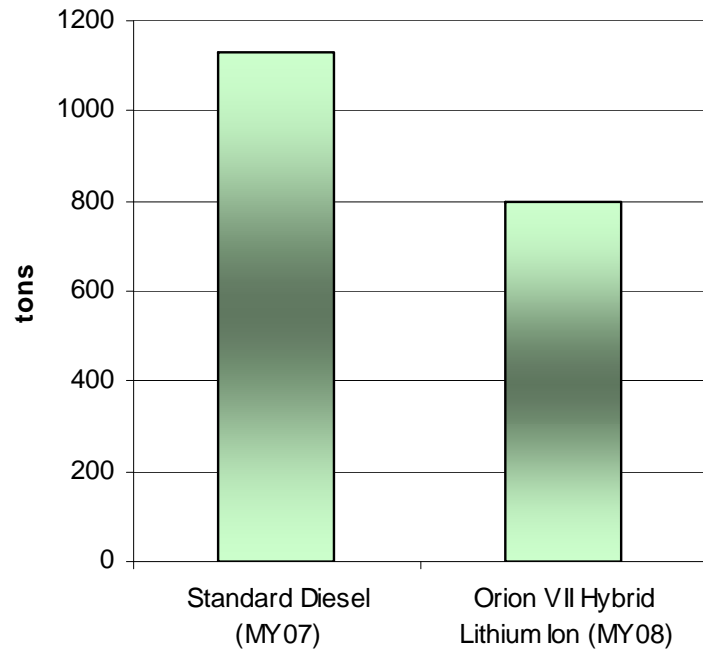
Lifetime Bus Fuel Usage



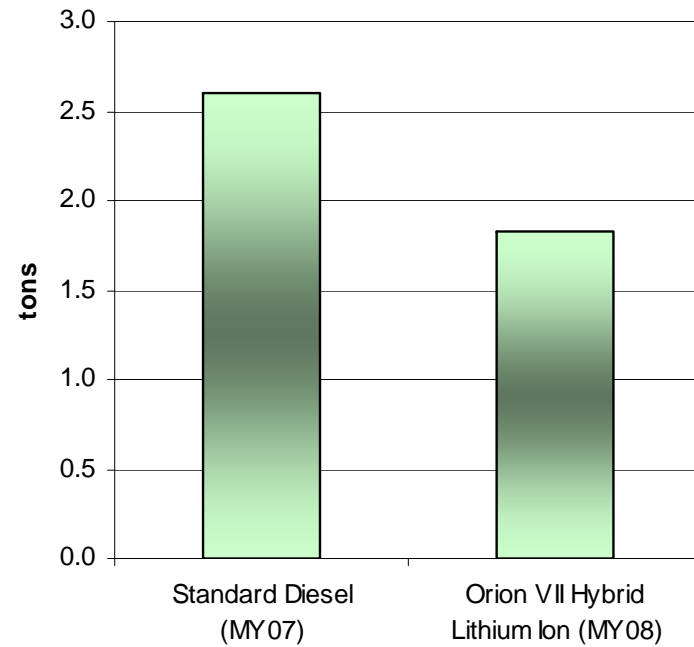
**About 30,000 gallons of fuel saved per bus lifetime**

# Orion VII Lithium-Ion Batteries Reduced Carbon Emissions

Lifetime Bus CO2 Emissions



Lifetime Bus NOx Emissions



**About 300 tons of CO2 and 1 ton NOx saved over bus lifetime**

## Orion VII Low Floor Transit Bus for 2010

- **New Family of engines for EPA 2010 will be integrated into the Orion VII**
- **Same proven Orion VII chassis will be used for 2010**
  - Altoona tested, shaker tested, and “real life” tested
  - Hybrid-electric, diesel and CNG fuels available
- **Streamlined appearance from 2007 will be carried over to 2010**
  - European design
  - All glass side windows
  - Enhanced driver’s compartment
- **Continued Vehicle Upgrades focusing on Bus Reliability**
  - Improved electrical system
  - Redesigned engine compartment layout including cooling system and reduction of hydraulics
  - Improved hybrid component packaging



## Summary

- **Daimler Buses North America is the world leader in hybrid buses**
  - Over 1,000 delivered and in service
  - Over 1,500 on order
  - 3 of 4 largest hybrid bus fleets in the world
  - Most reliable transit bus in nation's largest fleet



# Daimler Buses North America

