BAE SYSTEMS

DAIMLERCHRYSLER
Commercial Buses North America

BAE HybriDrive® Propulsion Overview

Orion VII Hybrid - Product Information

Orion VII Hybrid Bus Commercial Overview

- Experience
  - DaimlerChrysler Commercial Bus NA (Orion Bus) & BAE Systems teamed since 1997
  - Daily revenue service since 1998
  - 325 hybrid units in daily operation in NYC
    - World's largest hybrid bus fleet
    - 21,000 miles/day/fleet
    - 8 million miles/year/fleet

- Production
  - 700+ units on order for 2006-07
    - New York City Transit (500 + 389 options)
    - Toronto Transit: (150+220 options)
    - San Francisco (56+56options)

World leader in series hybrid transit buses

Hybrid Introduction

- **Definition**
  - Combines advanced engine & electric drive
  - Carries two fuels, e.g. diesel & electricity
  - Electric motor(s) turn wheels
  - Utilizes regenerative braking
  - Possibility of zero emission bus adaptation in future

- **Benefits**
  - Cleaner
  - More efficient
  - Better ride
  - Reduced operating costs

Hybrid electric vehicles manage propulsion energy more efficiently

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Orion VII Hybrid Bus System Overview

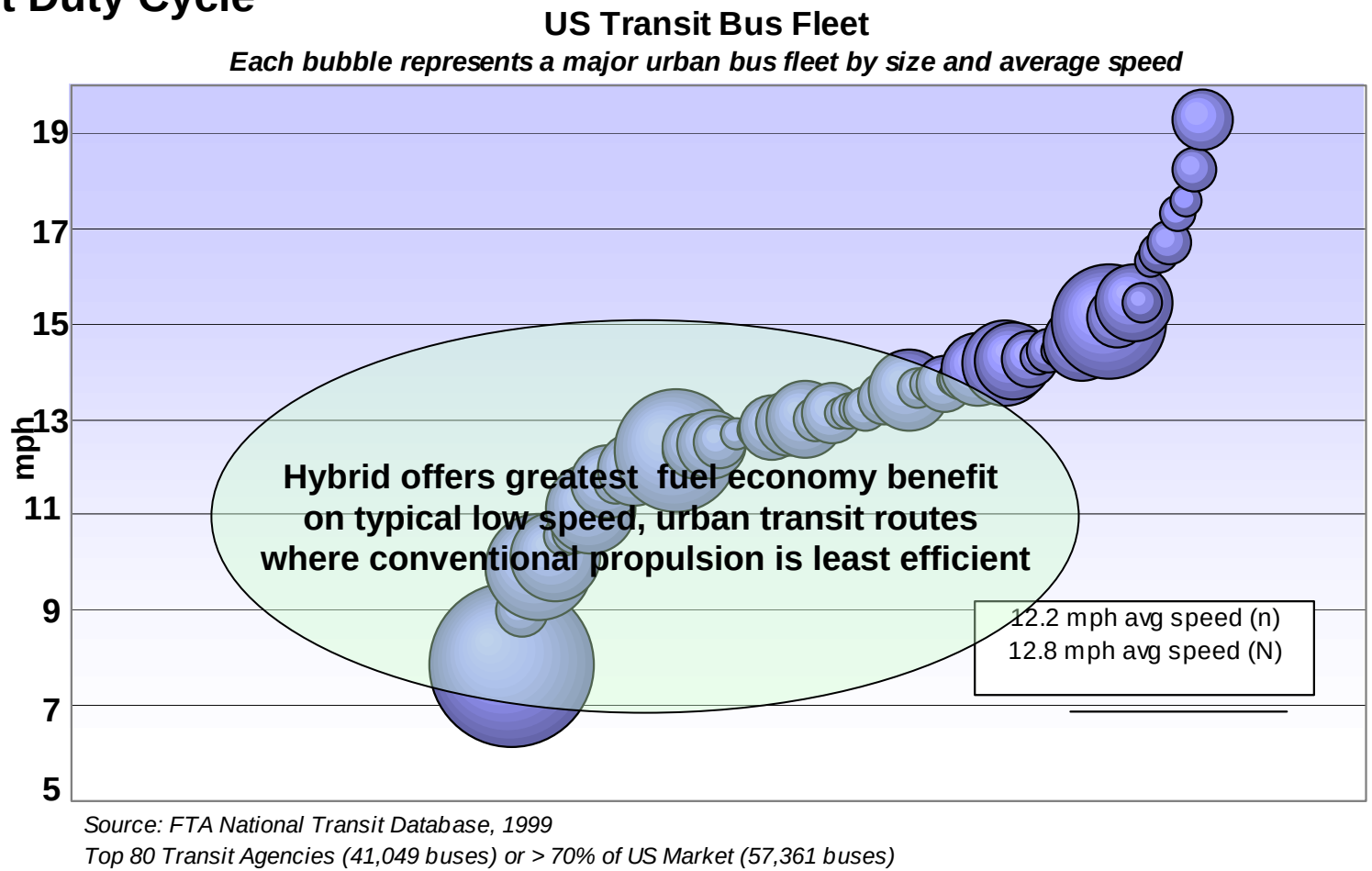
- **A** The smaller (6 liter) diesel ***engine*** runs at controlled speed and is connected to ***generator*** to produce electrical power for drive motor & batteries
- **B** The ***electric motor*** drives the vehicle & regenerates energy during braking
- **C** The ***batteries*** supply power during acceleration and hill climbing as well as store energy recovered during regenerative braking
- **D** The ***propulsion control system*** manages the entire system and optimizes performance for emissions, fuel economy and power

All electric series hybrid drive – clean, efficient, reliable, a path the future

Electric Drive Today

Series electric drive is widely used in our public transportation system today

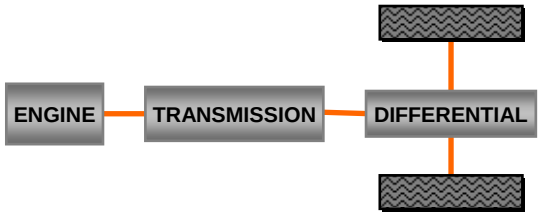
Transit Duty Cycle

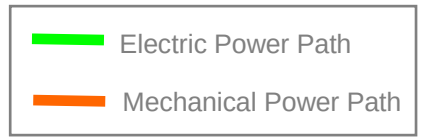


Source: FTA National Transit Database, 1999
Top 80 Transit Agencies (41,049 buses) or > 70% of US Market (57,361 buses)

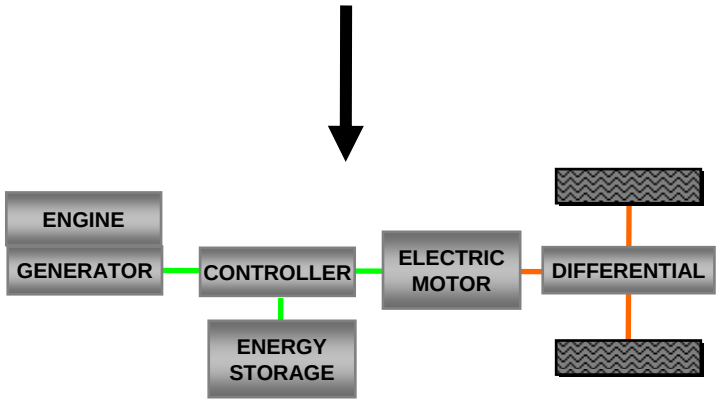
Series hybrid technology is ideally suited to urban stop & go

Propulsion Architectures

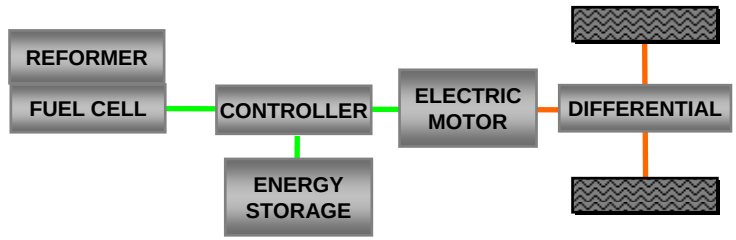




Traditional (mechanical) Drive Train



Series (all electric) Hybrid Drive Train



Zero Emission (all electric) Drive Train

Series hybrids offer a path to the zero-emission future

NYCT Fleet Evaluation by NREL

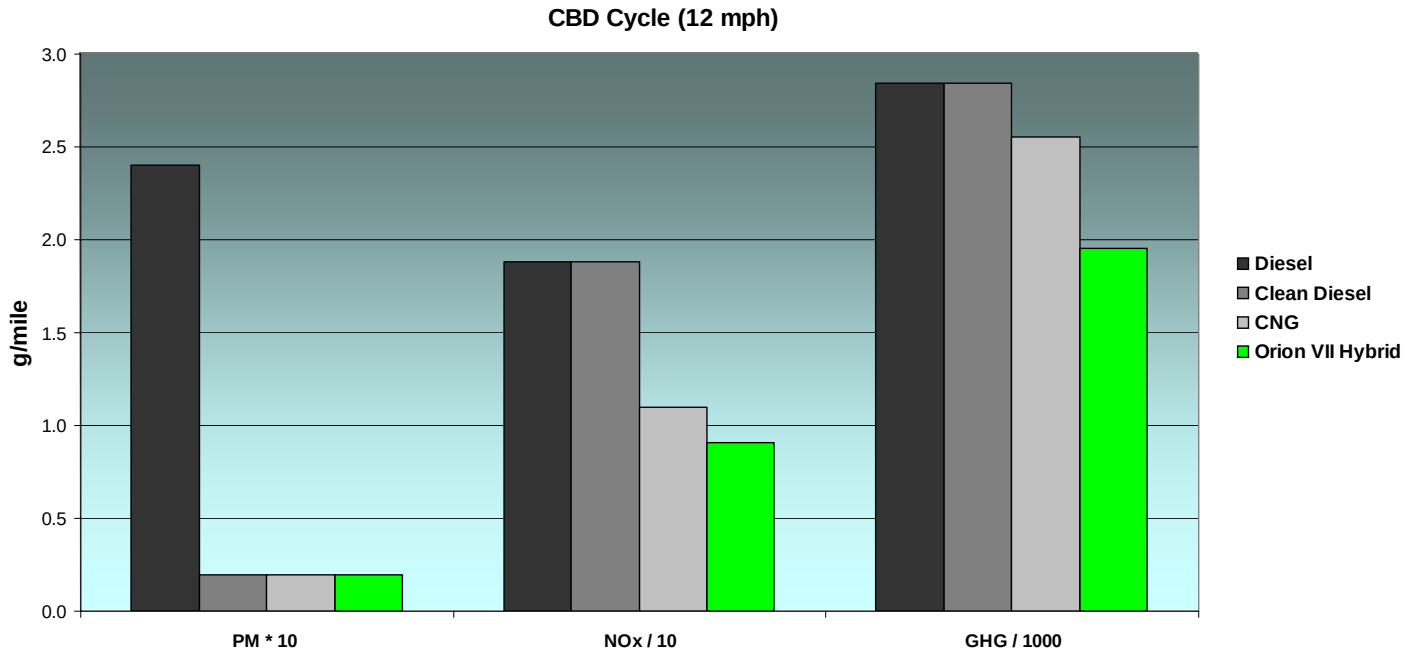
Source: NREL www.nrel.gov

Fleets & Timeframe	MY04 Orion VII Hybrid MY02 Orion VII CNG MY99 Orion V Diesel Sept 2004 – May 2005
Duty Cycle	~ 6 mph
Utilization	~ 30k miles/year ~ 15 hrs/day
Fuel Economy*	~ 45% + diesel ~ 100% + CNG
Bus Reliability	7,000 MDBF HEV 5,000 MDBF CNG 4,000 MDBF diesel
Propulsion Reliability	10,000 MDBF HEV 8,000 MDBF CNG 5,000 MDBF diesel

* Fuel economy is duty cycle dependent

Independent verification of series hybrid benefits

Emissions



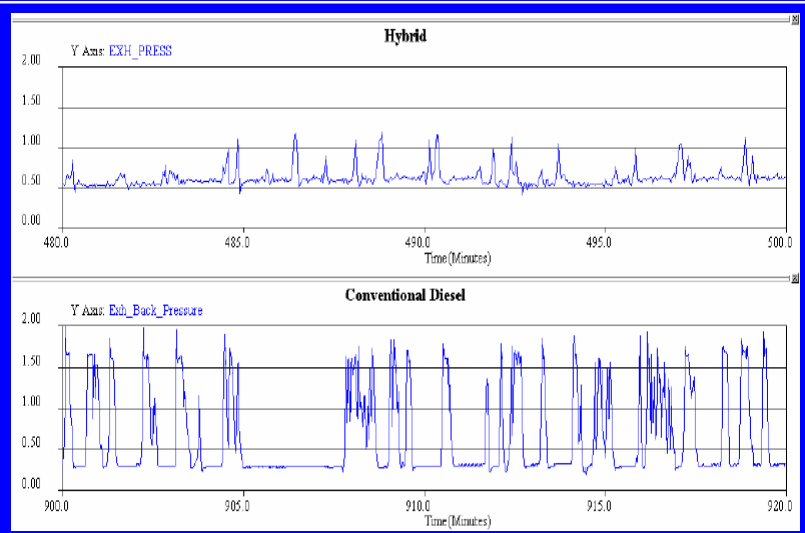
- 40% below current 2004 NOx (oxides of nitrogen) standard
- Compliant with 2007 PM (particulate) standard since 2002 using filter management technique unique to BAE Systems series hybrid
- 30% lower greenhouse gas emissions

The cleanest commercial solution available today

Engine-Aftertreatment Control

- All-electric series hybrid enables better engine management
- Less extreme engine transients and smart filter exhaust management
- No diesel particulate filter failures on Orion VII hybrid buses to date

Exhaust Pressure - DPF Inlet (PSI)

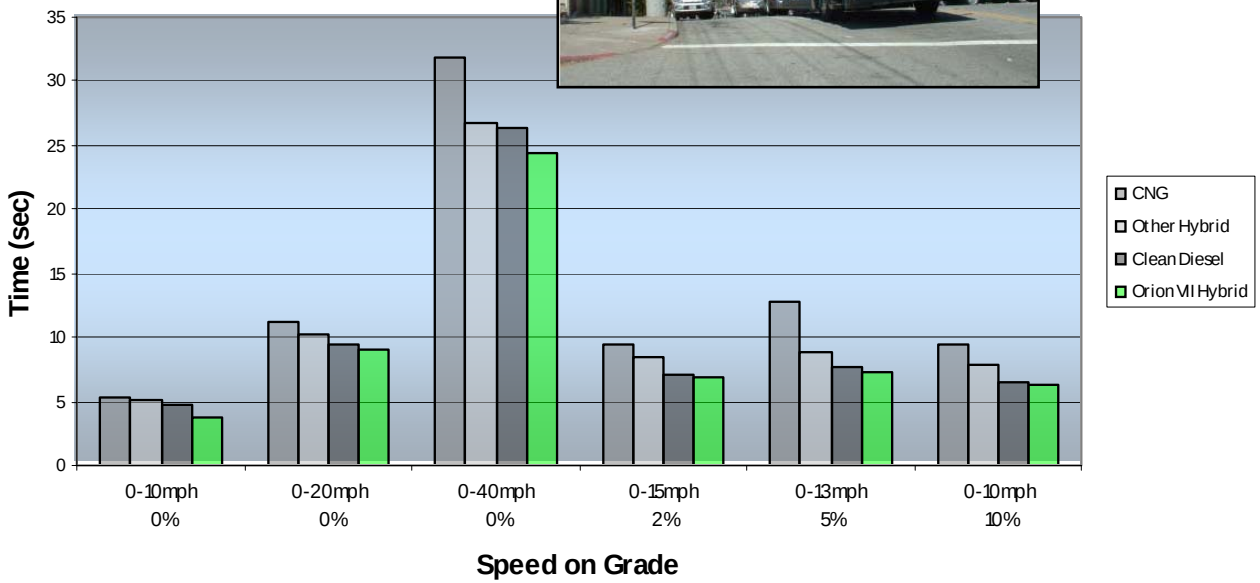


MTA New York City Transit

Series hybrid offers superior engine management

Operational Advantages

- Little/no operational training required
- Smoother, quicker acceleration
- No roll back on hills
- Less engine noise
- Operator's love it

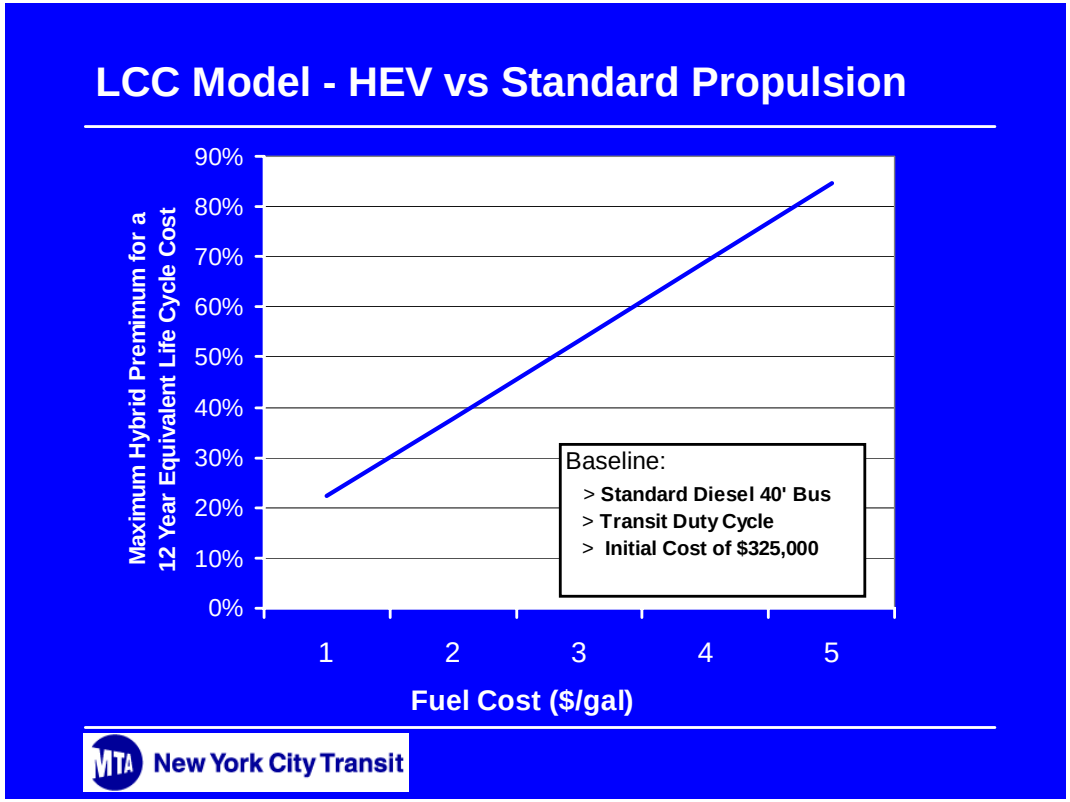


Superior operational advantages in typical transit duty cycle

Lifecycle Analysis

Lower O&M costs through

- Fuel savings
- Improved reliability
- No mechanical transmission
- Less engine wear & tear
- Less expensive engine
- Extended brake life
- Less expensive battery system



Hybrid reduces O&M costs and protects against rising fuel costs

Summary

- Orion & BAE Systems
  - World leaders in design & production of series hybrid bus
  - Selected by New York, Toronto and San Francisco

- Orion VII Series Hybrid Transit Bus
  - Lowest polluting commercial bus
  - Superior fuel economy savings
  - Robust, simple & proven design
  - Excellent reliability performance
  - Lower O&M costs – better value

Delivering superior technical and lifecycle value

Social Benefits

- Air quality/public health
  - About 4 tons of NOx reduced per bus lifetime*
  - About 235 tons of CO2 reduced per bus lifetime*
- Energy savings
  - About 20,000 gallons of diesel fuel per bus lifetime*
- Environmental justice
  - “My depot neighbors aren’t complaining as much…”

(James Anderson, MTA NYCT)

* 12 year, 500,000 miles urban drive cycle

Cleaner, smarter transportation