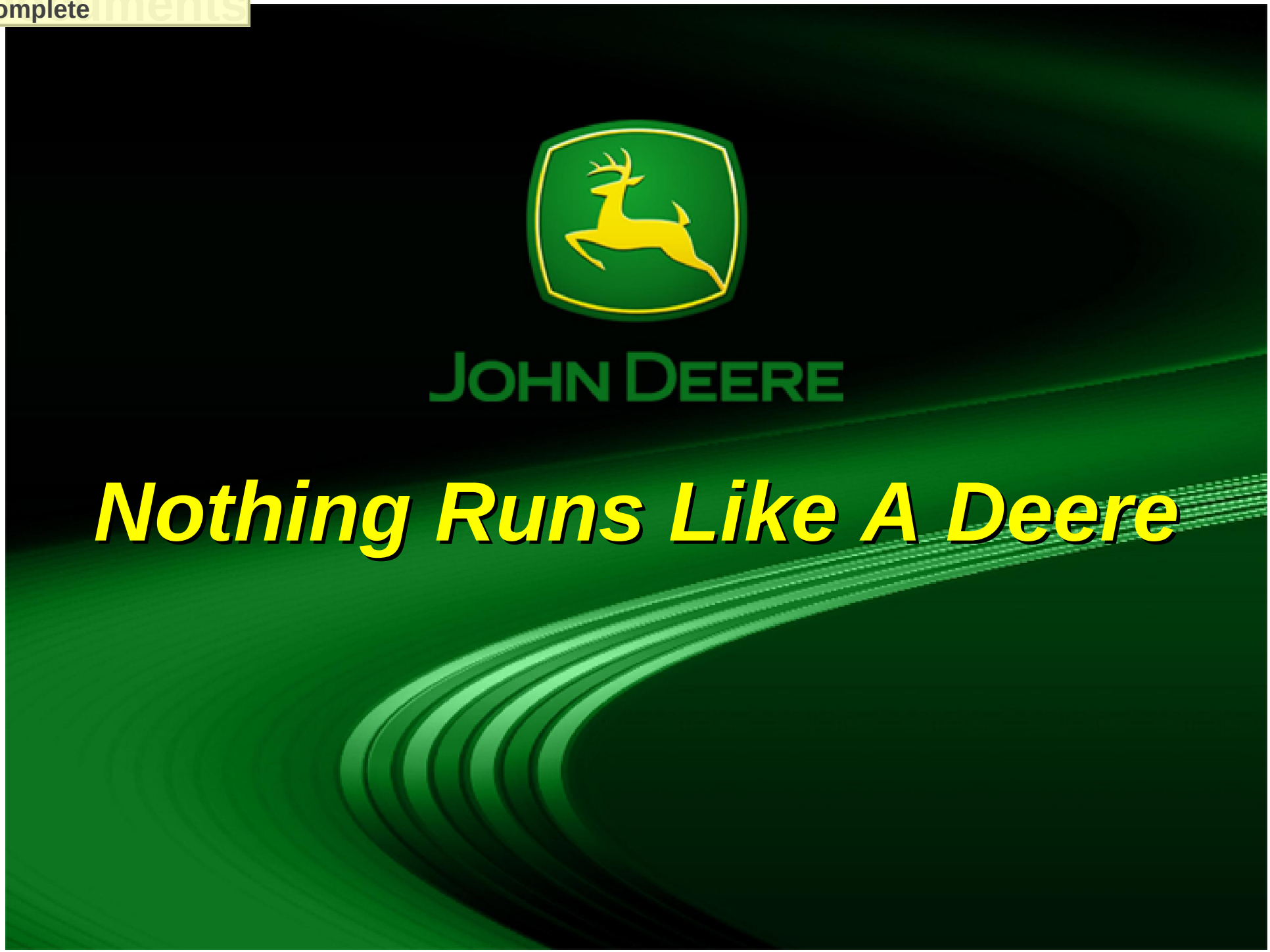
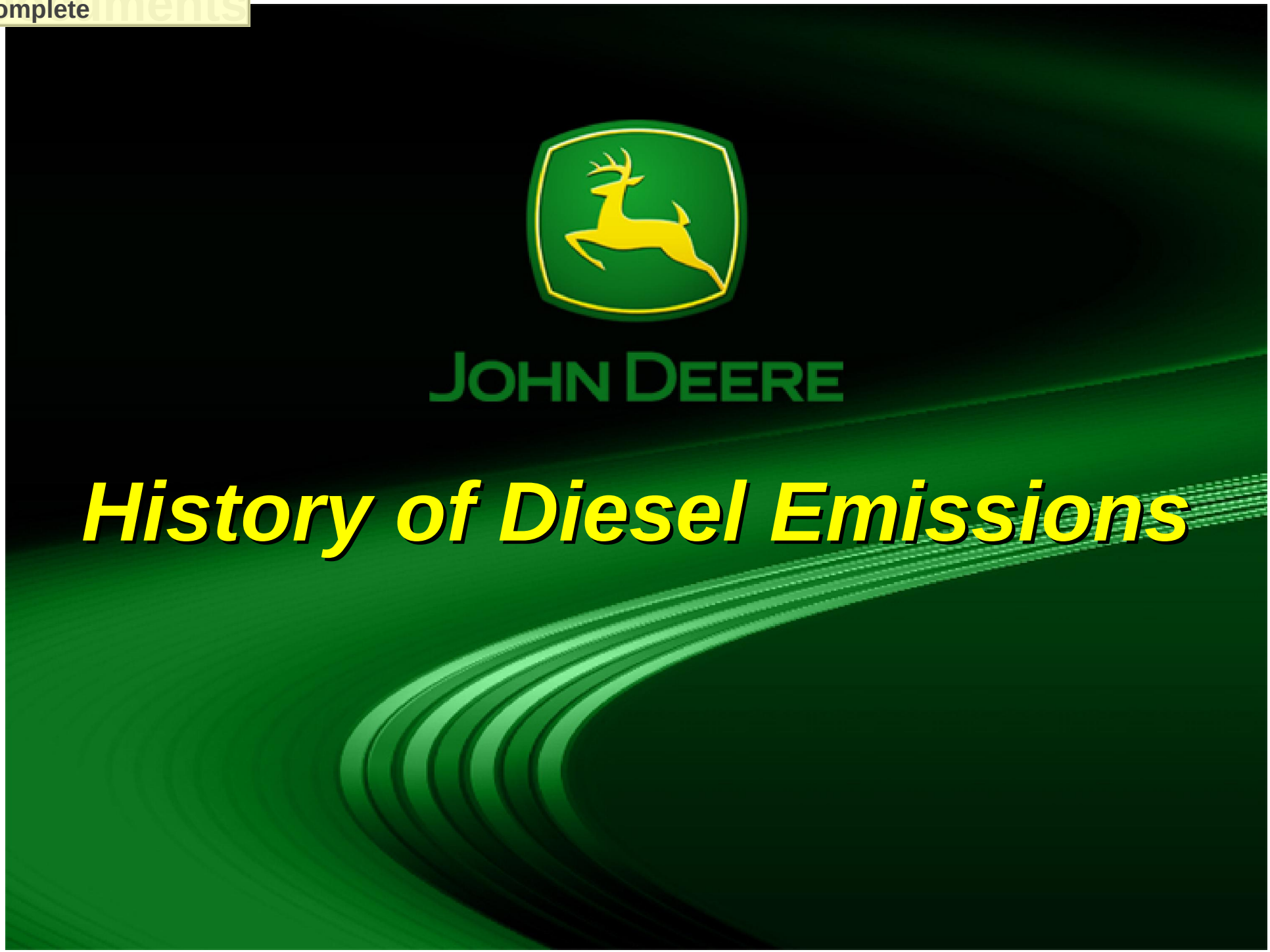




History of Diesel Emission Regulations

- 1974 – 1st Smoke Standards (HC & NOx 16 g/bhp-hr)
- 1984 – 1st NOx (nitrous oxides) Standards (NOx 10.7 g/bhp-hr)
- 1988 - 1st PM (particulate matter) Standards (0.60 g/bhp-hr)

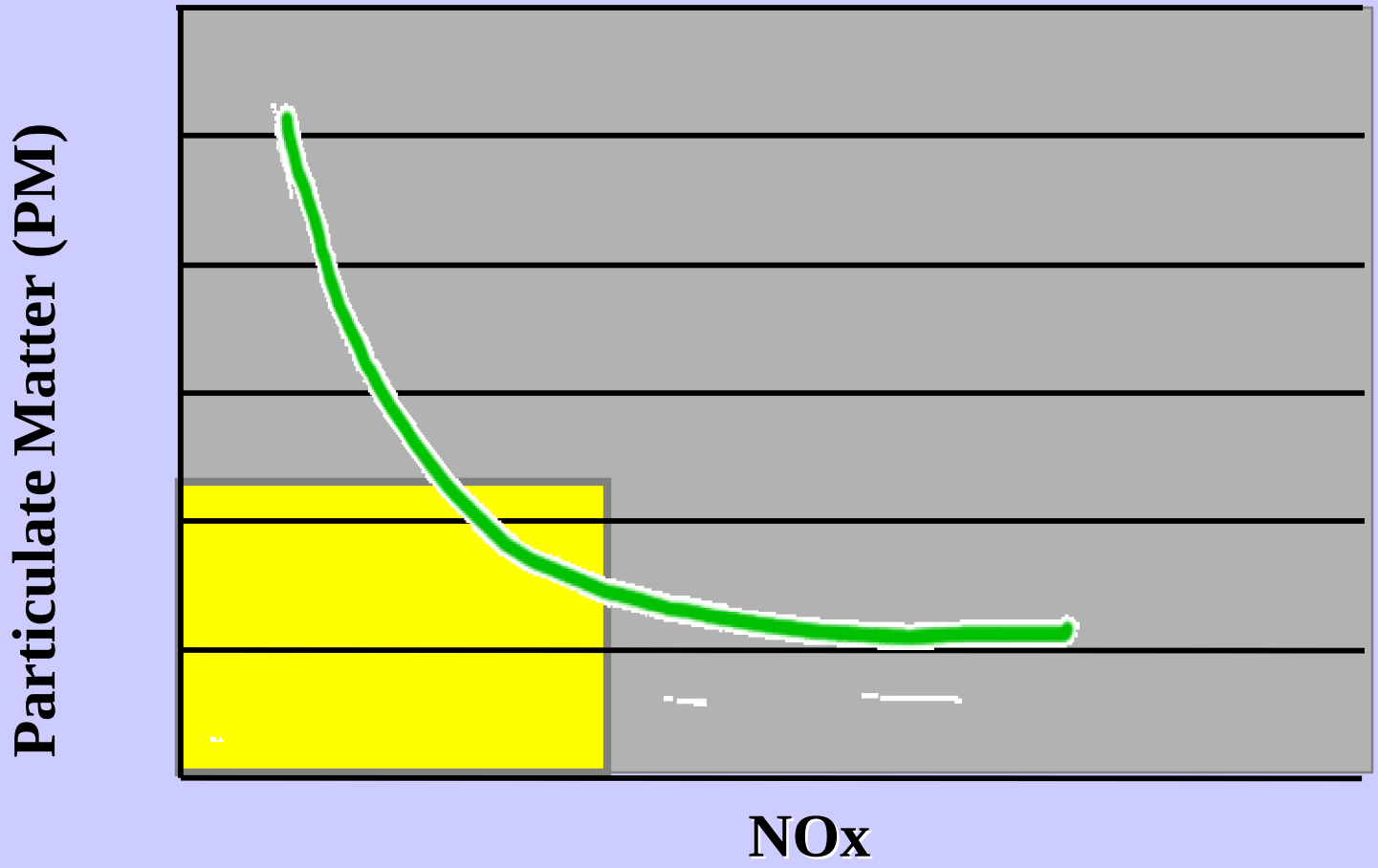
History of Diesel Emission Regulations-cont.

- **Early 1990's Emission Standards did not affect Diesel Simplicity**
  - **NOx Reduction achieved thru retarding injection timing (>PM)**
  - **1998 - NOx standard tightened to 4.0 g/bhp-hr**
    - **Turbocharger improvements**
    - **Electronic controls on nearly all engines**
    - **Retarded fuel injection timing**
    - **Unit injection on most engines; introduction of hydraulic electronic unit injectors**
    - **4 valves per cylinder**

History of Diesel Emission Regulations-cont.

- Oct. 2002 - NOx + HC standard re-introduced at 2.5g/bhp-hr
  - Introduction of Exhaust Gas Re-circulation (EGR)
  - Lowers NOx but encourages formation of PM
  - Introduction of PM Trap

PM / NOx Trade Off



History of Diesel Emission Regulations-cont.

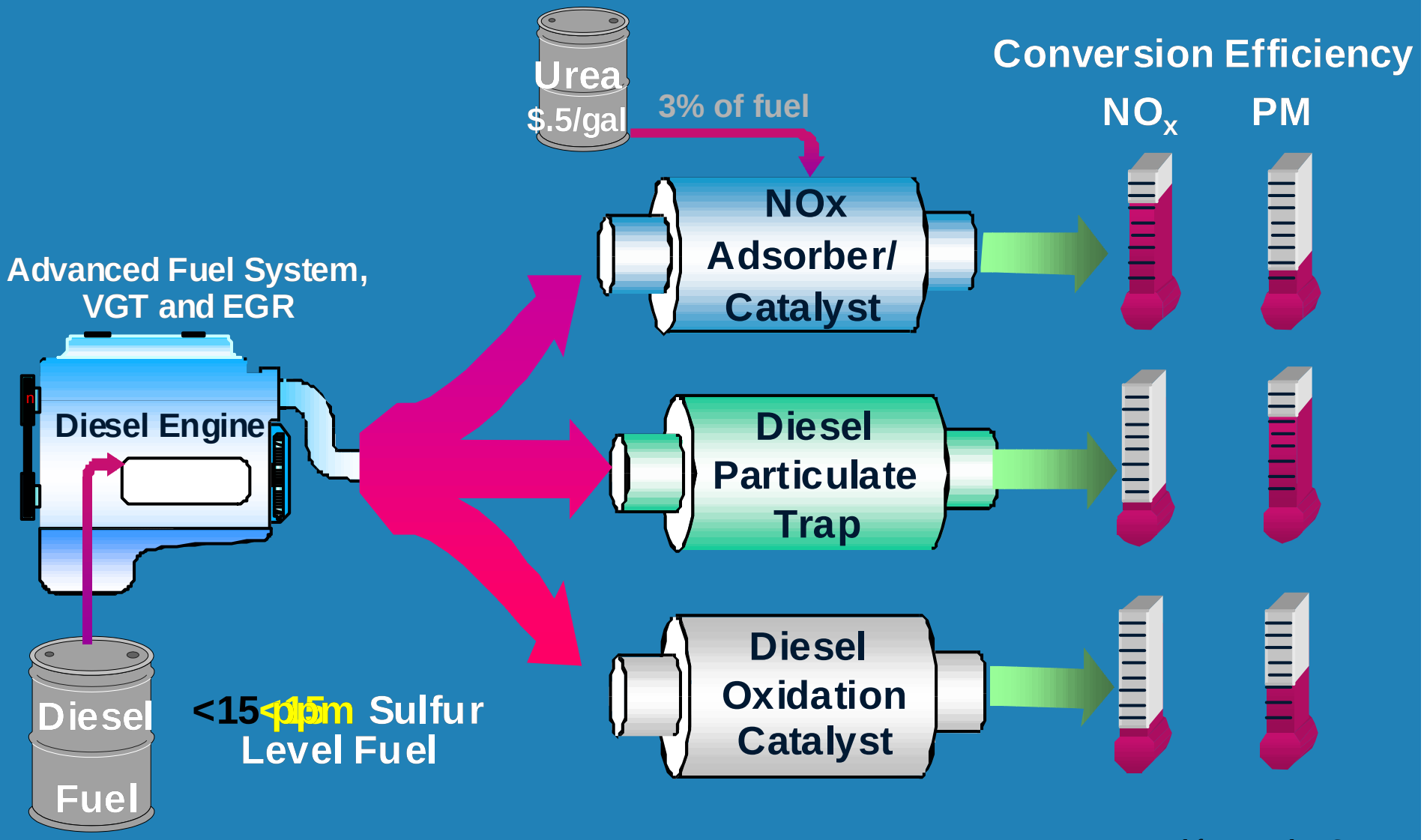
2007 Technology is coming on like a Freight Train

- 2007-2010 Technology
  - NOx (nitrogen oxides) standard revised to 0.20 g/bhp-hr (grams per brake horsepower hour)
  - NMHC (non-methane hydrocarbon) standard revised to 0.14 g/bhp-hr
  - PM (particulate matter) standard revised to 0.01 g/bhp-hr
    - Test Labs will have a difficult time measuring 0.01
  - Diesel fuel sulfur content maximum reduced to 15 ppm
  - Selective Catalytic Reduction (UREA)
    - Adds $15,000-$25,000 to Vehicle

History of Diesel Emission Regulations-cont.

- 2007-2010 Technology
  - Selective Catalytic Reduction (SCR)
    - NOx conversion of 70% with durability at low to mid range temperatures
    - Needs sophisticated controls and infrastructure for urea distribution
    - Adds $15,000-$25,000 to Vehicle

Diesel Emission Control Systems



Derived from Bartley, SwRI

Natural Gas Emission Control Systems

Conversion Efficiency

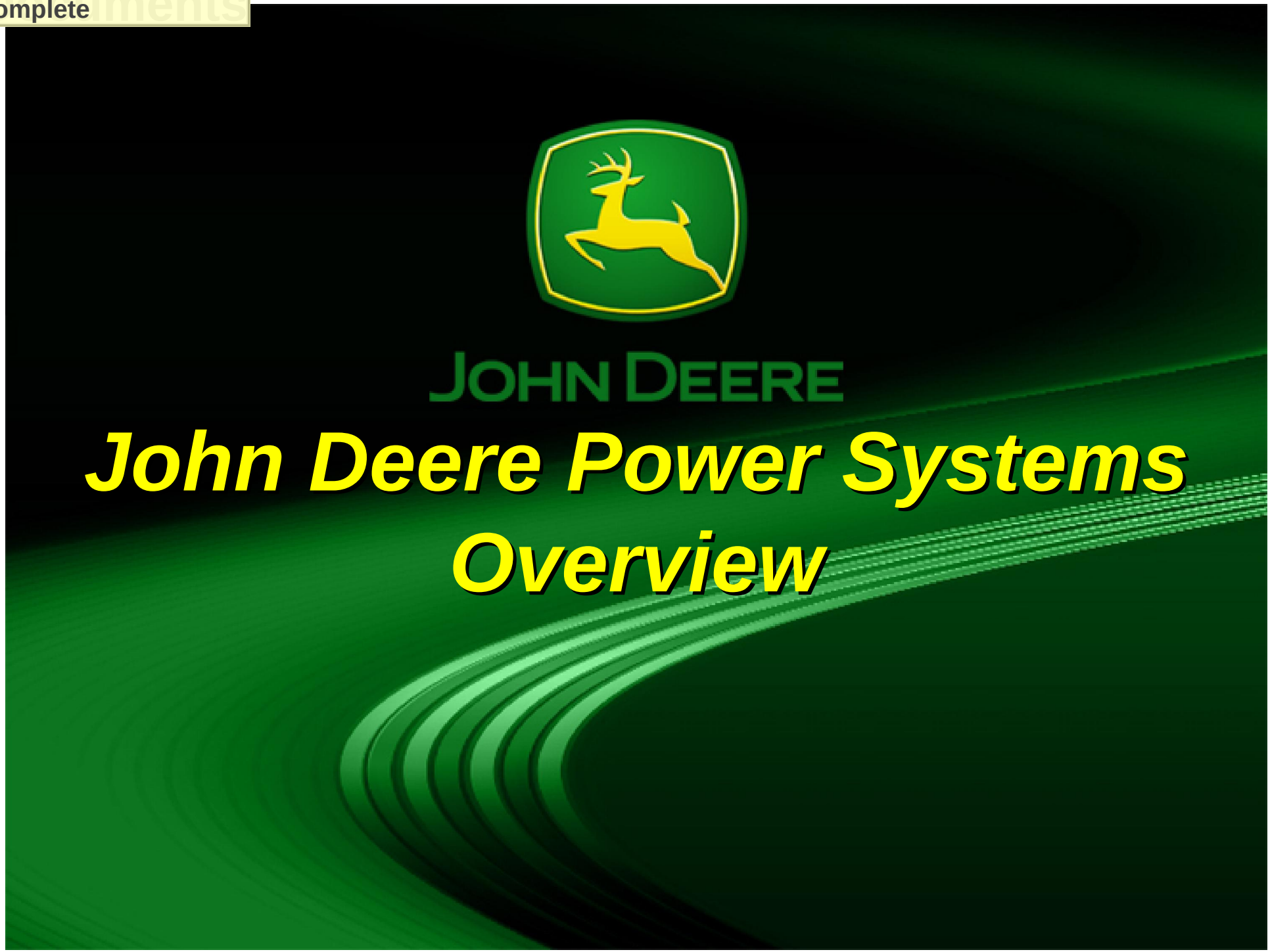
NO_x PM

CNG or LNG STORAGE

Derived from Bartley, SwRI

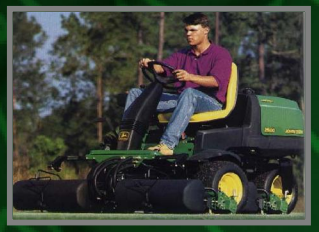
Implications of the Low-Emitting Diesel Technology Road Map

- **Ultra Low Sulfur Diesel**
  - Increased Capital & Maintenance Costs
  - Increased Fuel Consumption
  - Reduced Reliability
  - Additional Training
  - 15 ppm does not clean up PM
  - Technology Enabler
- **Lubricating Oils**
  - Enormous Amount of Sulfur
  - Adds 10 ppm to Combustion Chamber



John Deere Market Position

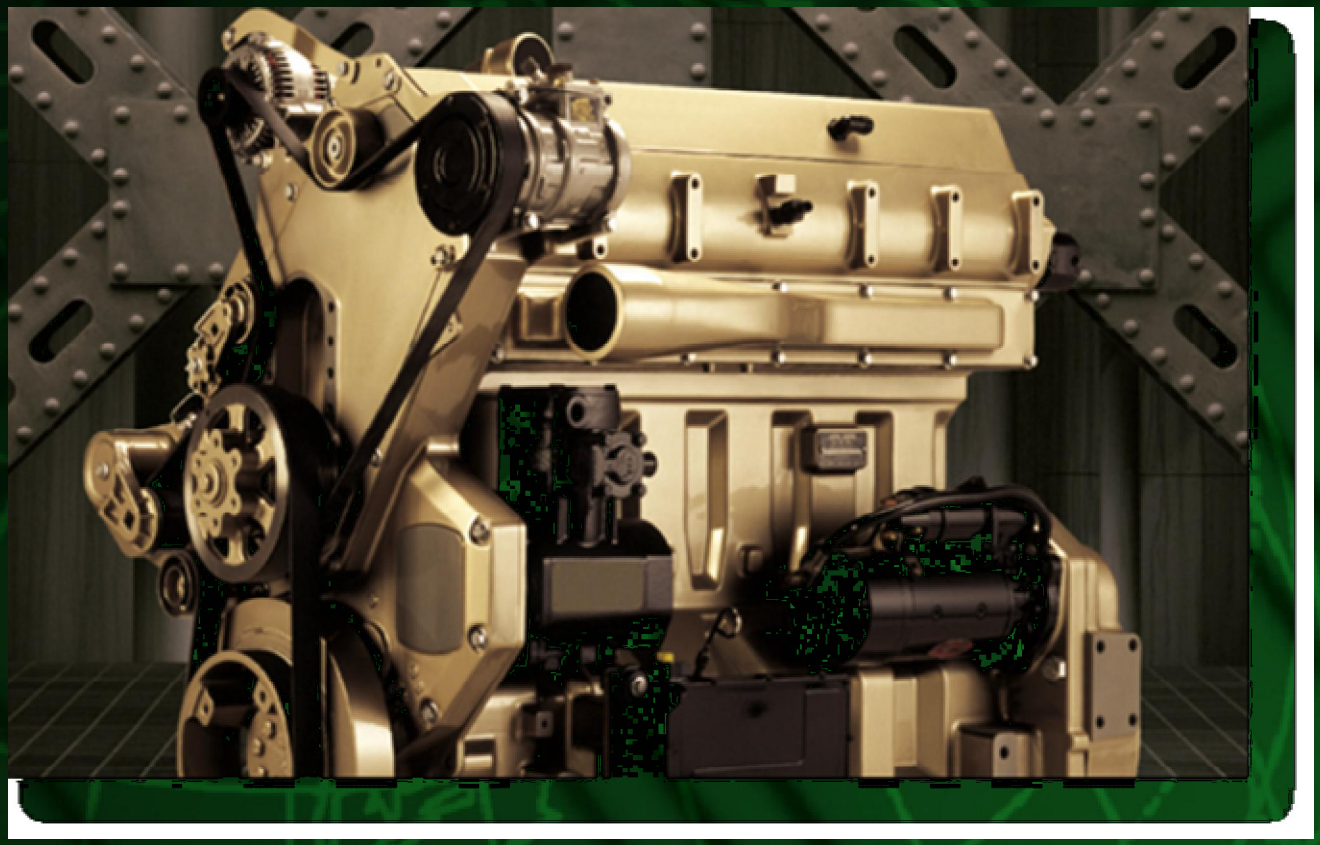



- Market Position
- Agricultural Equipment - 1st Worldwide
- Sugarcane Equipment (Cameco) - 1st Worldwide
- Construction Equipment (Bell) - 2nd North America
- Forestry Equipment (Timberjack) - 1st Worldwide
- Lawn & Ground Care Equipment - 1st Worldwide
- Commercial Worksite Equipment - 3rd North America
- Golf & Turf Equipment - 2nd Worldwide

JOHN DEERE

POWER SYSTEMS



Leading manufacturer of off-highway diesel engines and the technology leader in on-highway heavy-duty natural gas engine business

JOHN DEERE

HEAVY-DUTY DIESEL HERITAGE

- 8.1L Powers Deere On
  - Agriculture 70%+ load factors
  - Construction
    - Variability in speed and loading
    - High cyclic loading
    - Abusive environment

- Current diesel configuration rated up to 375 HP
  - Higher peak firing pressure
  - Higher BMEP

JOHN DEERE NATURAL GAS ENGINES

Rear Engine, Transit Style School Bus

1996 – 8.1L 250hp released in Blue Bird rear engine school bus

- 3 year exclusivity with Blue Bird (1996-1999)
- 110 buses deployed in 1996 - California Energy Commission

JOHN DEERE

JOHN DEERE PRODUCT PROFILE

- Customer Expectations of Deere CNG Engines
- Diesel-Like:
  - Driveability
  - Reliability
  - Cost of Ownership
    - Fuel Economy
    - Maintenance
    - Durability
  - Serviceability

Natural Gas Engine Maintenance

- Service Intervals
- **Oil/ Filter change:** 12 months / 25,000 miles (Low sulfated ash oil 0.5 to 1.0%)
- **New Spark Plugs:** 12 months / 25,000 miles
- **Adjust Valve Lash:** 24 months / 50,000 miles
- **Coolant Filter** Not Required

- Diagnostics
- **Computer Aided:** Trouble-shooting simplified

- Warranty

School Bus - 5 years / 100,000 miles

Transit Bus - 2 years / unlimited miles

Trucks - 2 years / 150,000 miles

Extended Warranty Available

JOHN DEERE

HFNO4 TECHNOLOGY

- NEXT GENERATION TECHNOLOGY
- Takes the 8.1L Natural Gas Engine to the Next Level of Capability
  - Reliability
  - Performance
  - Application flexibility
  - **Platform for emission reduction**

Future Development - 2005

- 8.1L
- Lean Burn
- 1.2 g NOx + NMHC – Fall 2005
- MHDD, HHDD & Urban Bus
- 250 - 280hp

Future Direction - 2007

- 8.1L → 9.0L
- Stoichiometric with 3 way catalyst
- Increased power rating-320 hp / 1100 lbft. Torque
- 0.2 g NOx unveiled - Summer 2005
- 0.2 g NOx field test – Spring 2006
- 0.2 g NOx production - Fall 2006

BELL DETROIT DIESEL, Inc.

1973 1st Truck Repower
American La France
6-71 Detroit Diesel
Allison Automatic

1984 Form Apparatus Services Division
Hahn Fire Trucks
FMC Fire Trucks
LTI (Ladder Towers Indus.)

JOHN DEERE

Bell Power Systems INC.
SERVING THE NORTHEAST

Bell Power Systems

1989 Sign John Deere Distributor Agreement

JOHN DEERE

1998 Form Natural Gas Vehicle Business Unit

Specialize in Repowering:
§Buses (School, Transit & Shuttle)
§Trucks (Delivery, Refuse, Municipal & Utility)

2003 Sign Cummins-Westport Agreement

JOHN DEERE

Bell Power Systems INC.
SERVING THE NORTHEAST

Bell Power Systems

1999 Built 20,000 Sq.Ft.
NGV Repower Facility

JOHN DEERE

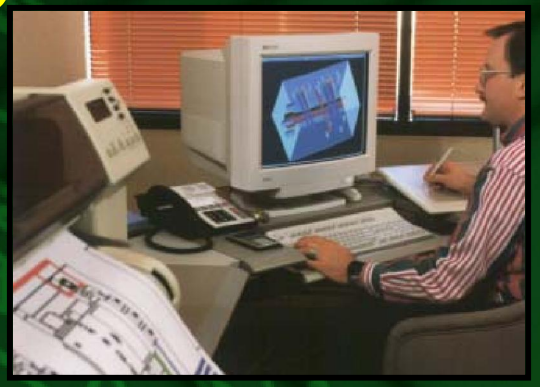
Bell Power Systems INC.
SERVING THE NORTHEAST

Bell Power Systems

Engineering Services

§ Work with OEMs to design engine installation

§AutoCAD



Fuel System Design & Fabrication

§Unique System for wide variety of vehicle applications

CNG, LNG & LPG Fuel Systems

JOHN DEERE

CHASSIS PARTNERS

Transit Style School Bus

Thomas

Bluebird

40’ Transit Bus

New Flyer

Orion

ElDorado

NABI

Commercial Bus

ElDorado

Bluebird

Cable Car

Refuse Trucks

Crane Carrier

Class 6 / 7 Trucks

Freightliner

Sterling

Manhattan Beer Distributors

2000 Repowered 15 IHC Beverage Delivery Trucks-Bronx, NY

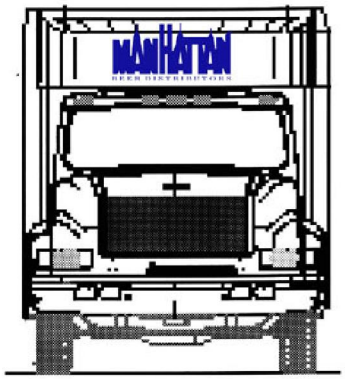
§ Truck Wrap" Public Awareness Campaign

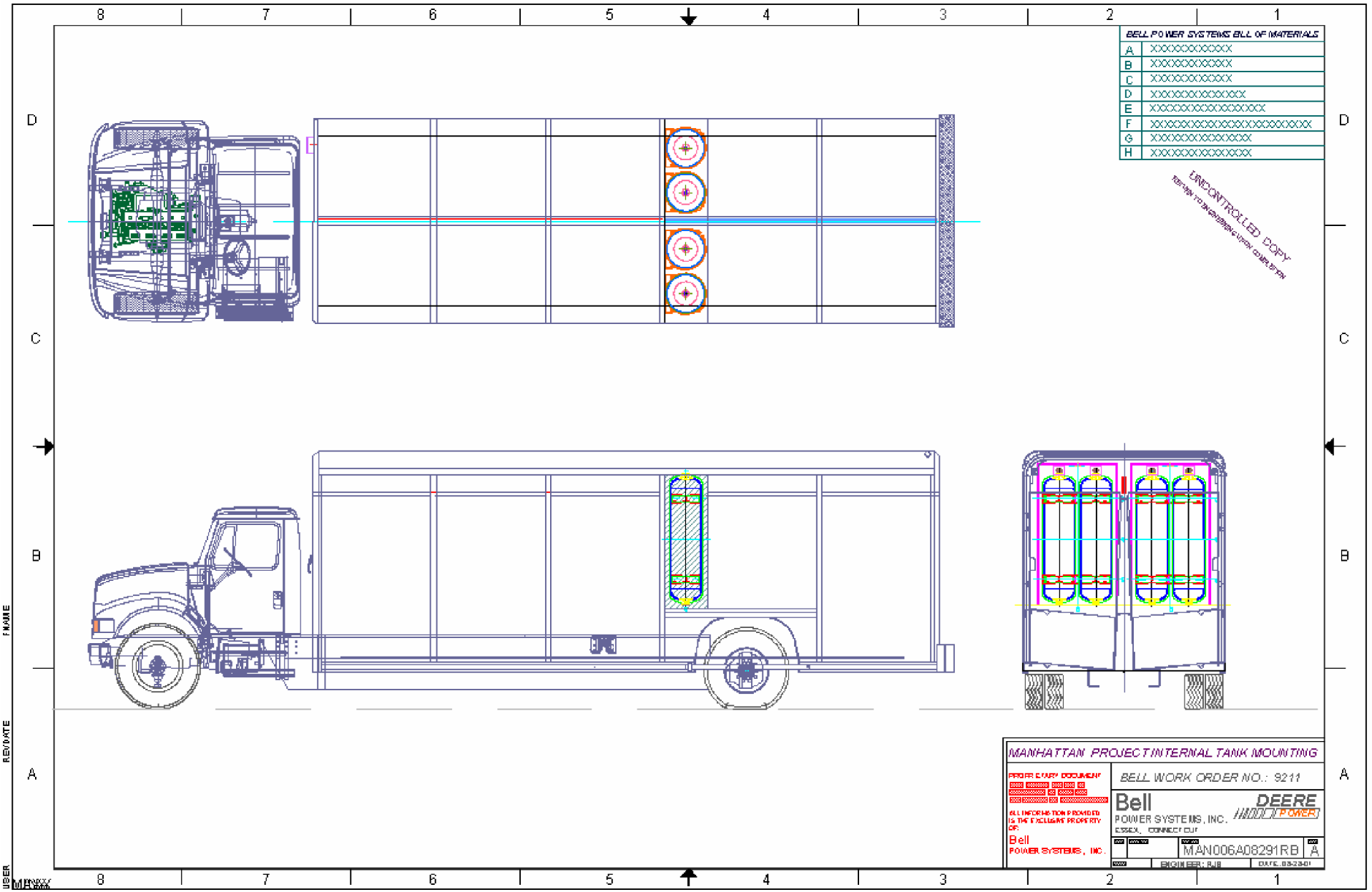
§On-site CNG station

2004 15 Trucks-Brooklyn, NY

2005 15 Trucks-Wyandanch, NY

§ Second on-site CNG station





Public Utilities

2003 Repowered 2 Sterling Actera Utility Trucks
Sewer Jet & Aerial Lift
Norwich (CT)

2004 Repowered 11 Freightliner FL70 Utility Crew & Dump Trucks
Pacific Gas & Electric

JOHN DEERE

16 Yd Leach Refuse Truck

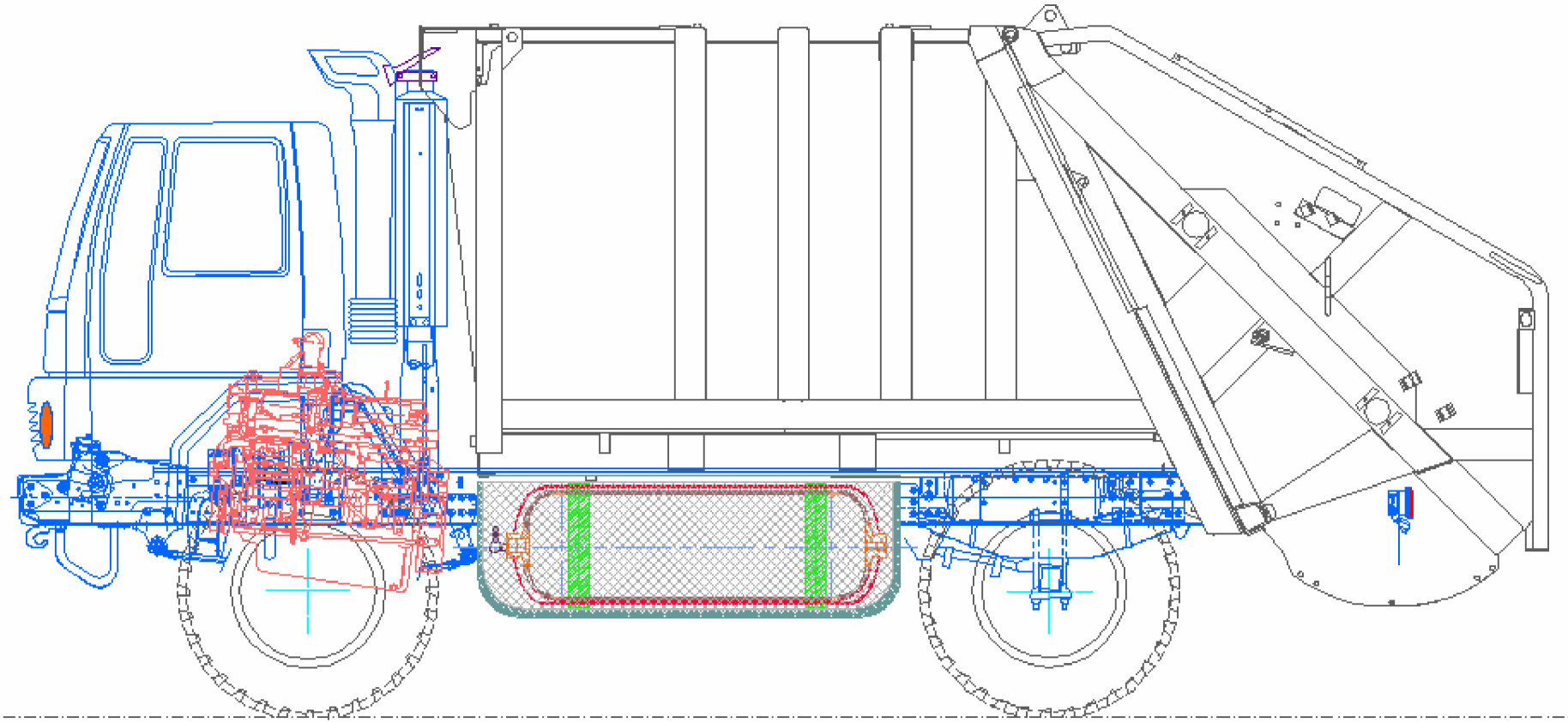
Sterling Cargo Chassis

Powered by:

§ **John Deere 220 hp @ 2400 rpm**

§ **640 Lb-Ft @ 1600 rpm**

JOHN DEERE



STERLING / LEACH ~ JOHN DEERE 8.

250 HP, TANKS 21.2 X 72=3

Bell
POWER SYSTEMS, INC.
ESSEX, CONNECTICUT

Bell
POWER SYSTEMS, INC.

LEA002A112801R8

ENGINEER: RJB

Washington Metropolitan Area Transportation Authority

Repowered five New Flyer Transit Buses 2003

§John Deere 6081HFN 280 hp

§4th Transit “Field Test” Program

§Bell Power Systems provides New Flyer Industries with engineering assistance for production intent

JOHN DEERE

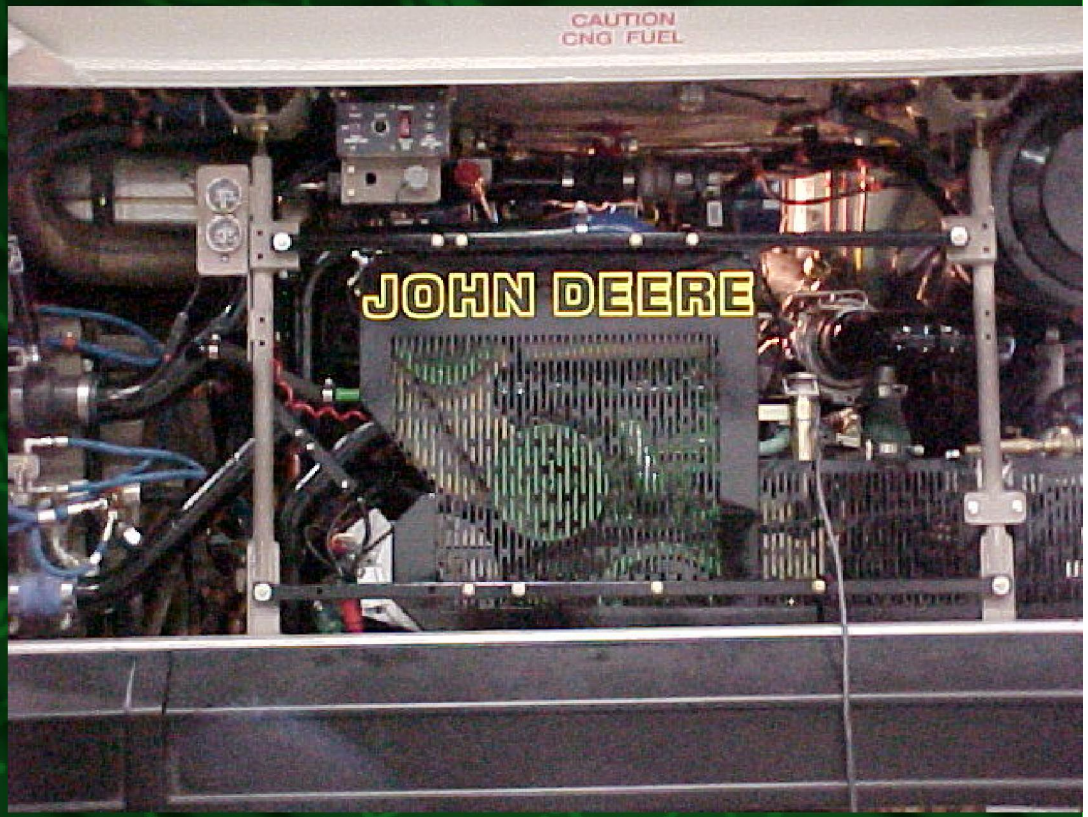
Washington Metropolitan Area Transportation Authority

2005

- Deere's MTBF is currently +12,000 miles

- Competitive CNG Engines are averaging 8,000 MTBF

- WMATA orders 100 Orion VII Buses with Deere Engines



JOHN DEERE

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www.bellpower-cleanengines.com

Bell
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JOHN DEERE