

DETROIT DIESEL

CORPORATION



Future Diesel Engine Thermal Efficiency Improvement and Emissions Control Technology A Detroit Diesel Corporation Perspective

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Series 60

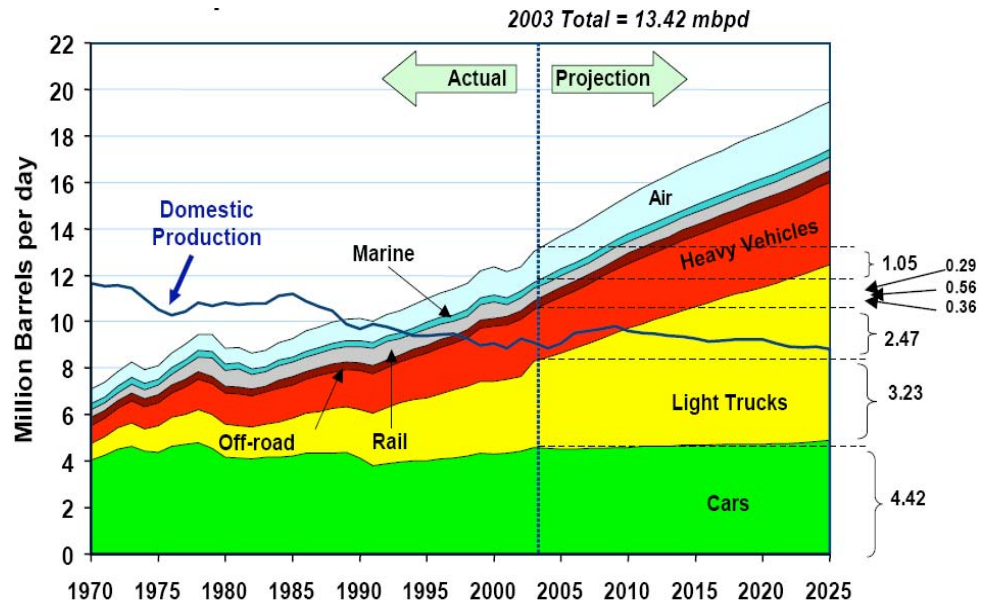
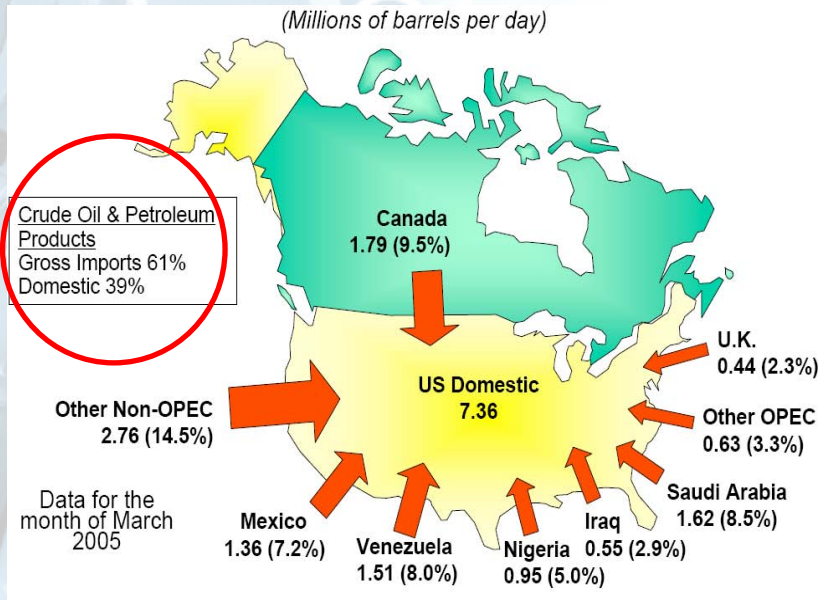


MBE 900



MBE 4000

Domestic Oil Situation and Dependence on Transportation

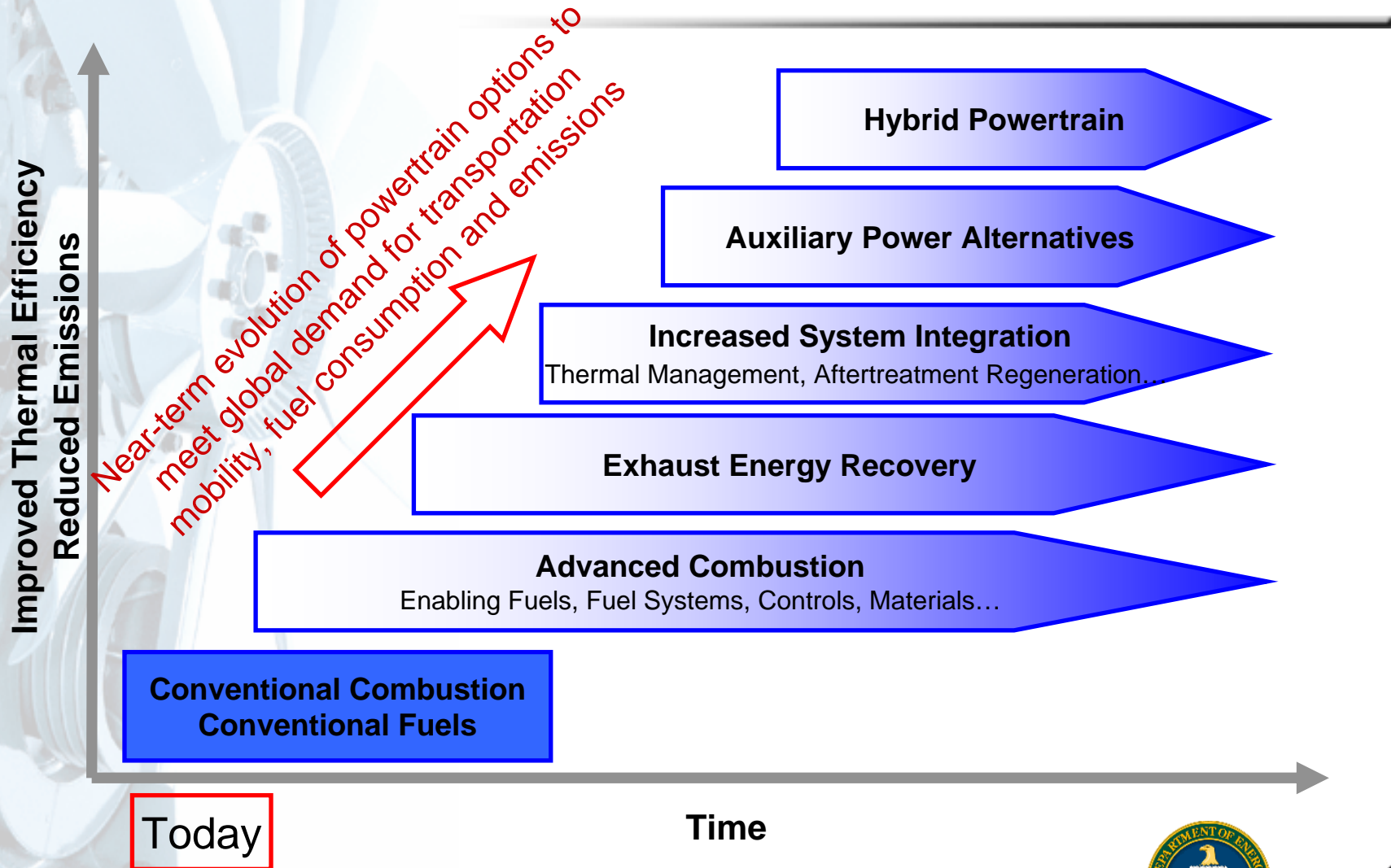


Source: Crude Oil and Petroleum Products, EIA Petroleum Supply Monthly, May 2005
 Source: Transportation Energy Data Book: Edition 24, ORNL-6973, and EIA Annual Energy Outlook 2005, Preliminary release, December, 2004

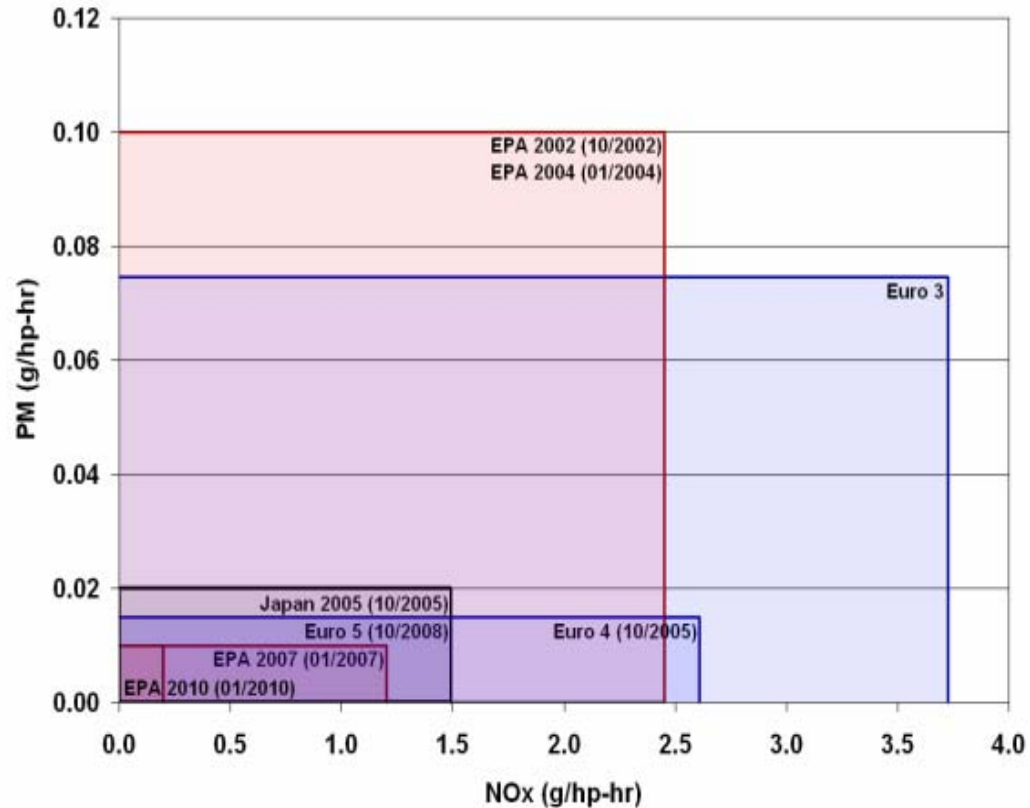
DDC remains fully committed to support DOE's strategic goal of developing more energy efficient and environmentally friendly transportation technologies that enable America to use less petroleum



Near-term Powertrain Evolution









Global Emissions Regulations



Global heavy-duty emissions regulations are approaching near-zero and present an opportunity for some common technologies to be utilized for global synergy



DaimlerChrysler Vision for Global Emissions Control Medium and Heavy Duty

		2005	2006	2007	2008	2009	2010	2011	2012	2013
			Japan '05				Post-Japan '05?			
			EPA 2007				EPA 2010			
			Euro 4		Euro 5		Euro 6?			
	Medium Duty		EGR, DPF				EGR, DPF, SCR			
	Heavy Duty		EGR, SCR				EGR, DPF, SCR			
	Medium Duty	EGR	EGR, DPF				EGR, DPF, SCR			
	Heavy Duty	EGR	EGR, DPF				EGR, DPF, SCR			
	Medium Duty		SCR		SCR			EGR, DPF, SCR		
	Heavy Duty		SCR		SCR			EGR, DPF, SCR		

EGR technology experience in the U.S. coupled with SCR technology experience gained in Europe lays a strong foundation for integration of EGR and SCR as part of the NOx control solution in the global market-place

EPA 2007 Requires Management of Multiple and Conflicting Issues

Significant Effort Required to Minimize Increase in Initial and Lifecycle Operating Costs

**Fuel density impact
(Fuel economy penalty)**

**Ultra low sulfur diesel
fuel**

**Diesel
particulate
filter (DPF)**

**New oil formulation (low
ash) for DPF**

**Maintenance
requirements (oil drain
interval)**



NTE Limits

**In-use emissions
testing conducted
by manufacturer**

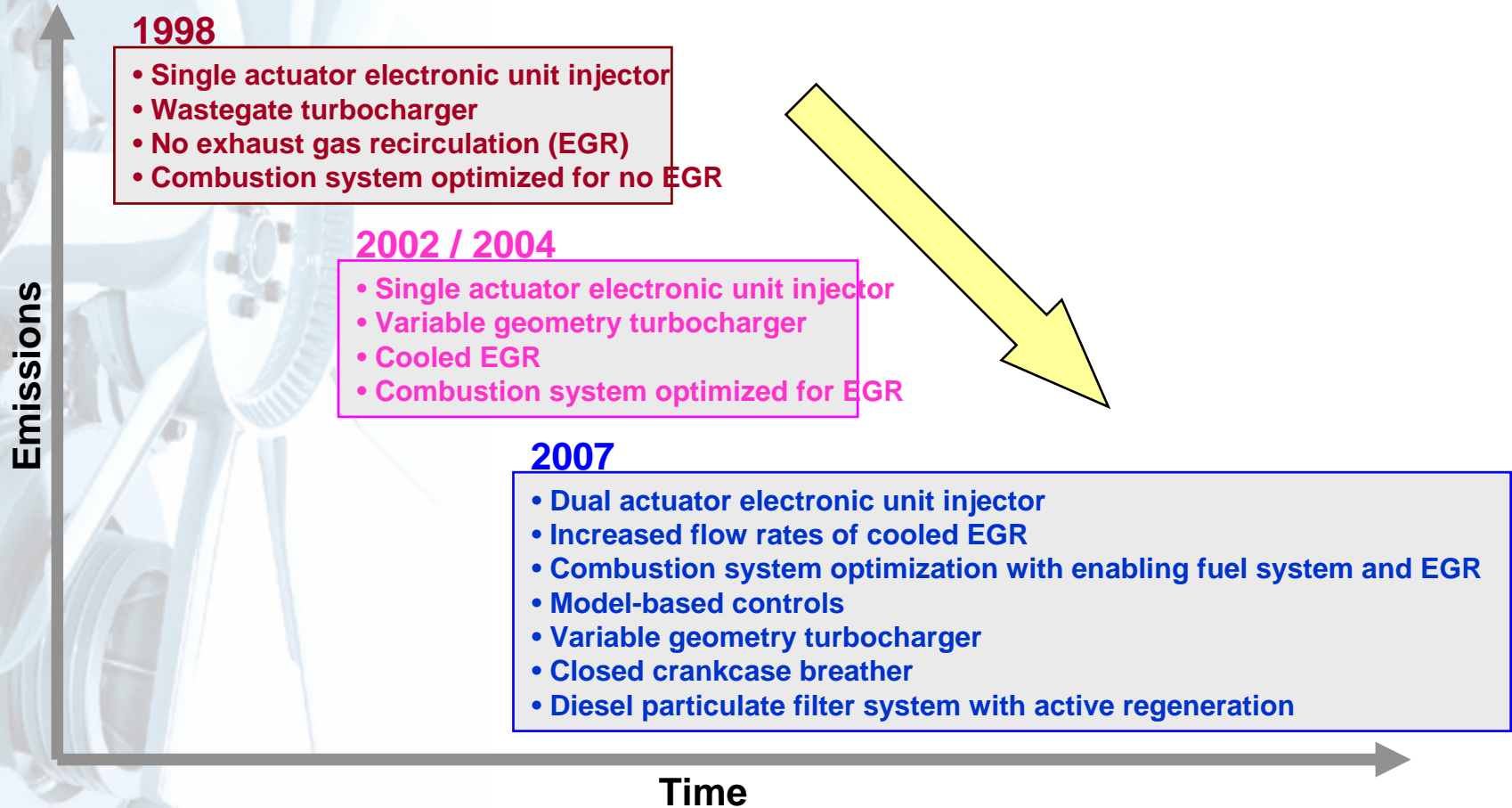
**Enhanced
diagnostics
requirements**

**Anti-idling
requirements**

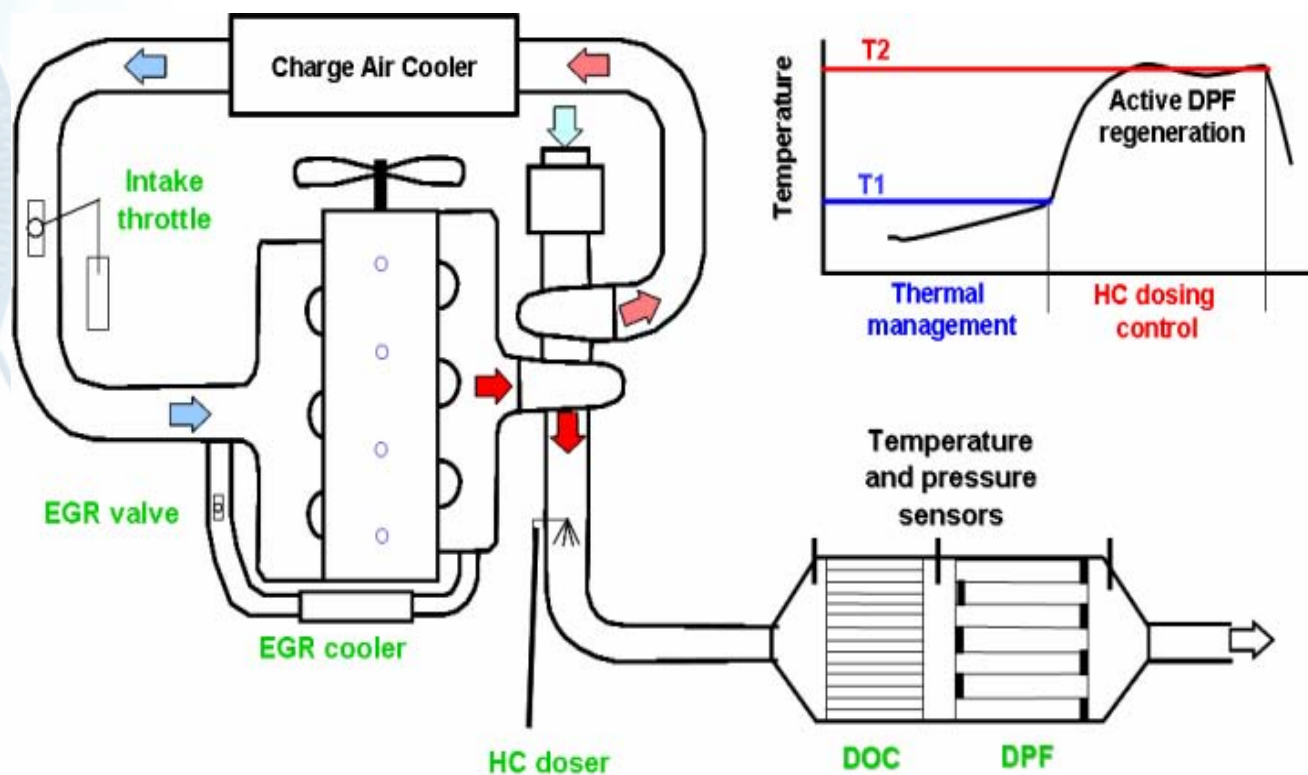


Detroit Diesel Heavy-Duty Engine Technology Evolution

1998 through 2007



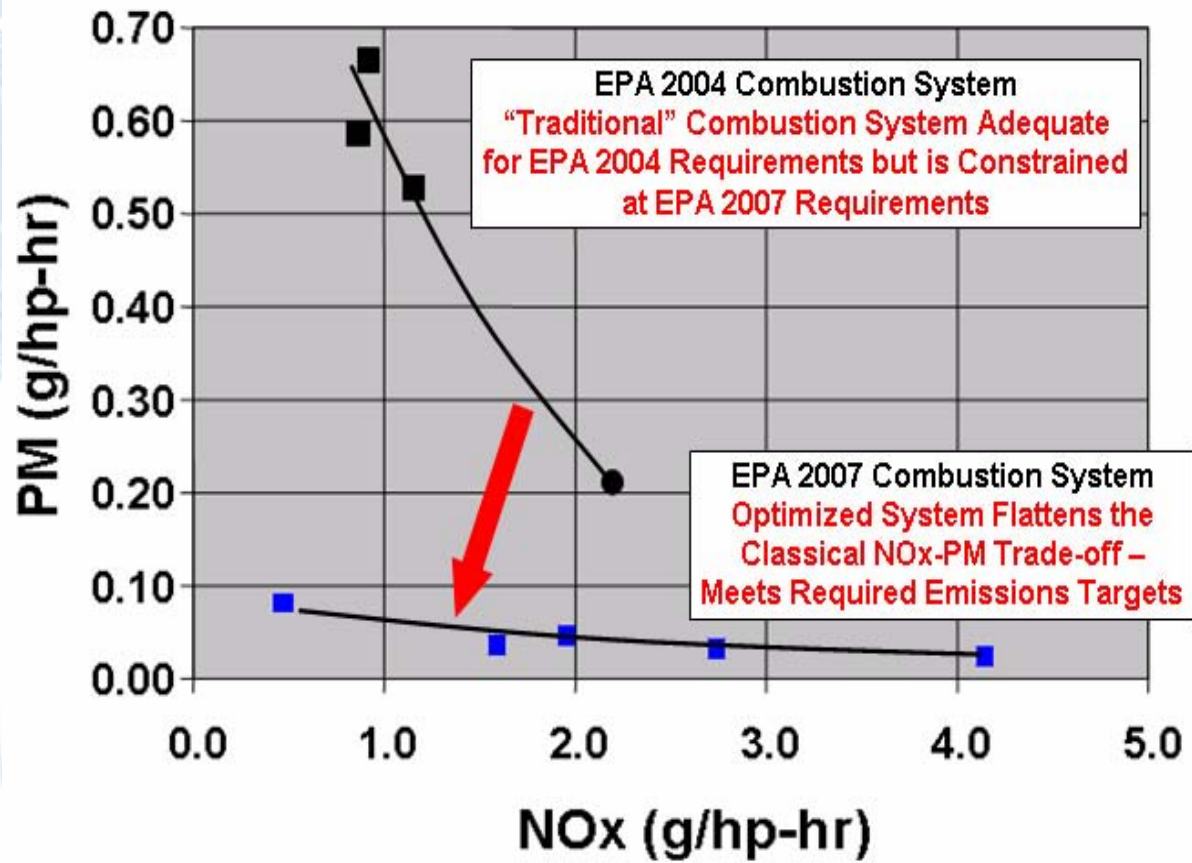
2007 Engine and Aftertreatment System Schematic



Combustion System (Including Fuel and EGR System) Optimization

14.0 L 6-cyl. Engine, 1800 rpm, 2.5 bar BMEP

Example Operating Condition Representative of Transient Acceleration



Series 60 Legacy and Current Development

- First heavy-duty diesel engine in the world with fully integrated electronic controls
- In 2004, the Detroit Diesel Series 60 was the Class 8 heavy-duty engine market leader (R. L. Polk)
- Combined, the Series 60 and MBE 4000 enjoy 27% of the Class 8 market
- Best selling engine for the last decade - more than 72,000 Series 60 engines will be shipped in 2005 bringing the total of Series 60 engines in operation worldwide to more than 800,000
- Series 60 remains the fuel economy market leader in the competitive heavy-duty diesel engine market
- Backed by extensive dynamometer and vehicle test-beds, including engineering, reliability-growth and customer demonstration vehicles, the Series 60-2007 engine is well-positioned for a successful launch



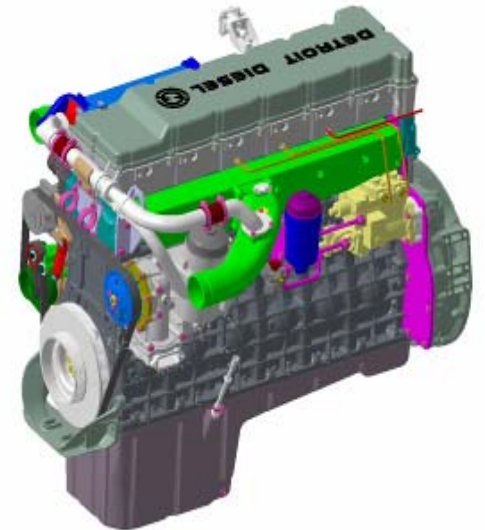
State-of-the-art Thermal Efficiency and Engine Technology Contributing Factors

- Collaborative DOE-DDC programs lay an ideal technology foundation for subsequent product development and eventual commercialization
- Increasingly stringent emissions regulations and technical complexity require increased emphasis on system (powertrain and vehicle) integration
 - DDC, with its vertically integrated business relationship within the Commercial Vehicles Division of DaimlerChrysler, is well-positioned to meet this challenge
- Ability to leverage global engineering resources and expertise for maximum synergy, while addressing regional issues

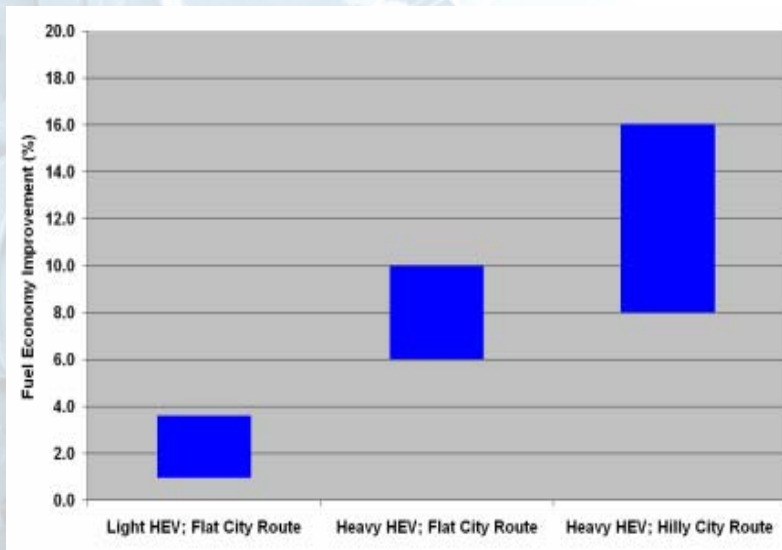


The Next-generation Heavy-Duty Engine Platform

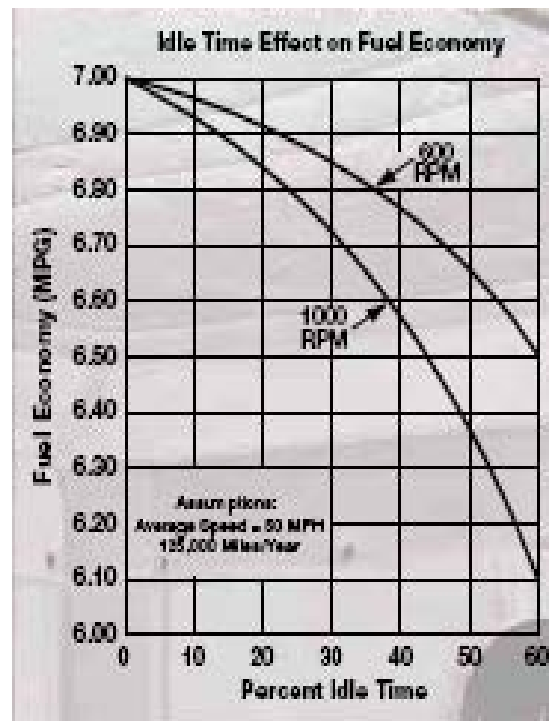
- The next-generation HD engine platform is our roadmap for continued success
 - Brand new engine line-up
 - Will meet the stringent standards for 2007 and 2010
- Combines DaimlerChrysler engineering and manufacturing resources worldwide
 - Best expertise from all areas to resolve specific regional issues
- General Features
 - Wide range of displacement and power ratings
 - Optimized cylinder block for noise / vibration reduction
 - Integral Jake brake with turbobrake option
 - Flexible fuel injection system
 - Advanced air system to optimize thermal efficiency



DDC's Fuel Economy Improvement Commitment Includes Development of Hybrid Powertrains and Idle Reduction Technologies



Potential to Improve Fuel Economy up to 16% for a Heavy Hybrid Electric Vehicle for a Hilly City Route



Detroit Diesel's patented DDEC® Optimized Idle feature is designed to improve fuel economy by optimally controlling engine idle time, based on engine temperature, battery voltage and interior temperature

Optimized Idle reduces idle time by ~50% resulting in a fuel economy improvement of ~

Analytical Results



Technology & Products that Continue to Benefit the Environment

Fuel Economy

- Supplier of the most fuel efficient diesel engines for various applications within the United States for nearly 20 years.
- Engines that help our customers reduce diesel fuel consumption in America by 2.5 million gallons per day.

Emissions

- Detroit Diesel meets the highest clean air standards for today and is a leader in developing clean burning diesel engines for the future.
- 2007 Detroit Diesel engines will emit 70% less pollutants than they did in 1998 – helping to preserve the clean air that Americans breathe.

Hybrid Technologies

- Detroit Diesel and Freightliner are working together to develop diesel hybrid electric engines that will:
 - Improve fuel economy
 - Reduce emissions
- Development of hybrid technologies is gaining momentum and will lead to high quality jobs and industry growth.

Celebrating 20+ Years of DOE & DDC Collaboration

