BLUETEC – Heading for 50 State Diesel

Diesel Engine-Efficiency and Emissions Research Conference
Detroit, MI. August 22nd, 2006
Dr. Simon Godwin
Content

1. Perspectives on diesel
2. BLUETEC technology
3. The future of diesel
DaimlerChrysler’s roadmap towards energy for the future

- **today**
  - Improvement of Conventional Fuels
  - Alternative Fuels
  - Hybrid Vehicles
  - Fuel Cell Technology

- **tomorrow**
  - Optimization of Combustion Engines
Perspectives

The diesel consumer proposition

- US consumers will be attracted to diesels for premium performance
- For US driving conditions, diesel offers optimum fuel savings
- With rising fuel prices, the consumer case for diesel strengthens
Perspectives

It’s all about torque

Comparison of torque – diesel as premium

- Liberty (V6)
- Liberty CRD (I4)
- ML350 (V6)
- ML500 (V8)
- ML320 CDI (V6)
- Ram 2500 (Hemi V8)
- Ram 2500 (Cummins I6)
Perspectives

Reducing petroleum consumption

**European diesel effect**

- Estimated fuel savings through diesel with current penetration:
  - **7 mn gall / day**

**US diesel effect**

- With a US diesel penetration of 30% from 2010 onwards, total fuel savings in 2020 would be:
  - **14 mn gall / day**
  - (EIA)

**US B20 biodiesel effect**

- Estimated 2030 fuel savings through B20 on-highway use:
  - **32 mn gall / day**

- Europe’s high diesel share drives lower petroleum consumption
- High diesel penetration in the U.S. will deliver petroleum savings
- Biodiesel use further decreases petroleum consumption
Perspectives

New 2007 DaimlerChrysler diesels

Fall 2006
- Mercedes-Benz E320 BLUETEC
- Mercedes-Benz R320 CDI
- Mercedes-Benz ML320 CDI

Early 2007
- Mercedes-Benz GL320 CDI
- Jeep Grand Cherokee CRD
- 2007 Dodge Ram 2500/3500
Perspectives

Specific challenges

Emissions regulations

• Current and future
• U.S. / 50 state / global

Diesel image
BLUETEC

Exhaust emissions

Task: Fulfilling federal and California emissions standards

Solution: BLUETEC, BLUETEC, BLUETEC
What is BLUETEC?

- “Blueprint for the cleanest diesel technology in the world”
- For all vehicle segments, all world markets
- Enables 50 state US emissions
- BLUETEC represents a bundle of technologies
Bluetec Diesel Particulate Filter

- Mercedes-Benz standard equipment in Germany since 2005
- Standard on all DCX US diesels from 2007 MY
- Filter durability has been proven and demonstrated
BLUETEC

2007 MY E320 BLUETEC

E320 BLUETEC

- Diesel oxidation catalyst
- DeNOx (NOx storage) catalyst
- Diesel particulate filter (DPF)
- BLUETEC catalyst

- DeNOx catalyst reduces NOx to achieve Tier 2
- BLUETEC catalyst “cleans up” components of DeNOx function
- With new V6 engine, E320BLUETEC will retain real world 35 mpg
BLUETEC

Performance

Federal exhaust emissions limits

NOx (g/mi)

PM (g/mi)

Bin 10

Bin 8

Bin 10

Bin 8

Bin 10
BLUETEC

BLUETEC with SCR

Vision GL320 BLUETEC with AdBlue SCR technology

- SCR with AdBlue has high NOx conversion and durability
- Enables Tier 2 Bin 5 for passenger cars and light trucks
- Provision of urea and refill compliance are challenges
BLUETEC

BLUETEC: Performance

Federal and California exhaust emissions limits

NO\textsubscript{x} (g/mi)

PM (g/mi)

Bin 5

Bin 10

LEV

BLUETEC
BLUETEC

BLUETEC: Maintenance & standards

- AdBlue tank size sufficient for refill interval to exceed oil change interval
- Refill primarily to be performed at oil change by dealer / mechanic
- Measures are under consideration to ensure vehicle operates with urea
- DaimlerChrysler and its competitors are performing research into urea-SCR technology to support consistent standards
- USCAR is leading a cooperative effort of industry in all aspects of urea-SCR
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BLUETEC

BLUETEC: AdBlue

AdBlue will be provided at DaimlerChrysler dealerships
The auto/engine industry has set up a urea stakeholder group
Filling stations, oil change and truck stops will be primary outlets
Future diesel

Diesel as a future powertrain

Diesel is integral to 4 out of the 5 projected future powertrain elements

- Reducing emissions, improving fuel economy and performance
- Improved fuel specification and new sources (ULSD, biodiesel)
- Looking to sustainable non-petroleum fuels such as XtL
- Selecting the optimum design and application of diesel / hybrid combination
Future diesel

Alternative diesel fuels

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<td>CTL</td>
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- ULSD (Ultra Low Sulphur Diesel)
- CTL (Cleaner Liquid Fuel)
- GTL (Gas to Liquid)
- SunDiesel
- BioDIESEL
- asfe (alliance for synthetic fuels in europe)
Future diesel

How to expand the market

Diesel characteristics

- Fuel economy
- Range
- Torque
- Towing
- Durability
- Familiarity

Customer financial benefit

Current diesel market growth

Image breakthrough in US

Market breakout to new customers
Future diesel

Diesel image breakthrough

BLUETEC brand

Biofuels, including biodiesel and “XtL”

- BLUETEC provides a focused message: clean technology
- Biofuels associate diesel with clean fuels and technology
- These messages will attract consumers unfamiliar with diesel
Conclusion

The diesel package

- All these elements together will drive the diesel market in the short, medium and long term
Conclusion

A BLUETEC future

- BLUETEC is an enabler for all these elements and ensures a sustainable U.S. diesel market as an integral part of the powertrain roadmap