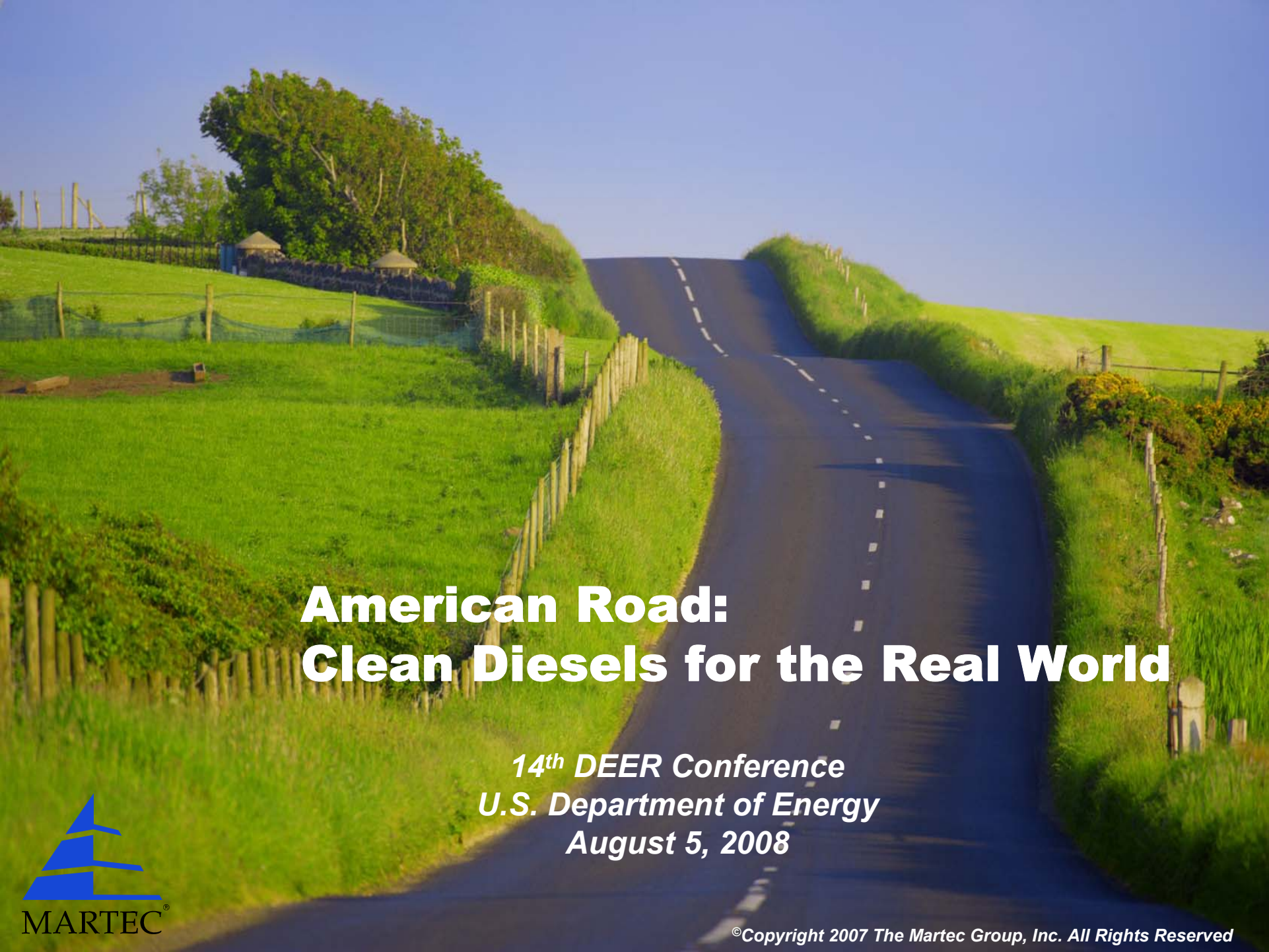


American Road:
Clean Diesels for the Real World

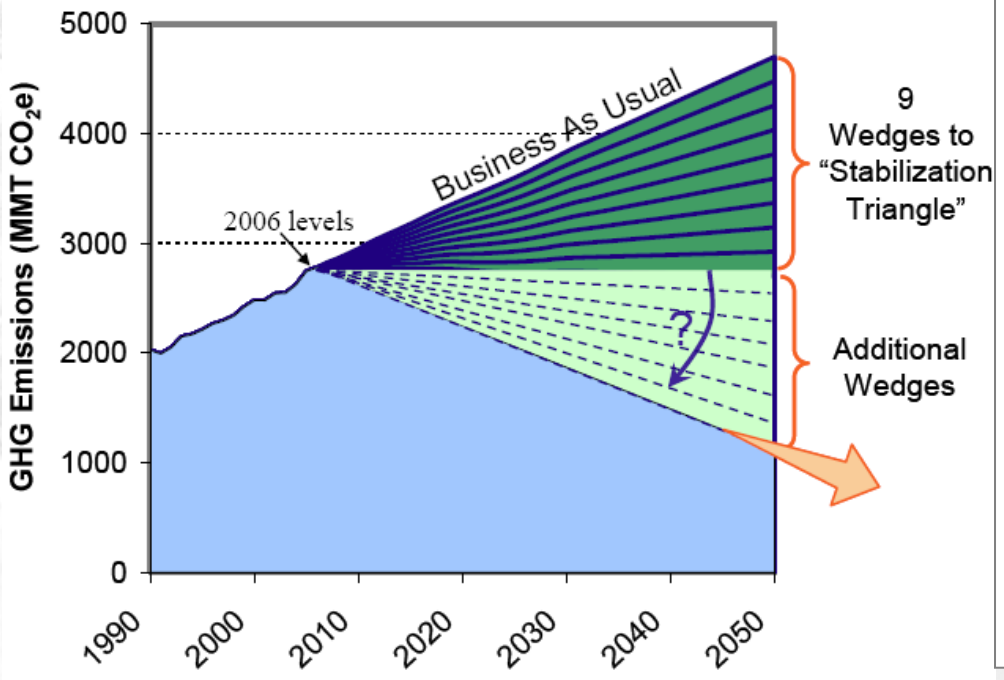
14th DEER Conference
U.S. Department of Energy
August 5, 2008

MARTEC®

©Copyright 2007 The Martec Group, Inc. All Rights Reserved

What is our national objective?

EPA Wedge Analysis



- Reduce consumption of petroleum . . . . . enhance energy security
- Stabilize and reduce GHG emissions
- Provide the greatest good at the lowest societal cost . . .
- … Expand national wealth/ prosperity of the US

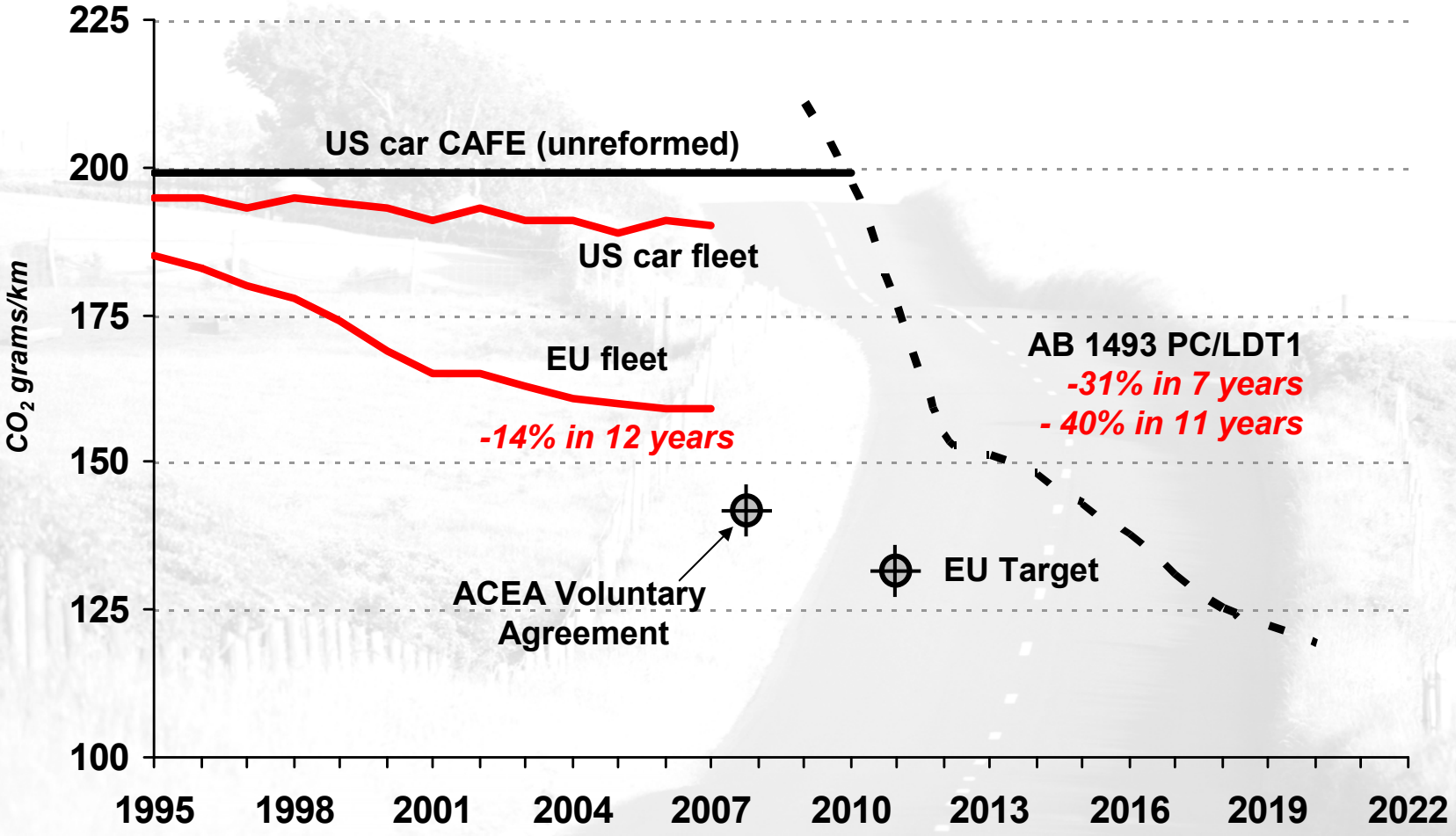
MARTEC

©Copyright 2008 The Martec Group, Inc. All Rights Reserved

AB 1493 forces the fleet average 26% below the 2007 EU fleet actual.

Light Duty Vehicles

Green House Gas Emissions Overview

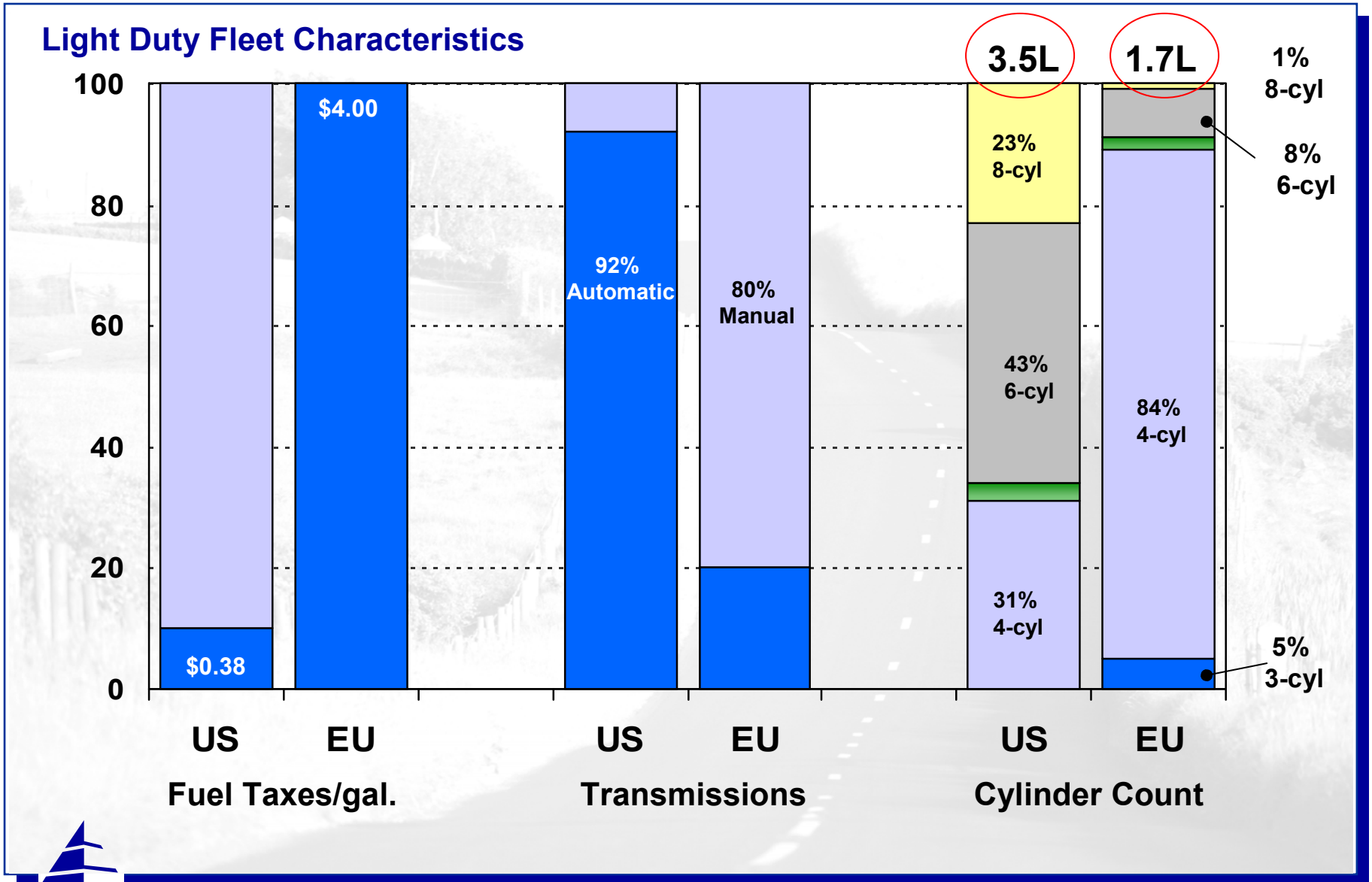


US and EU test cycles are not equivalent. ARB standard includes max MAC credit. AB 1493 LDT2 definition includes 8,500-10,000 lb. gvw MDPVs. Fuel economy conversions at 19.55 lb CO_2/gallon gasoline and 22.43 lbs/gallon diesel. US fleet excludes flex fuel credits.

MARTEC

©Copyright 2008 The Martec Group, Inc. All Rights Reserved

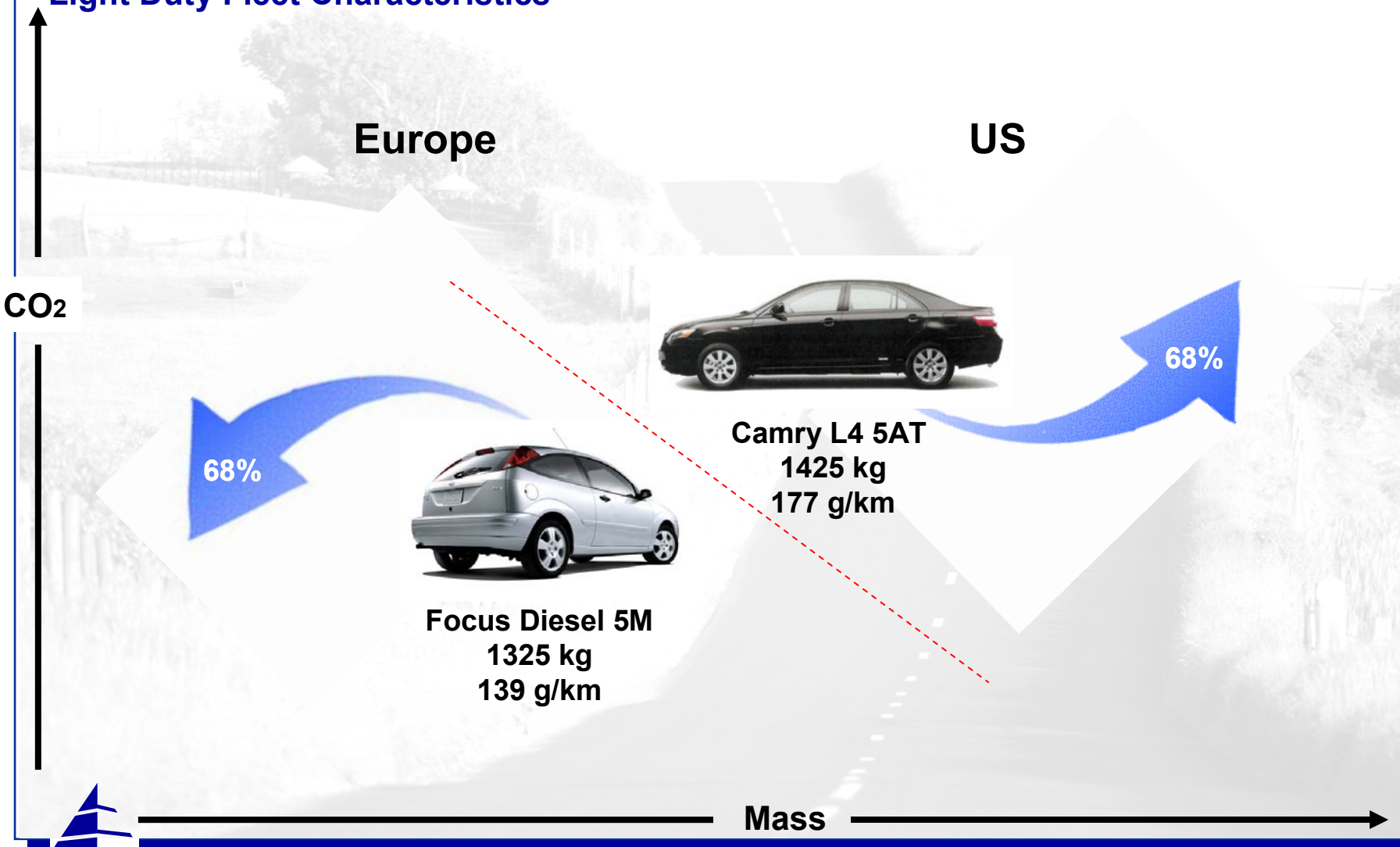
US and EU – vastly different fleet characteristics.



©Copyright 2008 The Martec Group, Inc. All Rights Reserved

The EU and PC/LDT1 fleet distribution is nearly reversed below/above ~ 1400 kg mass.

Light Duty Fleet Characteristics

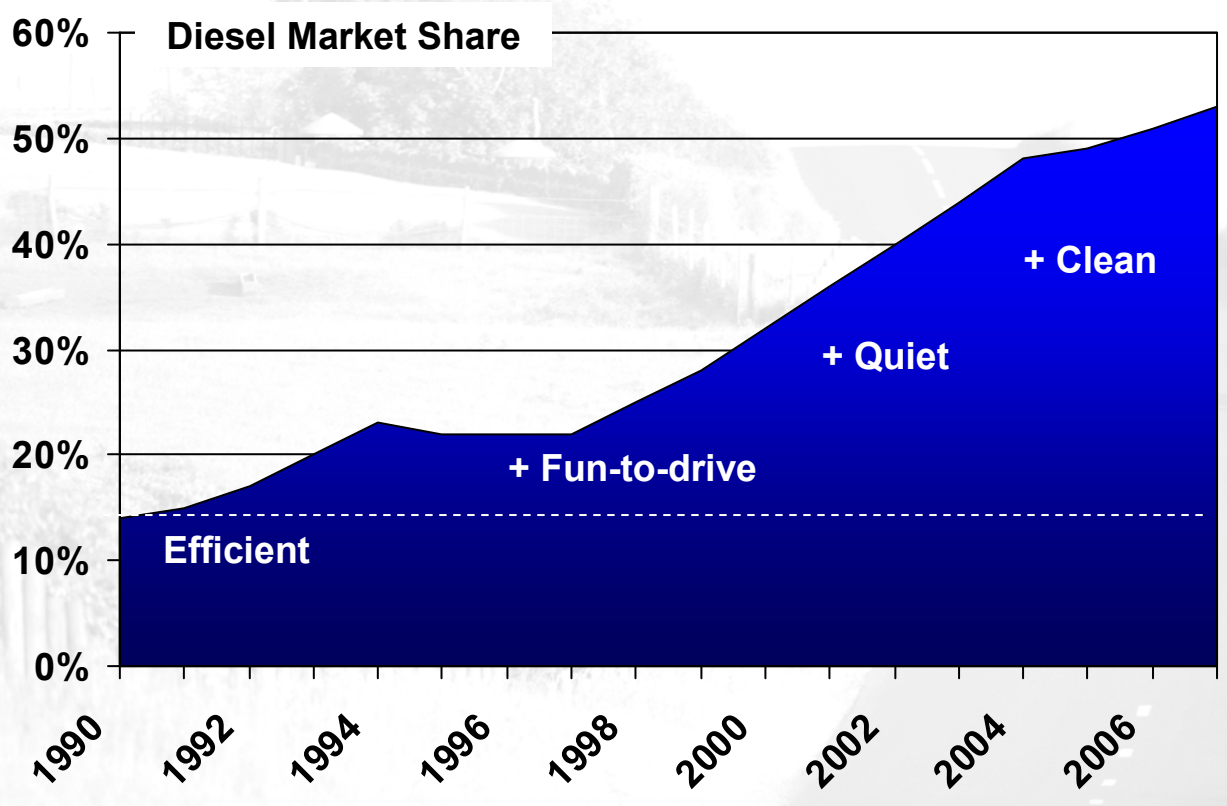


MARTEC

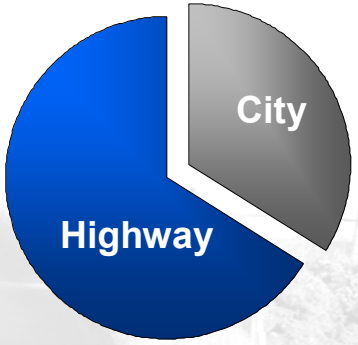
©Copyright 2008 The Martec Group, Inc. All Rights Reserved

Technology enabled an already efficient powertrain to become one that the mass market wanted to drive.

European Light Duty Diesel Market Share Development



Total Fuel Consumed



Political Cost/Benefit

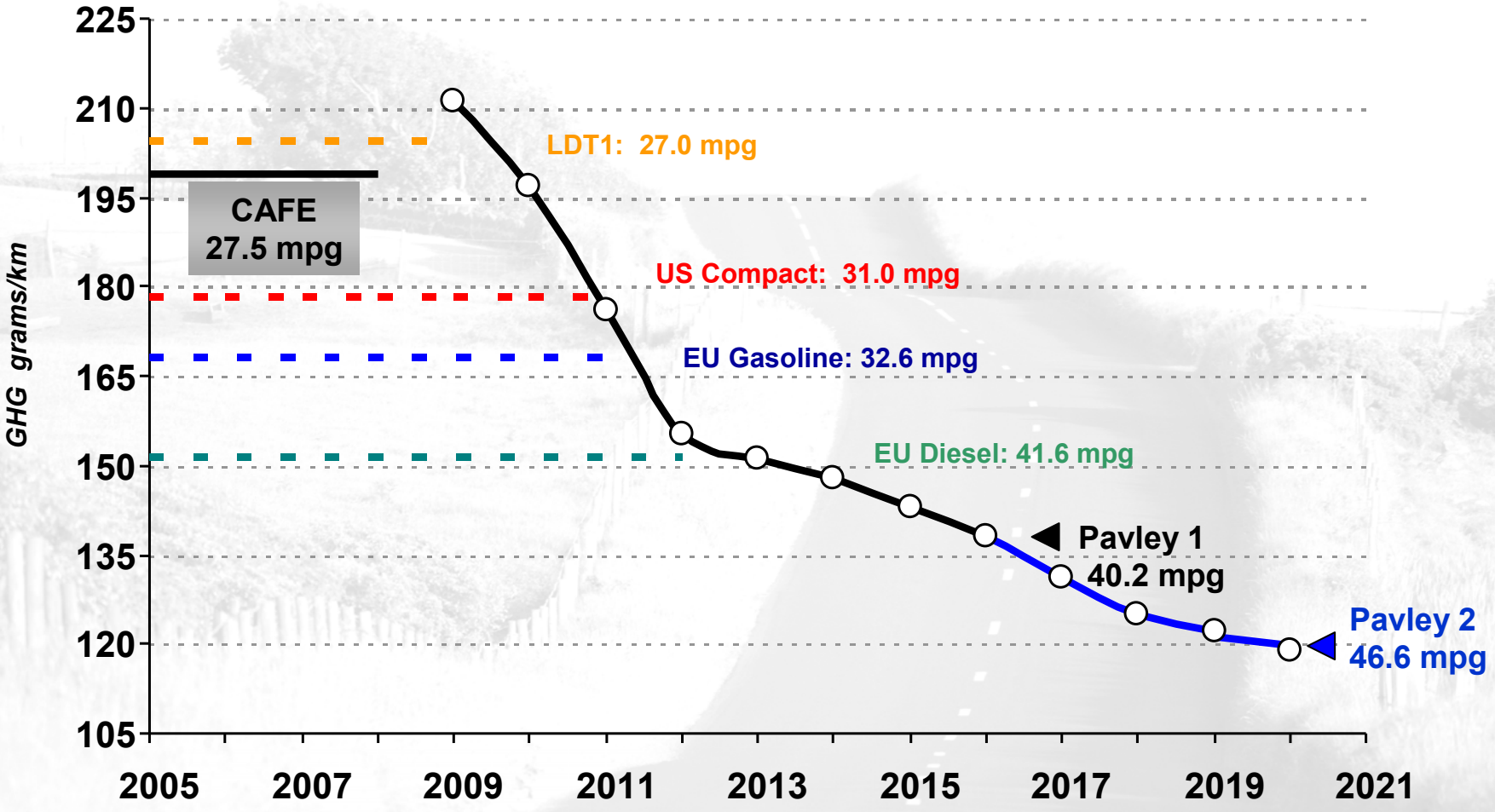
MARTEC®

©Copyright 2008 The Martec Group, Inc. All Rights Reserved

The 2007 EU *diesel* fleet would not meet the 2016 CA standard.

AB 1493 PC/LDT1

AB 1493 vs. 2007 Fleet Actual



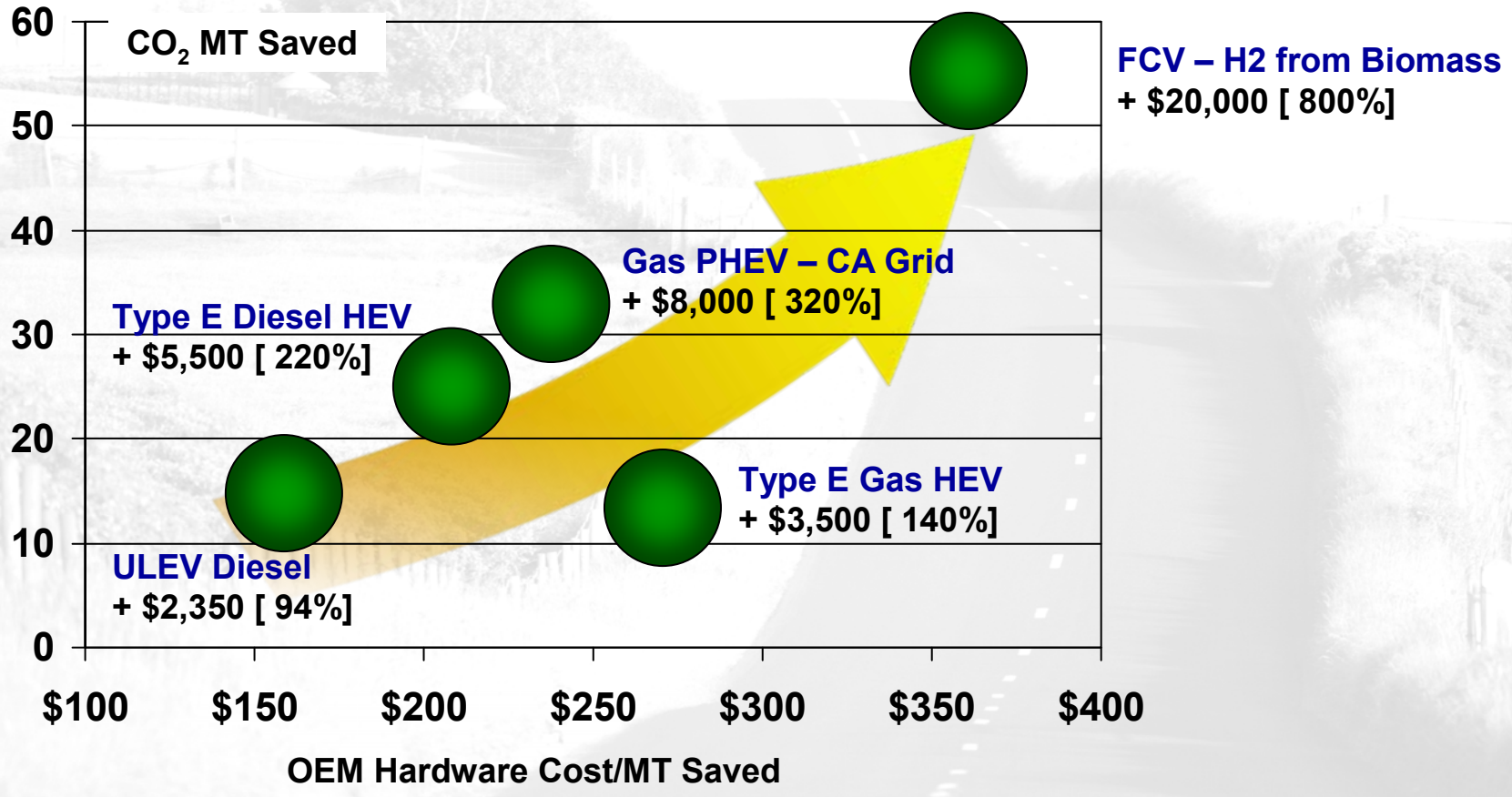
US and EU test cycles are not equivalent. ARB standard includes maximum MAC credits. Fuel economy conversions at 19.55 lbs CO_2/gallon gasoline and 22.43 lbs/gallon diesel.

MARTEC

©Copyright 2008 The Martec Group, Inc. All Rights Reserved

Globally, light duty diesels outsell hard hybrids 30 to 1.

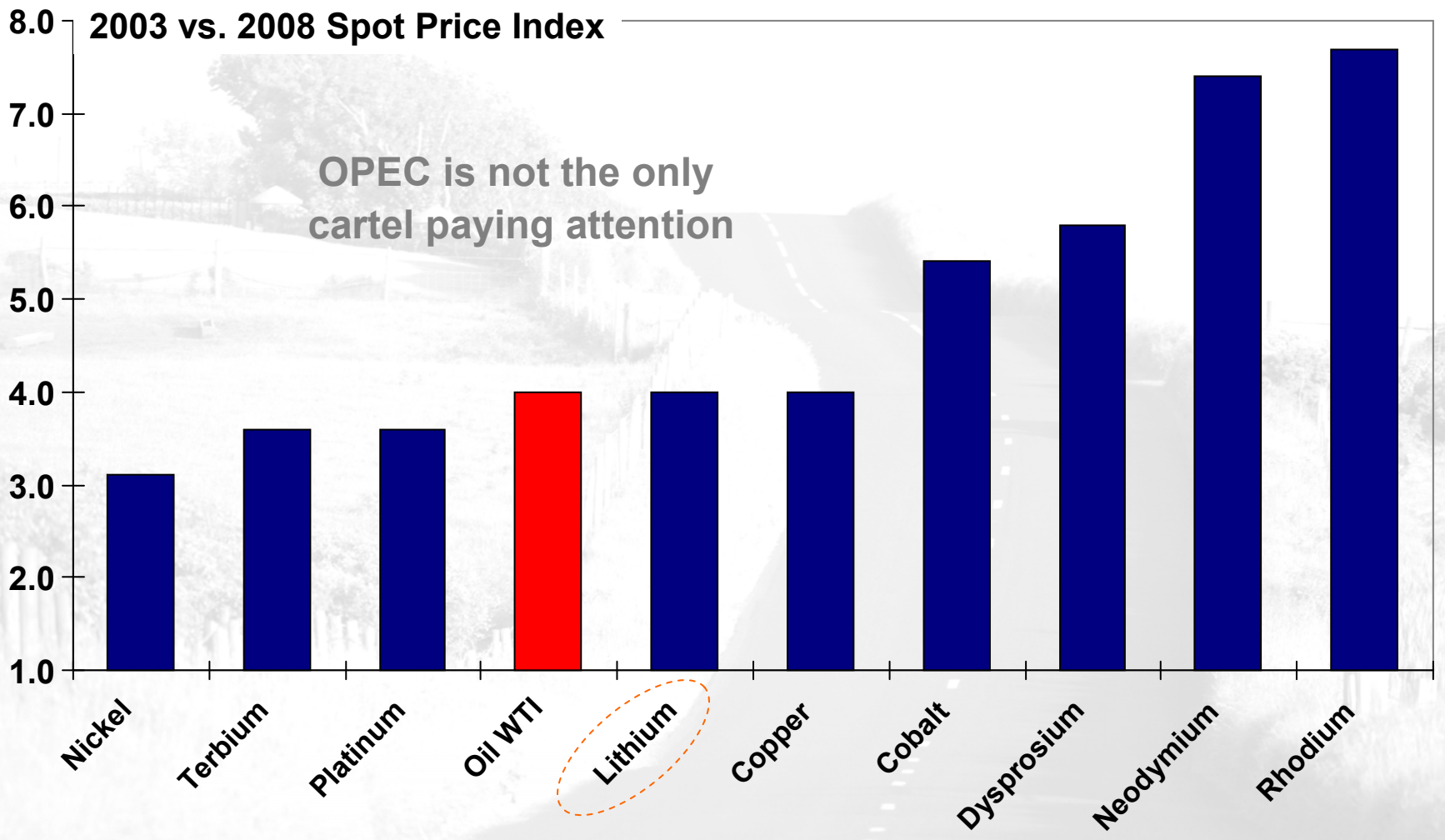
WTW Lifetime GHG Saved vs. OEM Mature Hardware Costs – Midsize Car



MARTEC®

©Copyright 2008 The Martec Group, Inc. All Rights Reserved

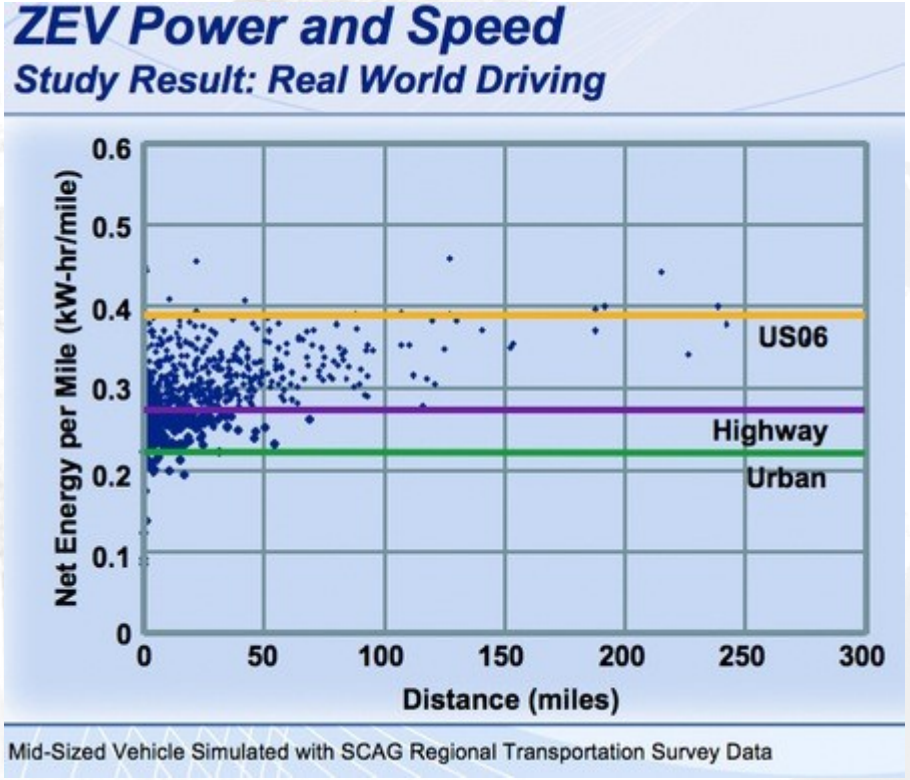
Over 1 vehicle design cycle, global prices for electrification-enabling materials rose along with oil.



MARTEC®

©Copyright 2008 The Martec Group, Inc. All Rights Reserved

Will the PHEV community prove technology developed for the Autobahn matches the way American's *really* drive?



New GM study (Savagian) based on GPS-monitored CA mid-size sedan owners.

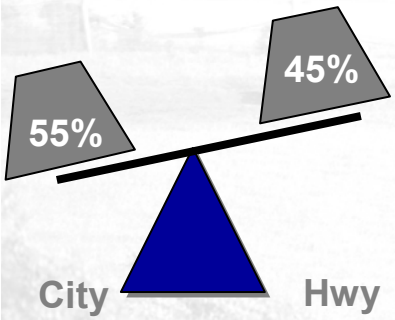
- Median CA driving intensity is between highway and US06 cycles
- Researcher's objective is to prove hybrids with larger batteries are required to match the way American's *really* drive

MARTEC®

©Copyright 2008 The Martec Group, Inc. All Rights Reserved

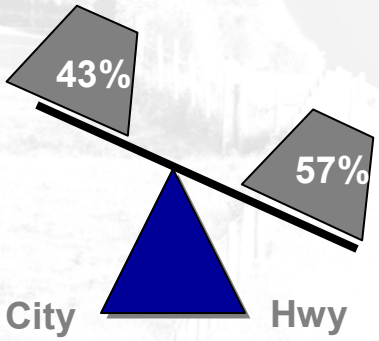
30 year-old federal test procedures are unhinged from the nation's objective of saving real barrels and real tonnes.

Societal Promise
On-Cycle



CAFE Test

109th Congress
H.R. 1103
A BILL
Fuel Efficiency Truth in Advertising Act of 2005



EPA Revised Sticker

Real World
Off-Cycle

US06

PHEV Study

2/3 Fuel Used

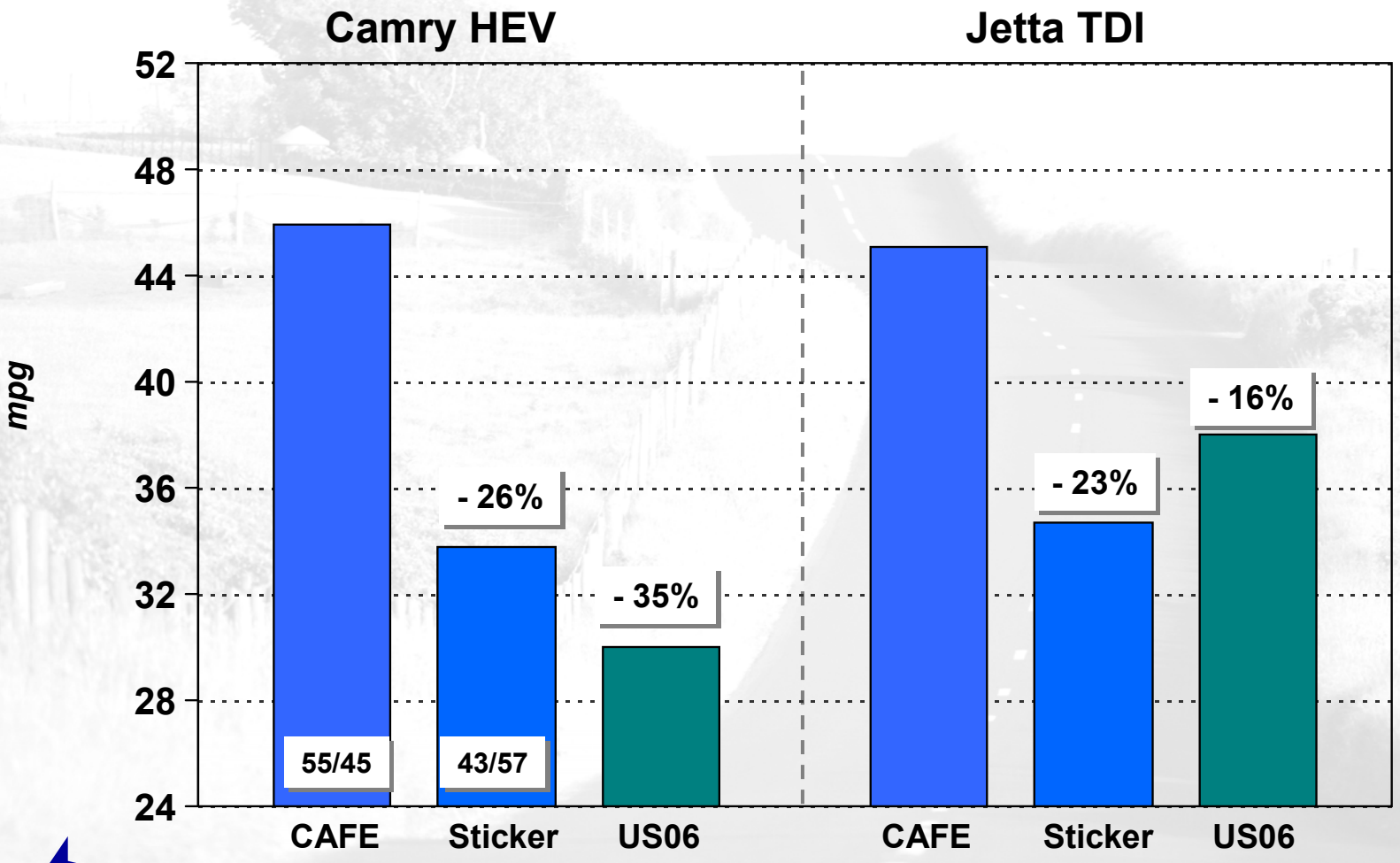
Designing vehicles to artificial test standards leads to:
- Technologies that over promise and under-deliver in real-world
- Attractive real-world technologies left on the table

MARTEC

©Copyright 2008 The Martec Group, Inc. All Rights Reserved

2 vehicles making a similar promise to society, but the off-cycle delivery is substantially different.

Real World vs. Lab World



MARTEC

©Copyright 2008 The Martec Group, Inc. All Rights Reserved

The hybrid value equation is built on stop & go driving conditions, where brake energy is captured.

Camry HEV

AT-PZEV (SULEV) certification

- 54.4 ft.^{2} footprint
- Sticker city: 33 mpg
- Sticker highway: 34 mpg
- 43/57 combined: 34 mpg

Jetta TDI

ULEV-II certification

- 49.4 ft.^{2} footprint
- Sticker city: 30 mpg
- Sticker highway: 40 mpg
- 43/57 combined: 35 mpg

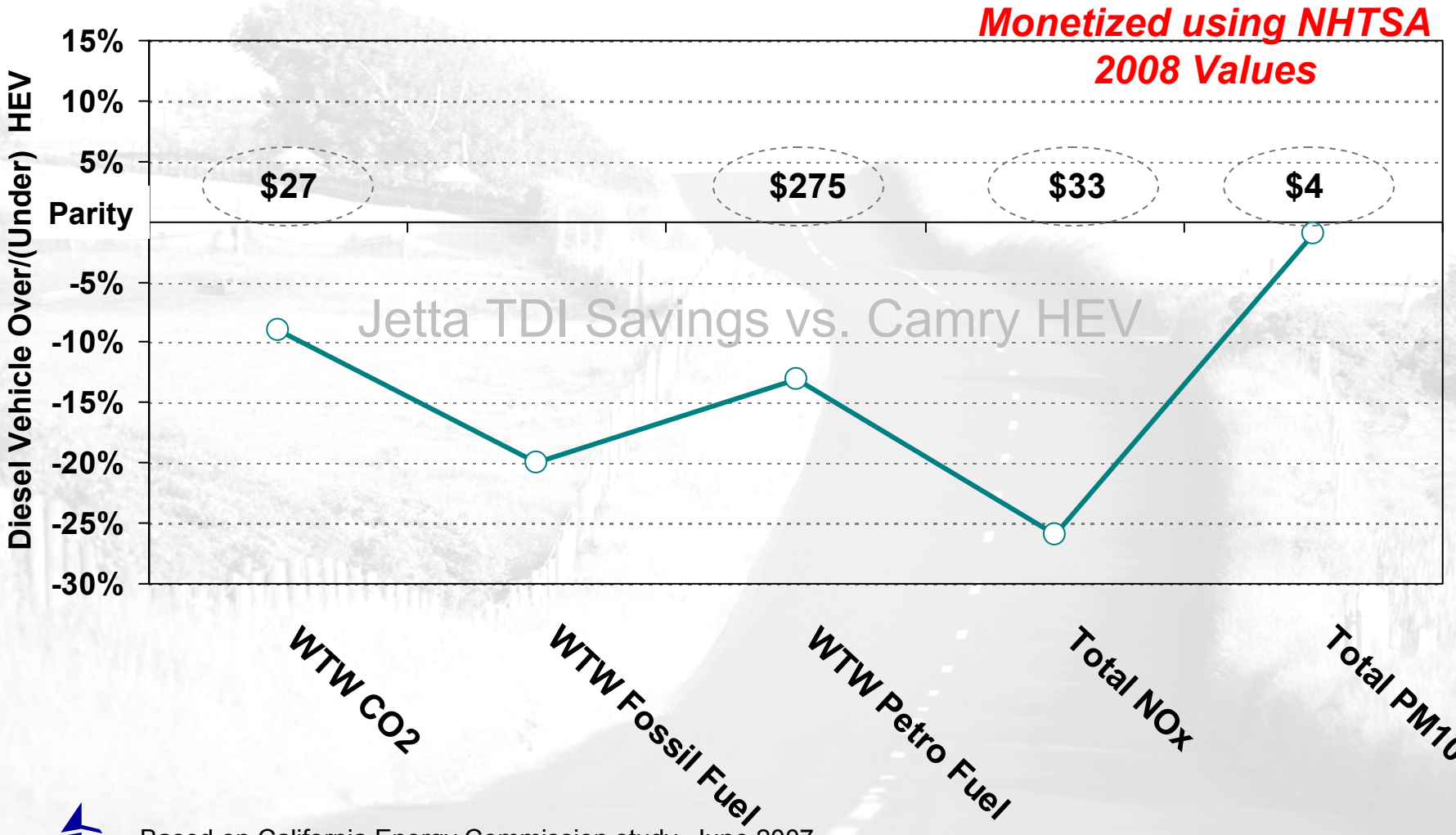
MARTEC

©Copyright 2008 The Martec Group, Inc. All Rights Reserved

Societal benefit of a diesel ULEV vs. an AT-PZEV.

Policy

CA WTW Benefits Over Life of the Vehicle (B10 and E10 Fuel)



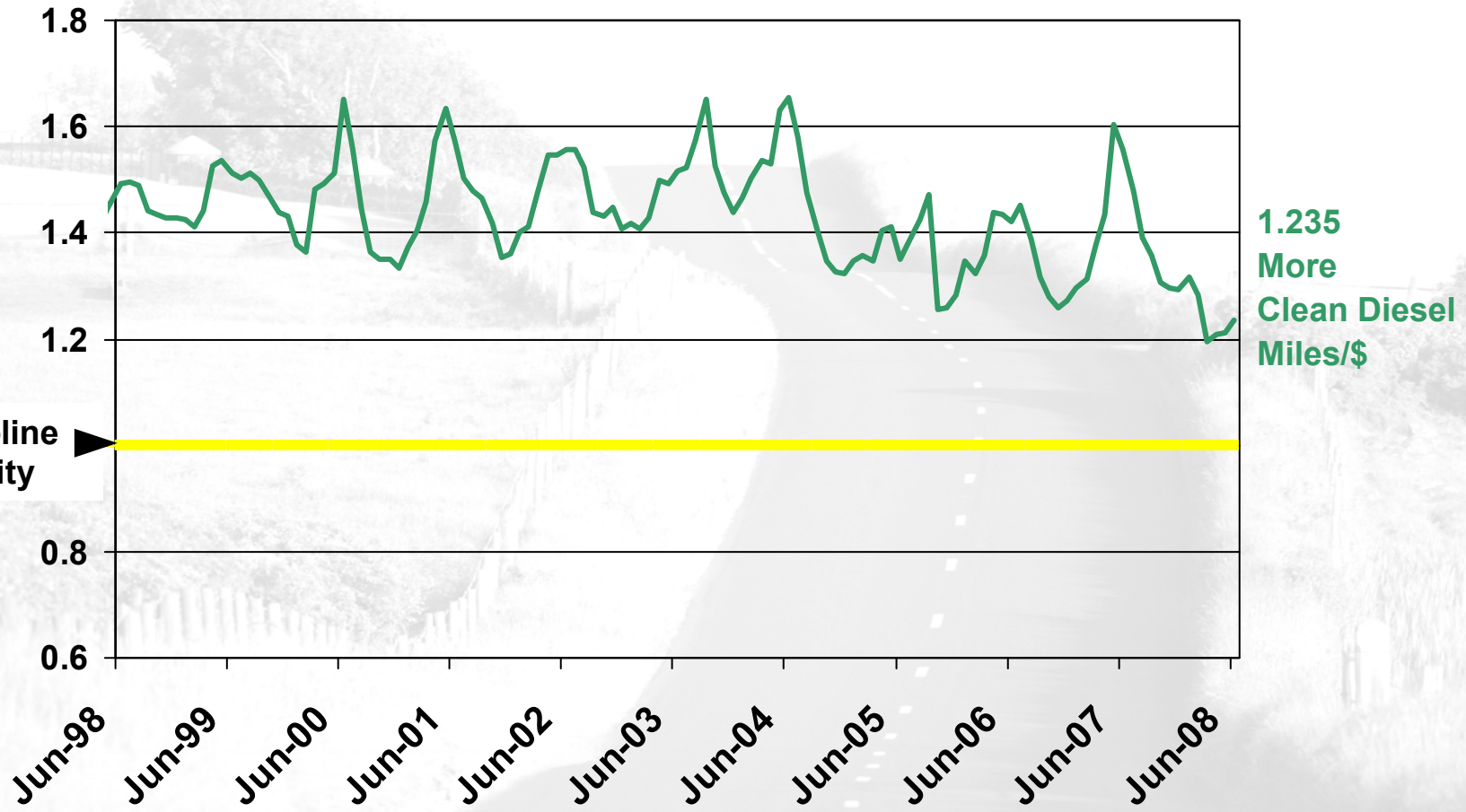
Based on California Energy Commission study, June 2007.

MARTEC

©Copyright 2008 The Martec Group, Inc. All Rights Reserved

Clean Diesel Miles per Dollar Index©

Miles per Dollar in a Clean Diesel Vehicle as an Index to Gasoline



MARTEC®

©Copyright 2008 The Martec Group, Inc. All Rights Reserved

Both consumers and the nation win with clean diesel.

Summary

1. **To expand American prosperity, policies must achieve the greatest good at the lowest societal cost.**

2. **To maximize petroleum and GHG savings from the light duty fleet, focus technology where the most fuel is consumed.**
   - High speed/high load drivers
   - Who accumulate the most miles per year

3. **Measuring fleet fuel consumption and GHG emissions with antiquated test procedures will not align with:**
   - A society that consumes 2/3rd of all fuel in non-urban use
   - Policy makers who will be accountable in barrels and tonnes
   - Manufacturers who must survive in this “wedge”

4. **To give consumers – and society – the best value for money, focus on fuel efficiency solutions that deliver:**
   - Best drivability
   - Lowest variable cost increase
   - Highest demonstrated residual value performance

❖ ❖ ❖

martecgroup.com

©Copyright 2008 The Martec Group, Inc. All Rights Reserved