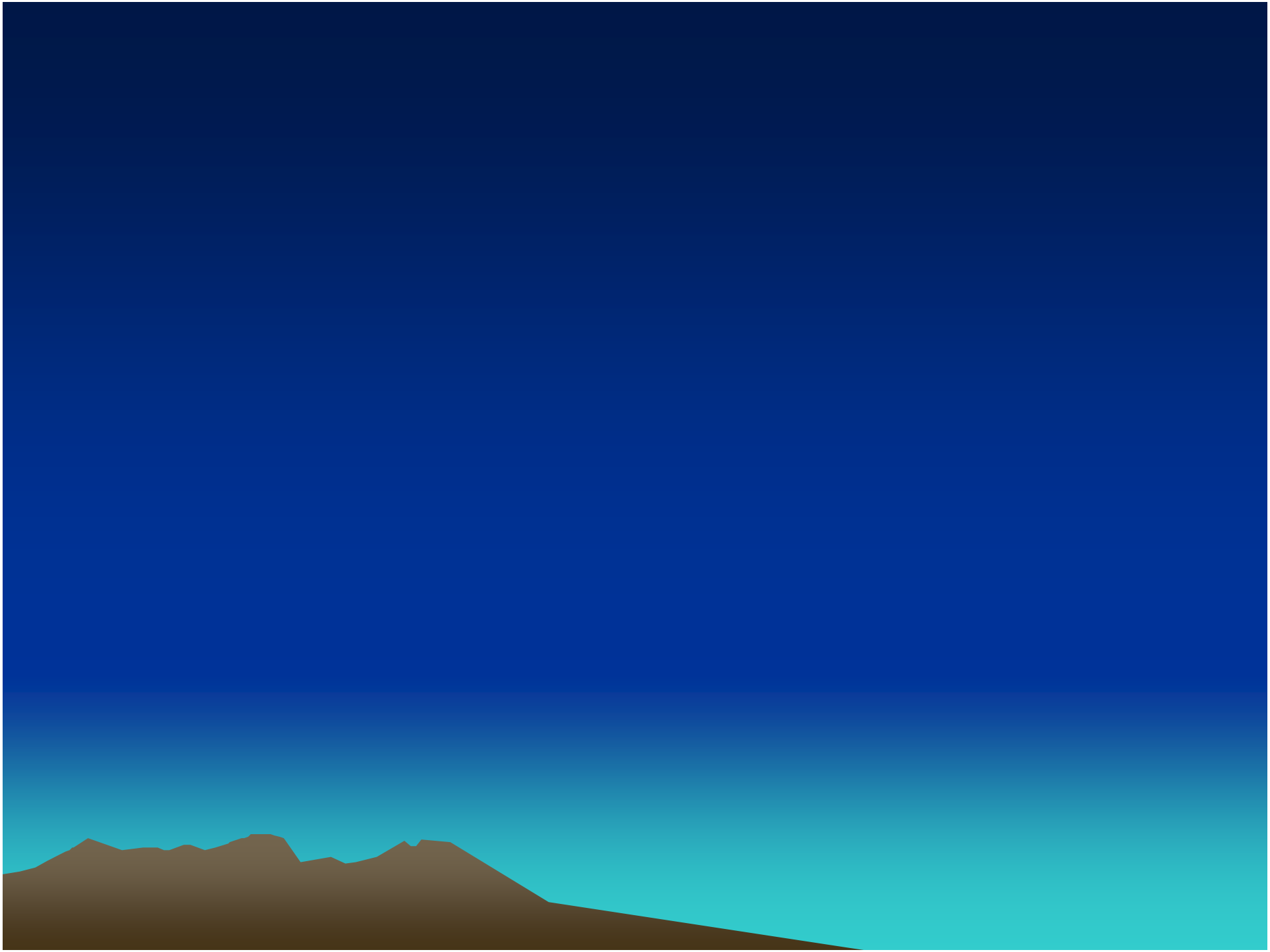
A View From The Bridge

12th Diesel Engine Efficiency
And Emissions Research Conference
Detroit, MI
August 21, 2006
Michael P. Walsh

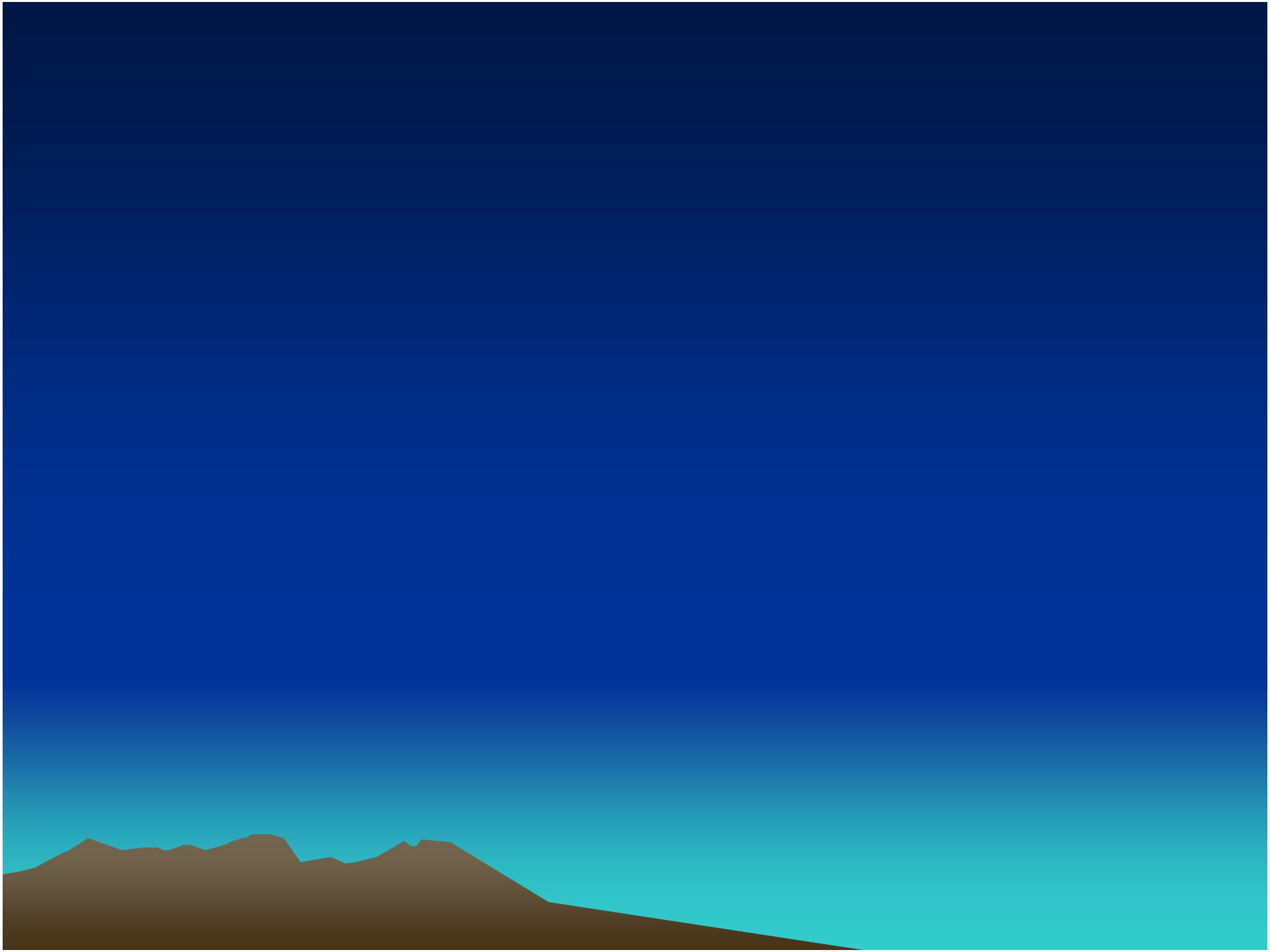
One Result: Serious Health Concerns

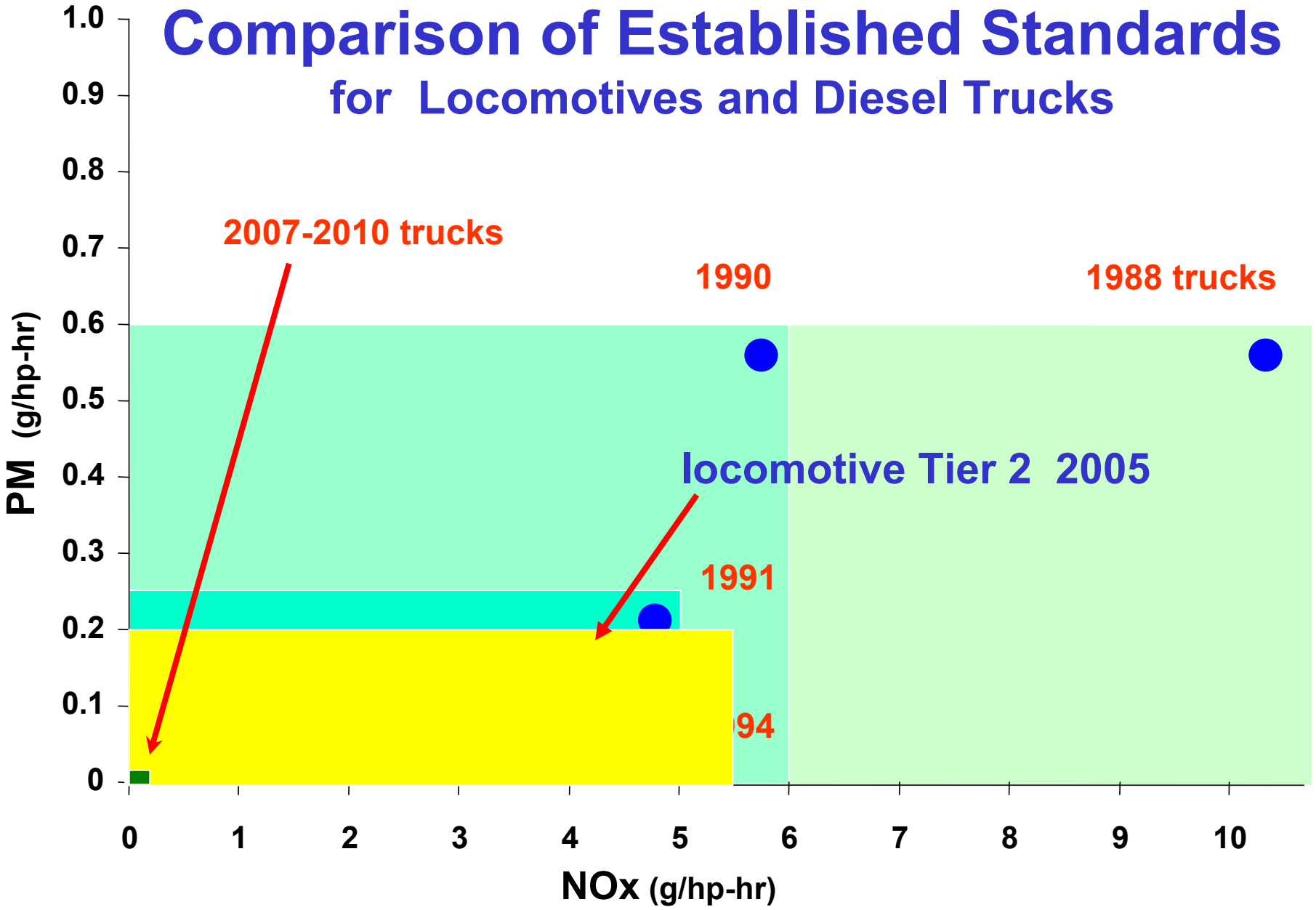
- **WHO Concludes ~ 800,000 Premature Deaths Each Year From Urban PM; Most in Asia**
- **Numerous Studies in Europe & US Consistently Link PM With Premature Deaths, Hospital Admissions, Asthma Attacks, Etc.**
- **No Evidence of a Threshold**
- **PAPA Project Indicates Similar Effects in Asia**
- **Ozone, NO_2, Various Toxics Also Serious Health Concerns**



Innovative Aspects of US Program

- Close Collaboration Between CARB and US EPA
- Not To Exceed Provision
- Mandatory Manufacturer In Use Testing
- Heavy Duty Diesel OBD




Comparison of Established Standards
for Locomotives and Diesel Trucks
2007-2010 trucks
1990
1988 trucks
locomotive Tier 2 2005
1991
94
PM (g/hp-hr)
NOx (g/hp-hr)
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
1
2
3
4
5
6
7
8
9
10

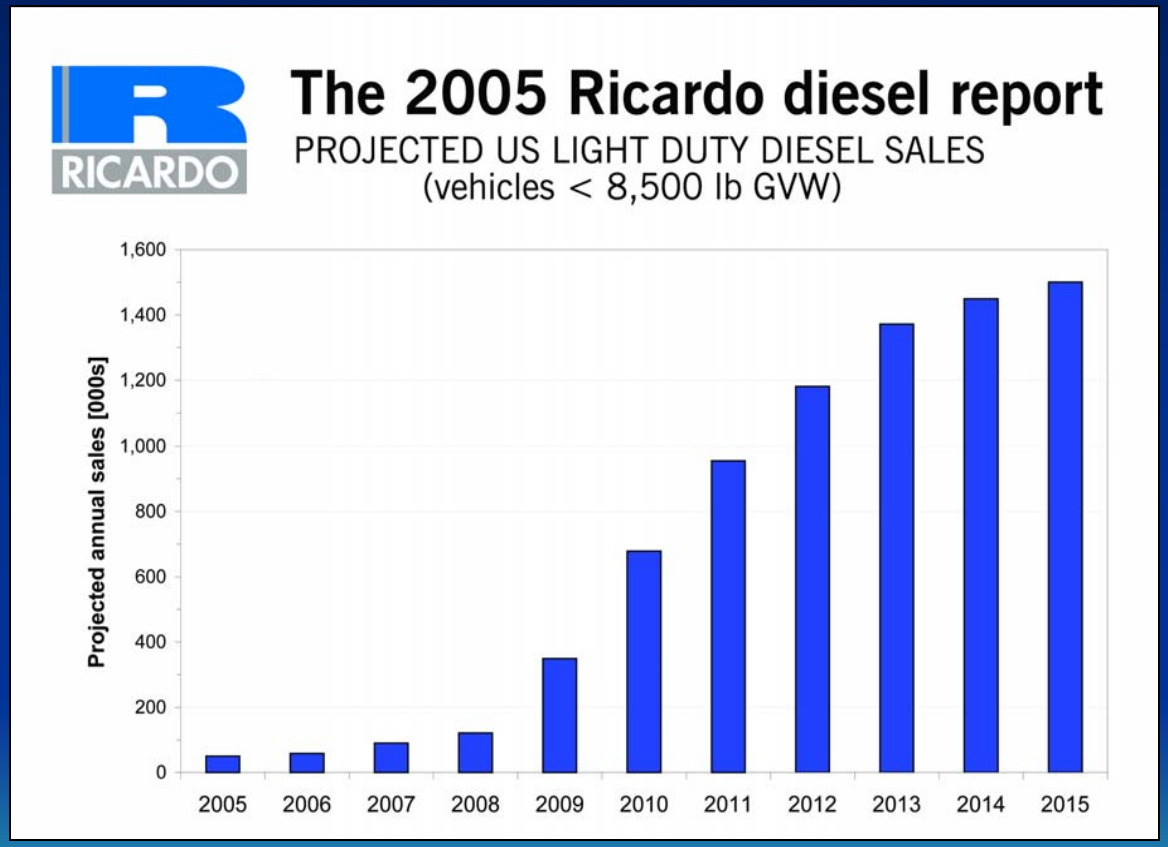
Industry Announcements Show That Industry Can & Will Meet US Requirements

- DaimlerChrysler, VW, and BMW have all announced planned introductions of passenger diesel vehicles in the U.S. market in the 2008/9 timeframe.
- Honda will enter the U.S. passenger diesel market in 2009 using NOx adsorber aftertreatment technology.

Future Size of U.S. LDD Market?

- Ricardo predicts US light duty diesel market to grow from 43,000 units in 2004 to 1.5 million in 2015.

- Similarly, J.D. Power and Associates predicts 4X growth in the U.S. diesel car market by 2015.

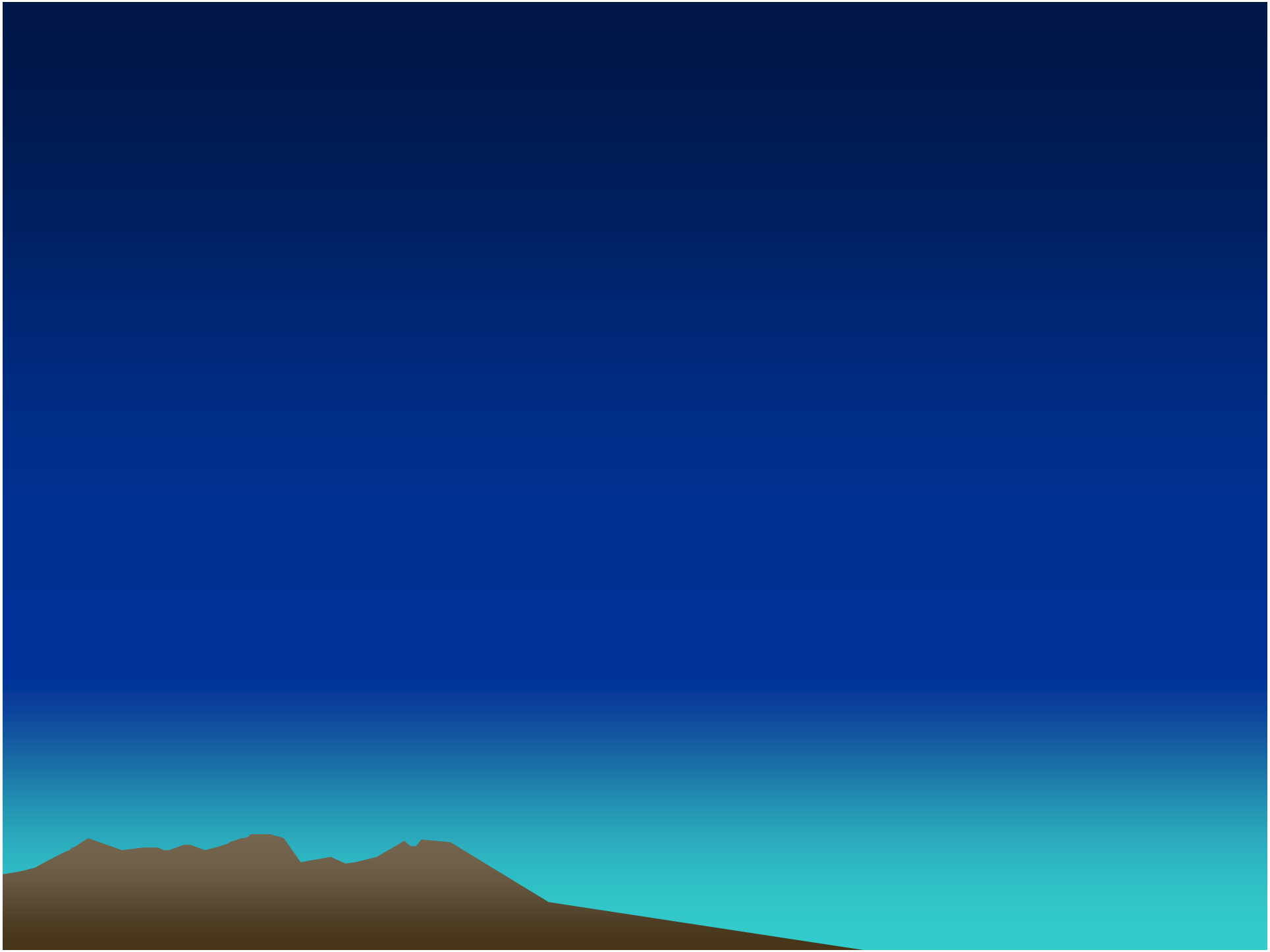


Important Implications of the US Diesel Control Program

- Massive Public Health and Environmental Benefits
- Technology Leadership Which Could (Should?) Spread To The Rest of the World
- Potential Fuel Savings and CO_2 Reductions in the US

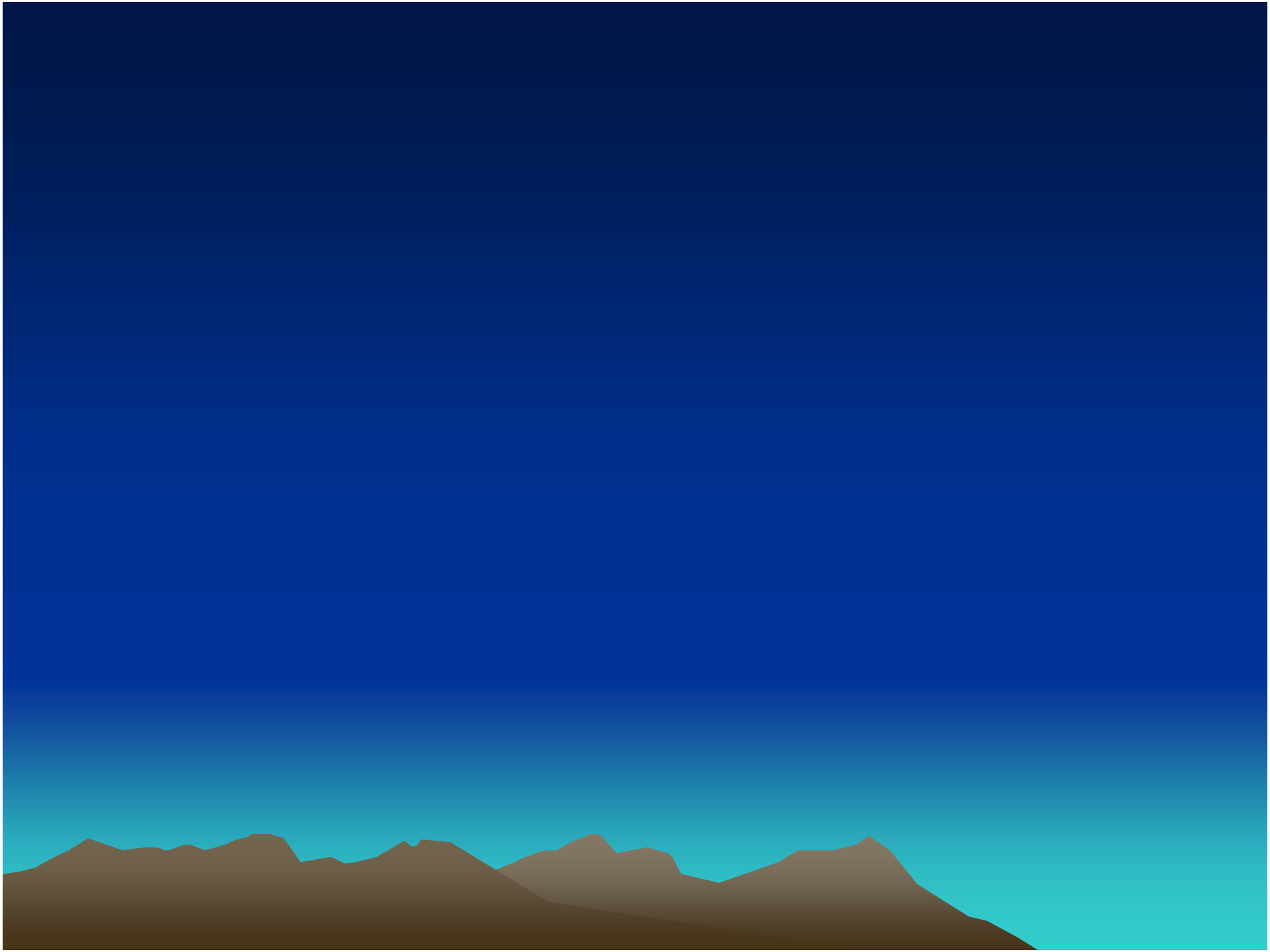
The Potential Fuel Saving and CO2 Benefits Of Higher Diesel Penetration in the US Will Be Squandered If It Only Leads To More Sales of Bigger, Higher Performing Cars and SUVs

Government and Industry Leadership Are Needed!

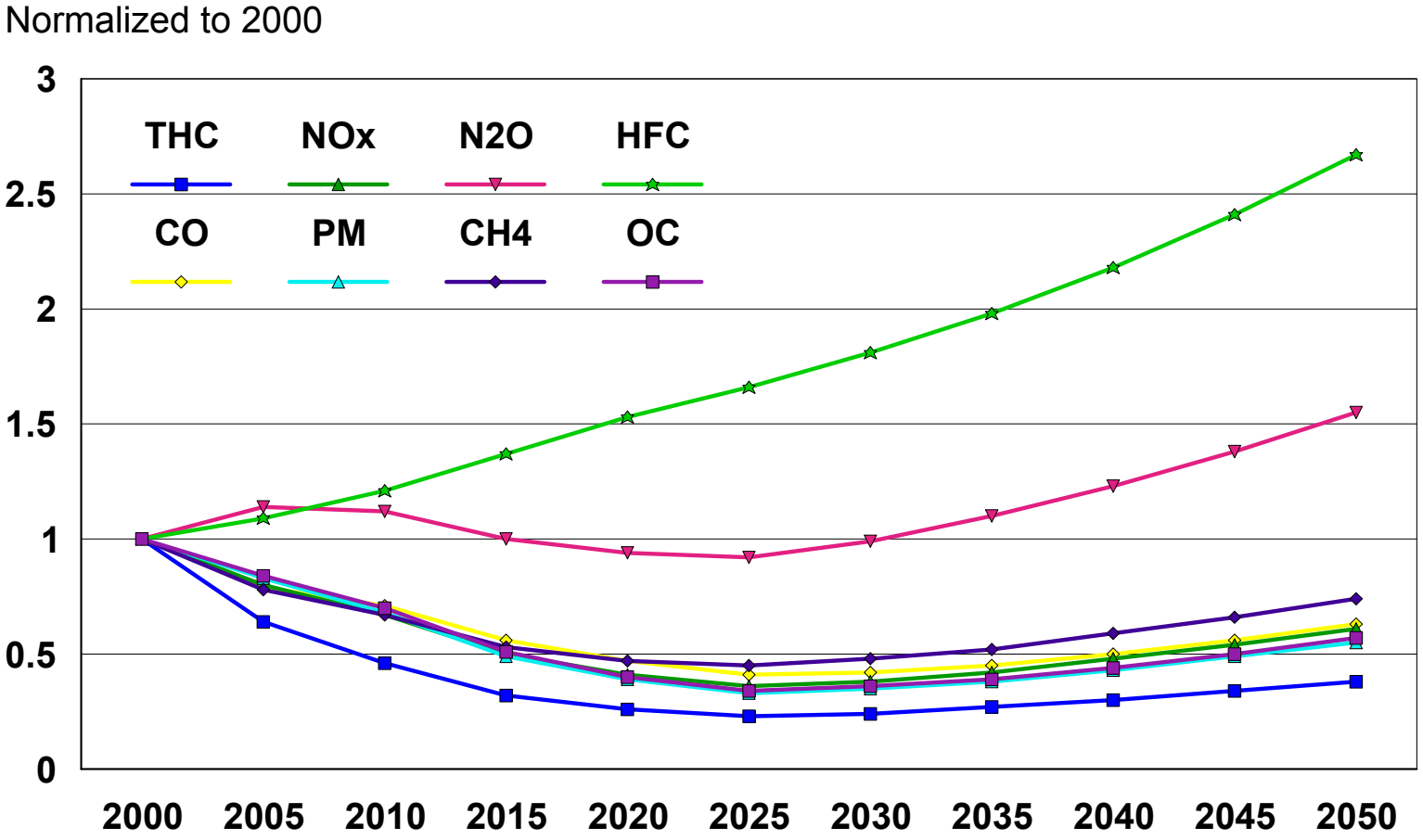


Light Duty Is Not As Promising

ght Duty Gasoline and Diesel Vehicle Standards

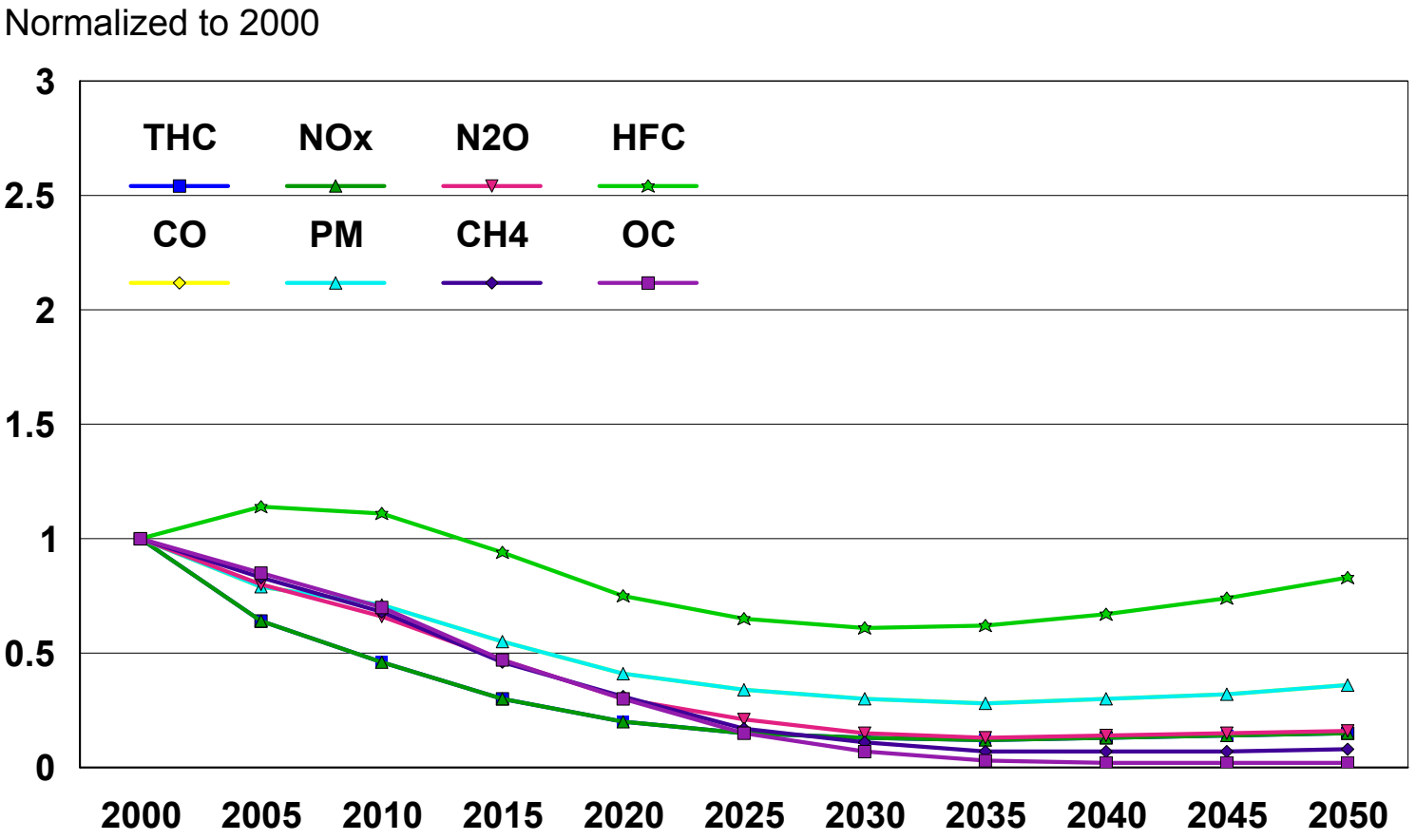


Vehicle Emissions Trends
(Business As Usual Scenario)



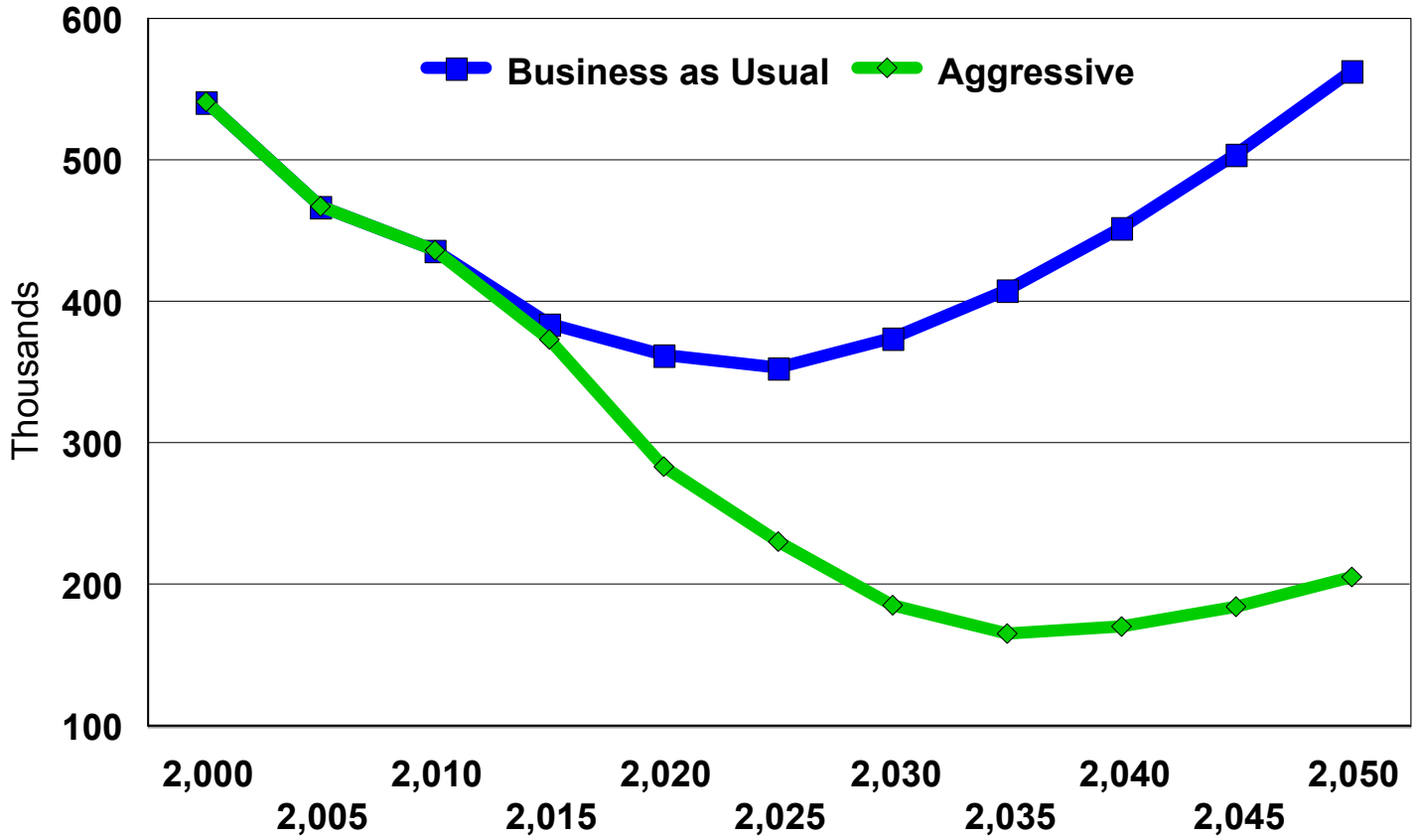
While Europe (& Japan) Lead on CO2, The EU's Very Weak Diesel Limits Hurt Globally

Vehicle Emissions Trends
(Aggressive Scenario)



Tougher Standards in The EU & More Rapid Adoption By Other Countries (i.e., China, India) Could Greatly Improve Trends

CO_2 Equivalent Non-CO_2 Greenhouse Gases From Road Vehicles



Conclusions

- The US Diesel Control Program Leads the World and Diesel Manufacturers Have Risen To The Challenge
- Marine & Locomotive & Existing Stock Remain To Be Successfully Cleaned
- The World is Harmonizing On Stringent HDD Requirements and ICCT Is Pushing This Agenda
- The EU's Weak Diesel Emissions Proposal Hurts Not Only Local Air Quality But Global Efforts To Reduce Non CO_2 Greenhouse Gases