



U.S. Department of Energy  
Energy Efficiency and Renewable Energy

*freedomcar & vehicle technologies program*

# DEER CHAIR'S OVERVIEW

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Office of FreedomCAR and Vehicle Technologies

US Department of Energy

Washington, D.C.

Diesel Engine Emission Reduction Conference

Newport, Rhode Island

August 24, 2003



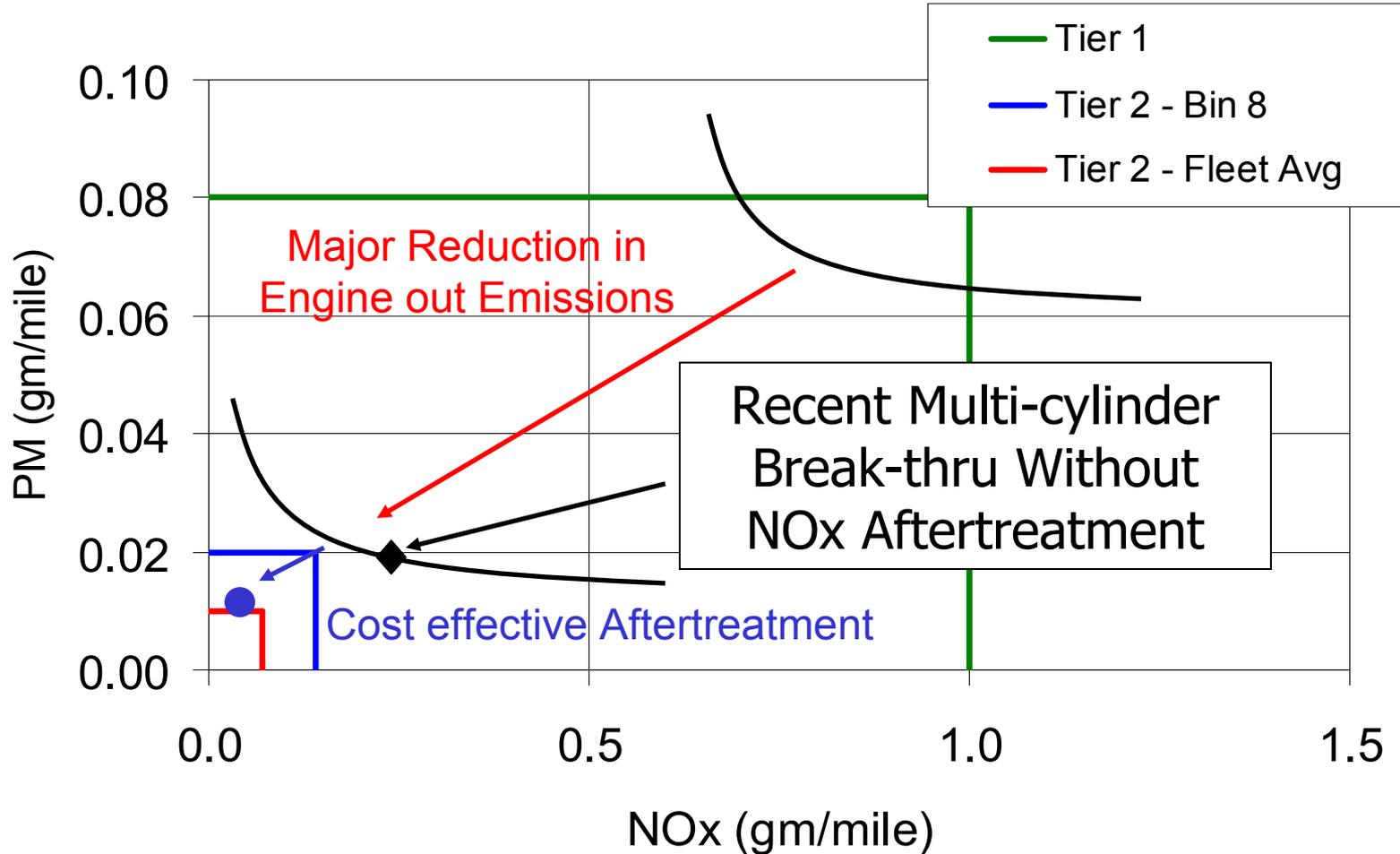


- Try to Cover Issues - Technology and Regulations which affects Diesel
- Invite Representatives from the Environmental Community
  - Organize their own session
    - Michael Block – NESCAUM
- Diesel Emissions
  - Fuels and Lubes
  - Combustion
    - HCCI-rapidly moving lab → commercial
  - Aftertreatment
    - Major advances



# Caterpillar Approach to Tier 2

## Light Truck Standards



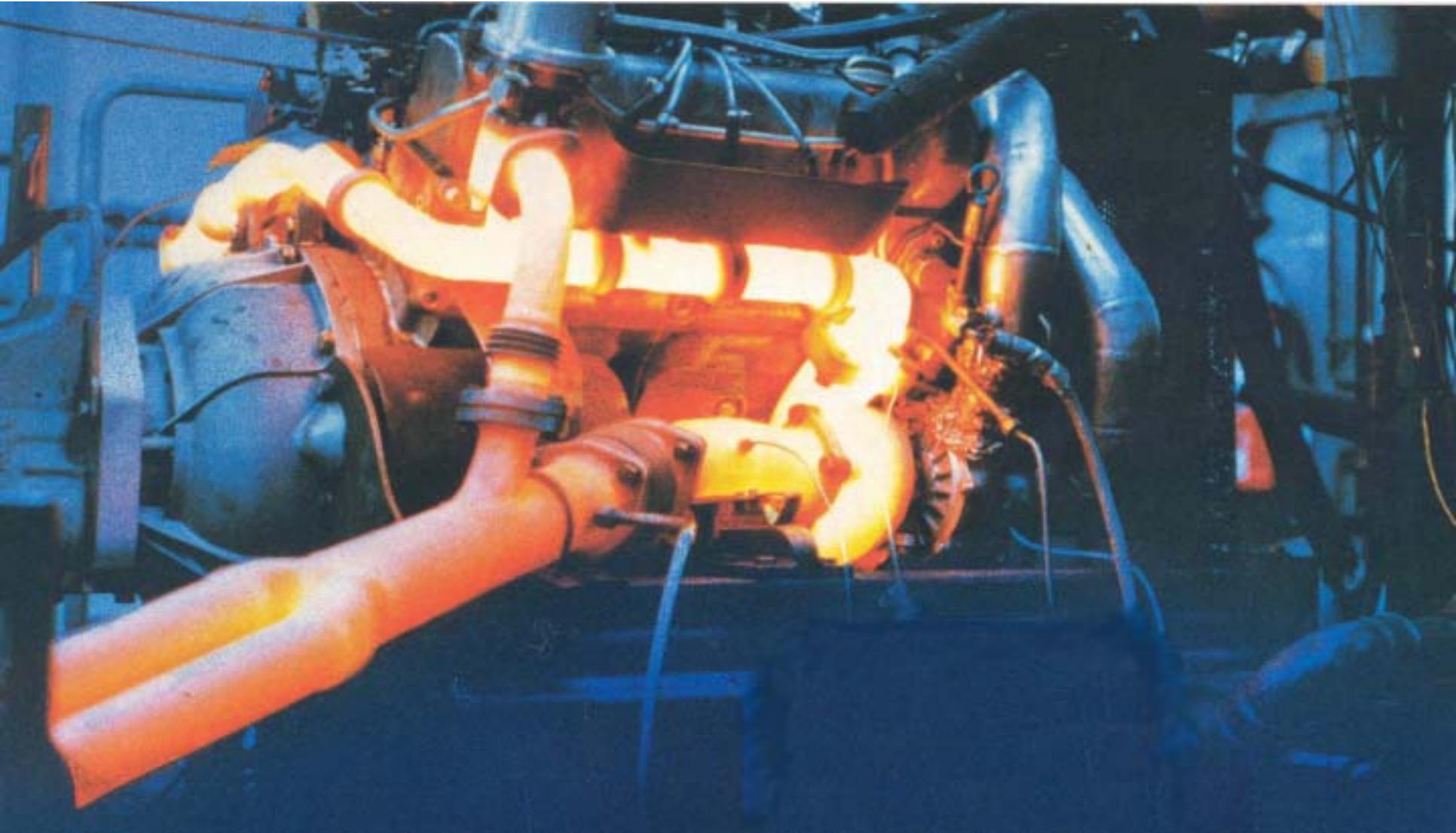


- Waste heat utilization
  - Thermoelectrics
  - Electric Turbocompound
- Ride and Drive
  - Presentations by key directors of diesel engine development
  - 20 diesel passenger cars & light trucks
    - Some US market shortly



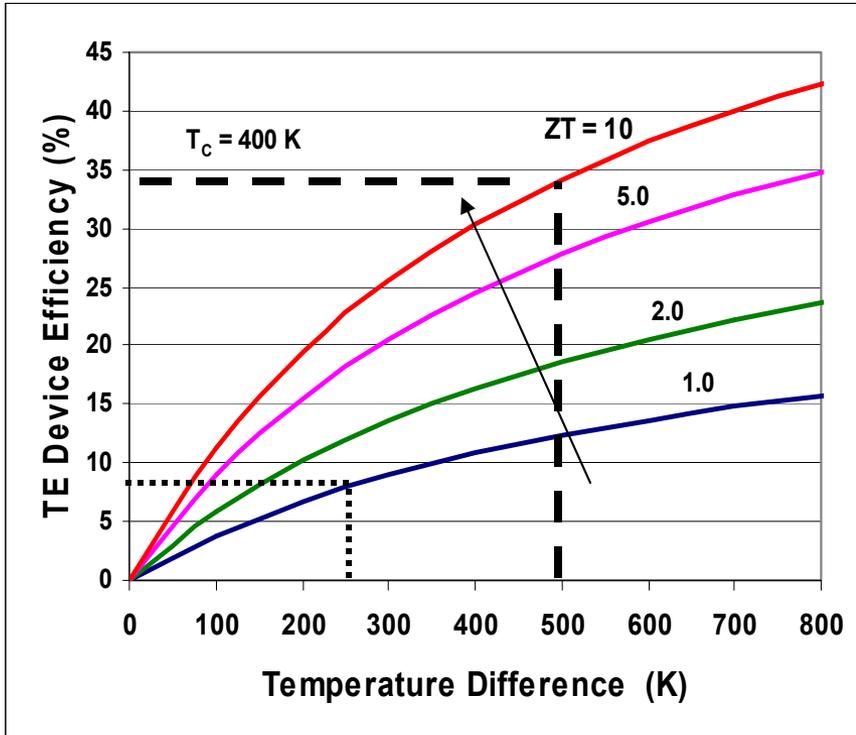
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# Waste Heat Energy





# Thermoelectric (TE) Energy Conversion



For a given  $\Delta T$ , higher the ZT, higher the heat-to-electric conversion efficiency

If ZT of 10 can be achieved, a theoretical conversion efficiency of ~35% is possible for  $\Delta T$  of ~500C



- Health Effects and Air Quality
  - Diesel vs. CNG buses
    - US and European tests
  - Diesel and Gasoline PM
    - Toxicity
- Suggestions for Environmentalists
  - PM trap retrofit and OEM
  - Oxidation Catalyst for CNG
  - Diesel Chips
    - Defeat emissions



# Particulate (PM) Traps in European Diesel Cars

- Following Cars will have PM Traps by 12/03

<u>Manufacturer</u>	<u>Models</u>
Audi	A4,A6,A8
BMW	5 Series
Ford	Focus
Mercedes	Class C,E
Opel	Astra, Vectra
Toyota	Avensis
VW	Passat, Golf
Renault	Laguna, Vel Satis

These models will be presented at the Frankfurt Auto Show Sept. '03

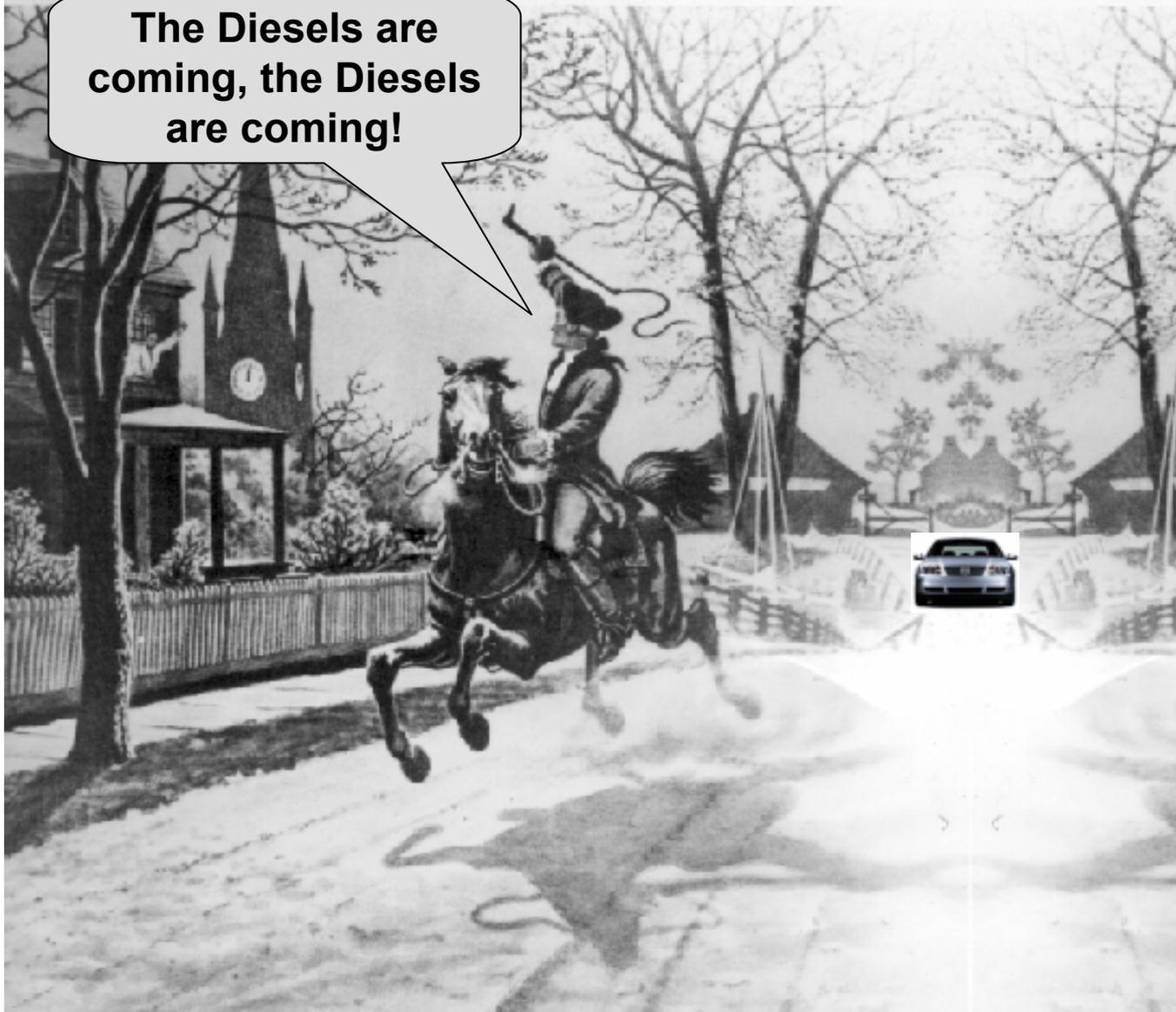


# Sports Car vs. Truck





# Paul Revere Rides Again!



**The Diesels are  
coming, the Diesels  
are coming!**

