

# Integration of Energy and Emissions Issues for Mobile Sources

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# California has focused on energy & environmental issues since 1970's

- Sustained effort and progress on reducing mobile source emissions
  - Alternative fuel technologies
  - LEV regulations
  - U.S. EPA and CA heavy-duty on-load 2007/2010 standards
  - ZEV goals and regulations

# California has focused on energy & environmental issues since 1970's

- Piecemeal regulations and efforts to improve vehicle efficiencies
  - CAFE
  - Energy Policy Act (1992)
  - Alternative fuel programs

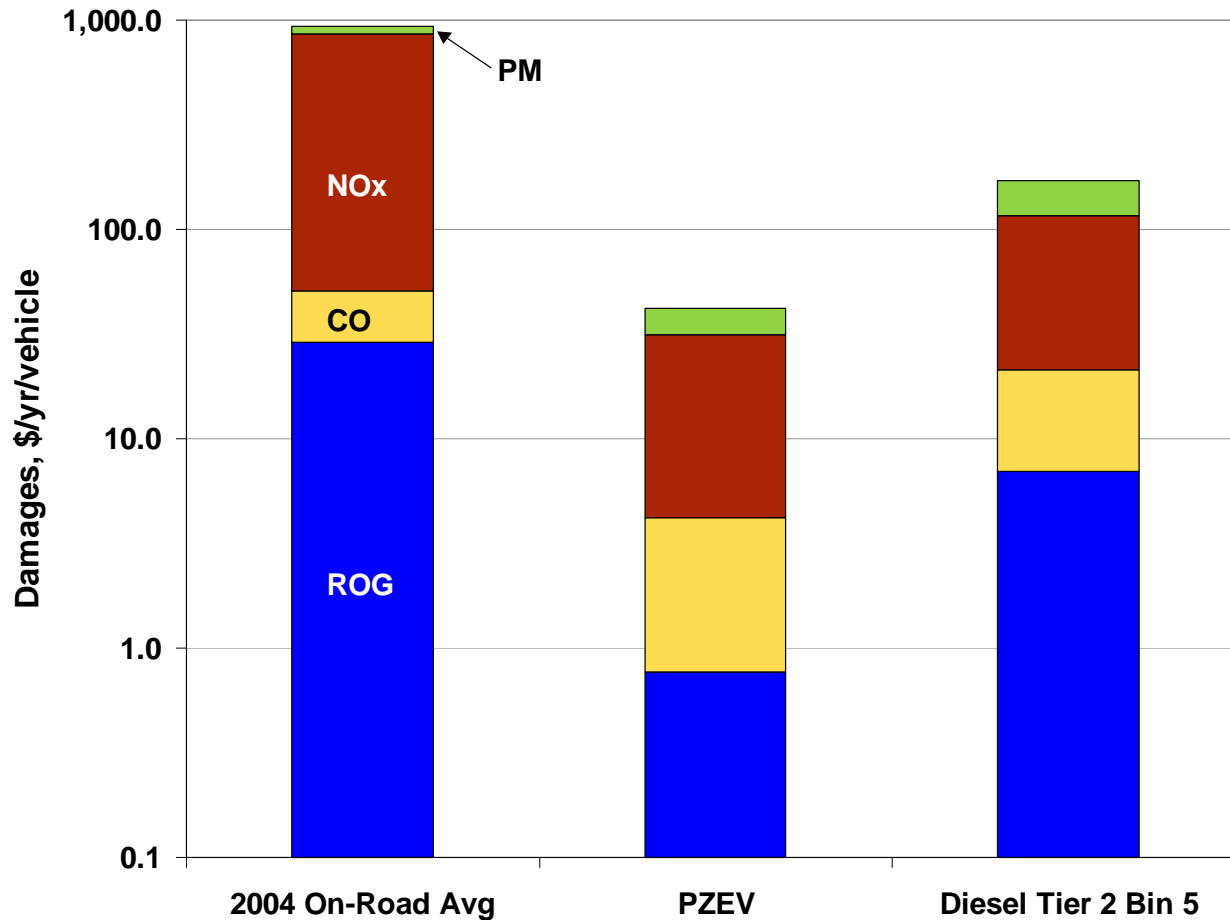
# Clear public consensus that vehicle emissions result in pollutants that affect individual health

- Hydrocarbons + NO<sub>x</sub> + sunlight produce ozone
- Direct particulate emissions from gasoline and diesel engines and indirect particulate emissions resulting from NO<sub>x</sub> + NH<sub>3</sub> emissions interactions in atmosphere
- Other criteria (CO, NO<sub>2</sub>) and toxic (e.g., benzene) emissions

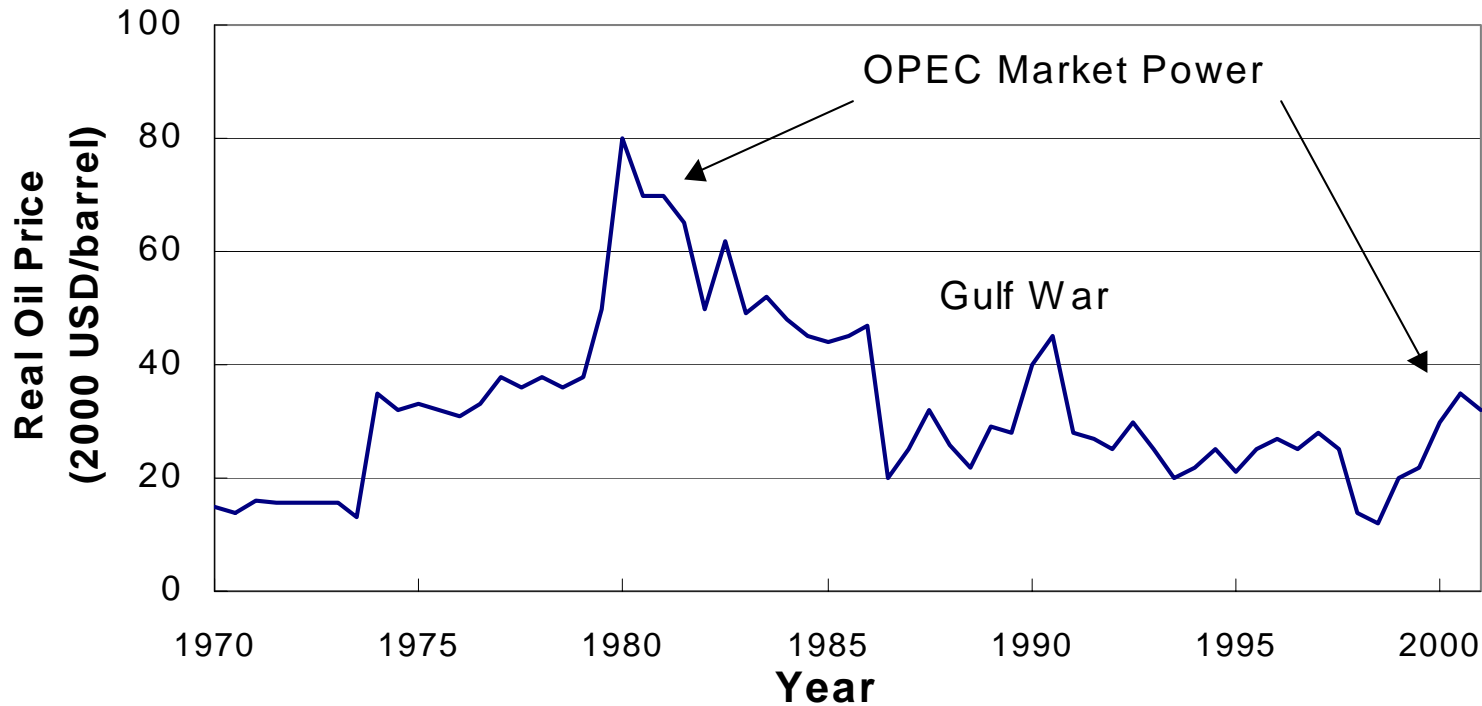
# Smog and smoking vehicles two examples of easily recognized pollution



# Comparison of health based damages for light-duty vehicle technologies

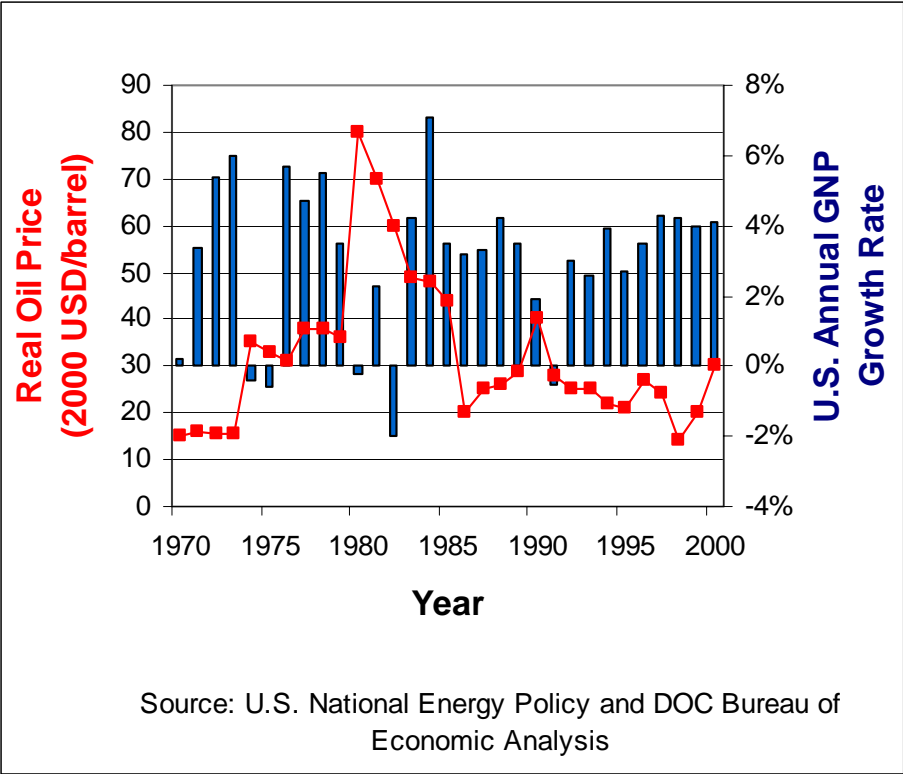


# No clear public consensus on energy issues....



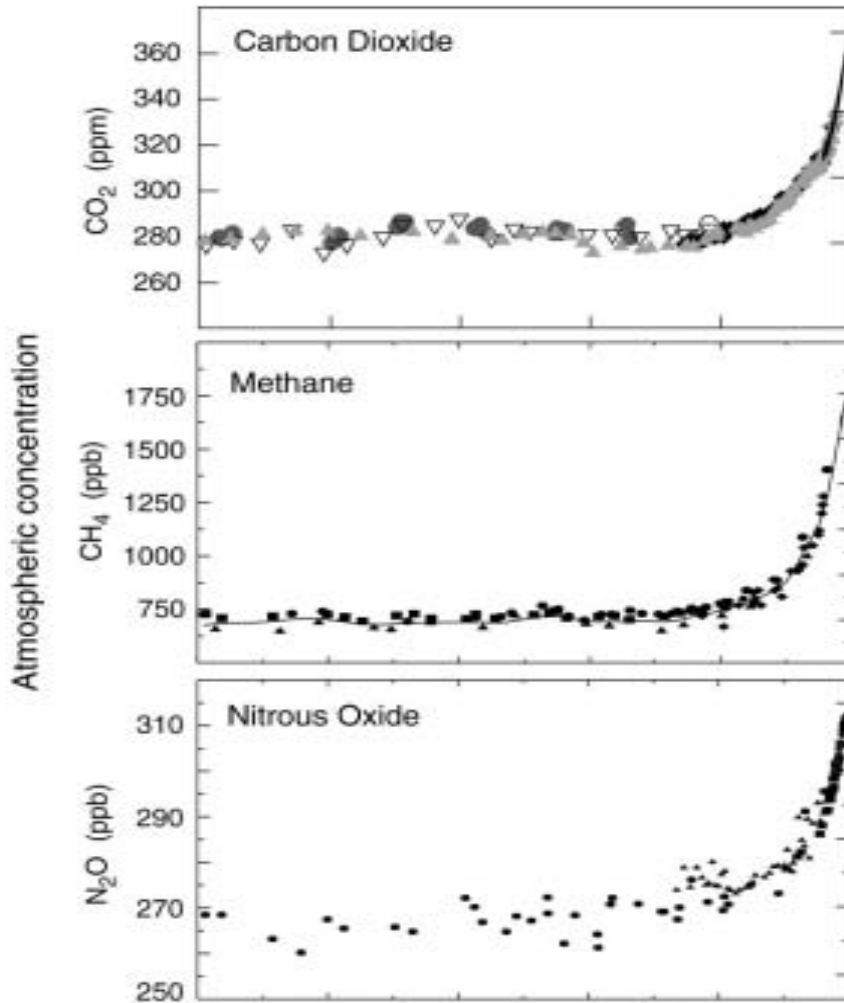
Source: National Energy Policy, May 2001, Figure 2-7  
for West Texas Intermediate Crude Spot Price

# ...Lots of Attention at Times



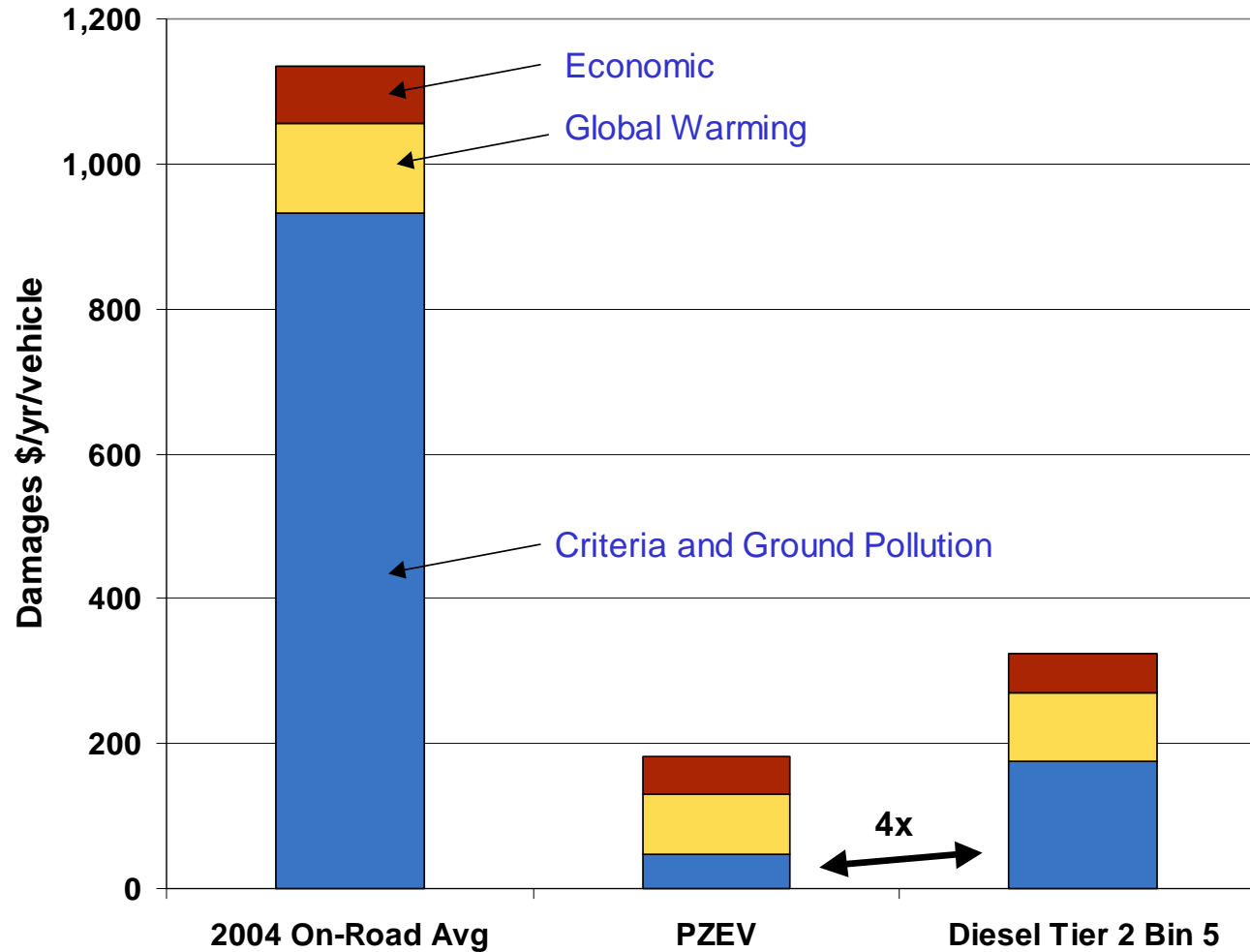


# Vehicle Emissions Contributing to Global Warming



- Carbon dioxide, methane, nitrous oxide, particulate matter, and other pollutants cause global warming
- IPCC concludes increases in these gases are a result of human activities

# Comparison of Damages from LDVs



# Summary

- Advanced gasoline and diesel technologies cost effectively reduce ROG, CO, NO<sub>x</sub>, and PM emissions
- CO<sub>2</sub> emissions can also be effectively reduced with advanced technologies
  - ARB in process of setting LDV CO<sub>2</sub> standards for MY 2009
  - Variety of gasoline technologies possible
  - Diesel technologies also viable if emissions comparable to PZEVs

# Summary

- Next generation vehicles have the potential to substantially reduce environmental and economic impacts and also substantially reduce petroleum consumption