

Policy Implications of Achieving Technology Goals

Asilomar 2009

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**2007 MIT Study of Greenhouse
Gas Emissions from Plug-in
Hybrids, Battery EVs, and Fuel
Cell EVs.**

Electric Powertrains: Opportunities and Challenges in the U.S. Light-Duty Vehicle Fleet

Matthew A. Kromer and John B. Heywood

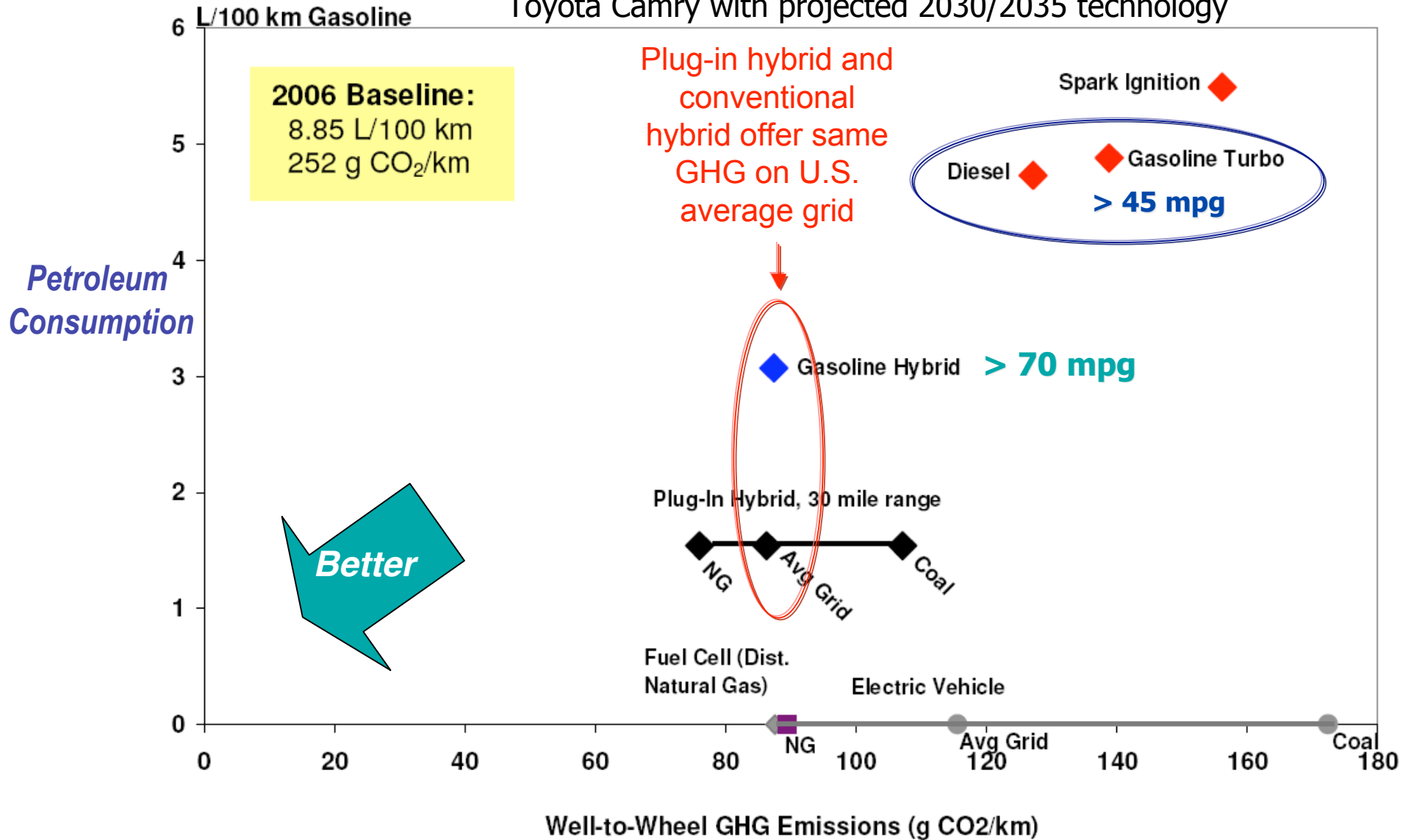
*May 2007
LFEE 2007-02 RP*

*Sloan Automotive Laboratory
Laboratory for Energy and the Environment
Massachusetts Institute of Technology
77 Massachusetts Avenue,
Cambridge, MA 02139*

Publication No. LFEE 2007-02 RP

2030/2035 Technology Comparison

Toyota Camry with projected 2030/2035 technology



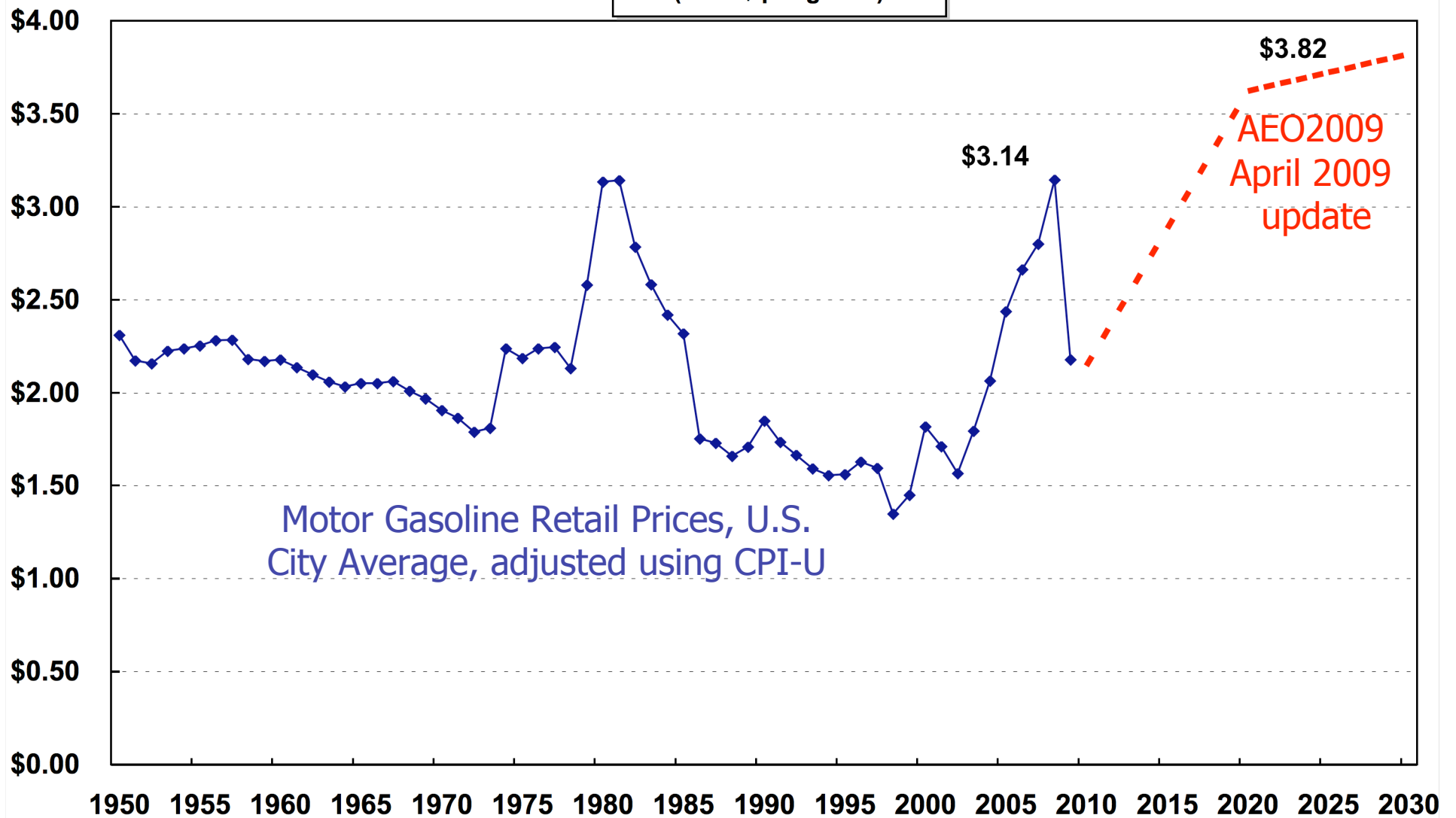
Source: 2007 MIT Study

Assumptions for 2030 Fuel Cost Projections

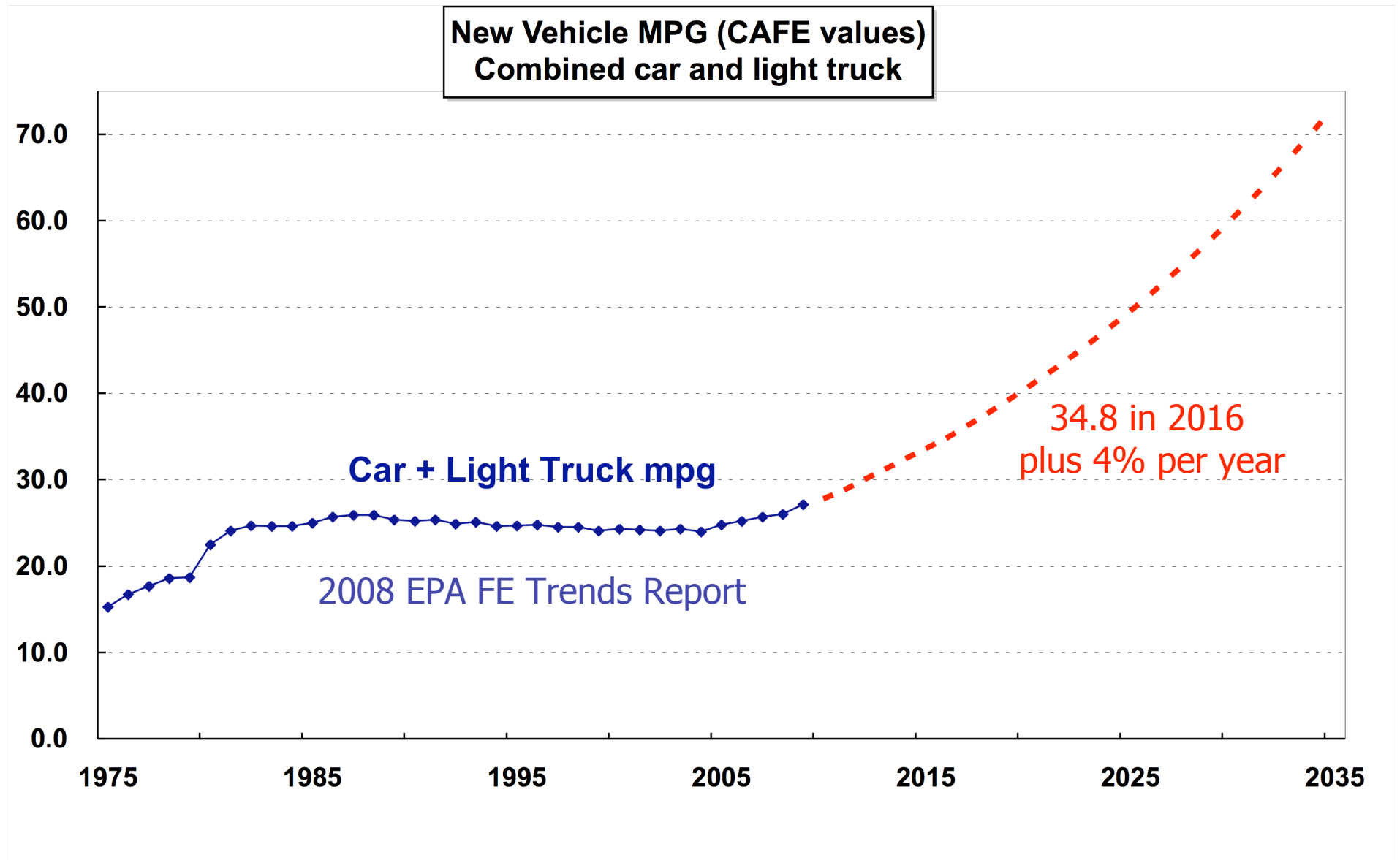
- New vehicle fuel economy (car and light truck fleet combined)
 - EPA FE Trends Report through 2008 (removes FFV credits)
 - 34.8 mpg in 2016 (35.5 discounted for A/C provisions)
 - 4% increase every year after 2016
 - Yields 60 mpg in 2030 and 73.3 in 2035
 - MIT 2007: 76.4 mpg in 2030 for Camry-size HEV - equivalent to 71 mpg for fleet
- Future oil prices, future electricity rates, growth in disposable income
 - Updated AEO 2009 Reference Case Reflecting Provisions of the American Recovery and Reinvestment Act and Recent Changes in the Economic Outlook
 - Gasoline - \$3.62 in 2020, \$3.82 in 2030 (2007\$)
 - Electricity - 9.3 cents/kW-hr in 2020, 10.1 cents in 2030 (2007\$)
 - Real disposable income growth: 1.7%/yr from 2010 to 2020, 2.1%/yr from 2020 to 2030
 - Historical disposable income: BEA, Table 2.1, Personal Income and It's Disposition
- EV electricity consumption from 2008 EPRI-NRDC report
 - 2006 cars - 237 Wh/mile on test cycles, 280 in-use, and 318 from AC socket.
 - 2006 smaller trucks (< 6000 GVWR) - 296 Wh/mile on test cycles
 - Consumption is reduced by 0.5% per year (vehicle load improvements)
 - Yields 205 Wh/mi in 2035 for cars on test cycles, similar to MIT's 190-200

Real Gasoline Price

Real Gasoline Prices
(2007 \$ per gallon)

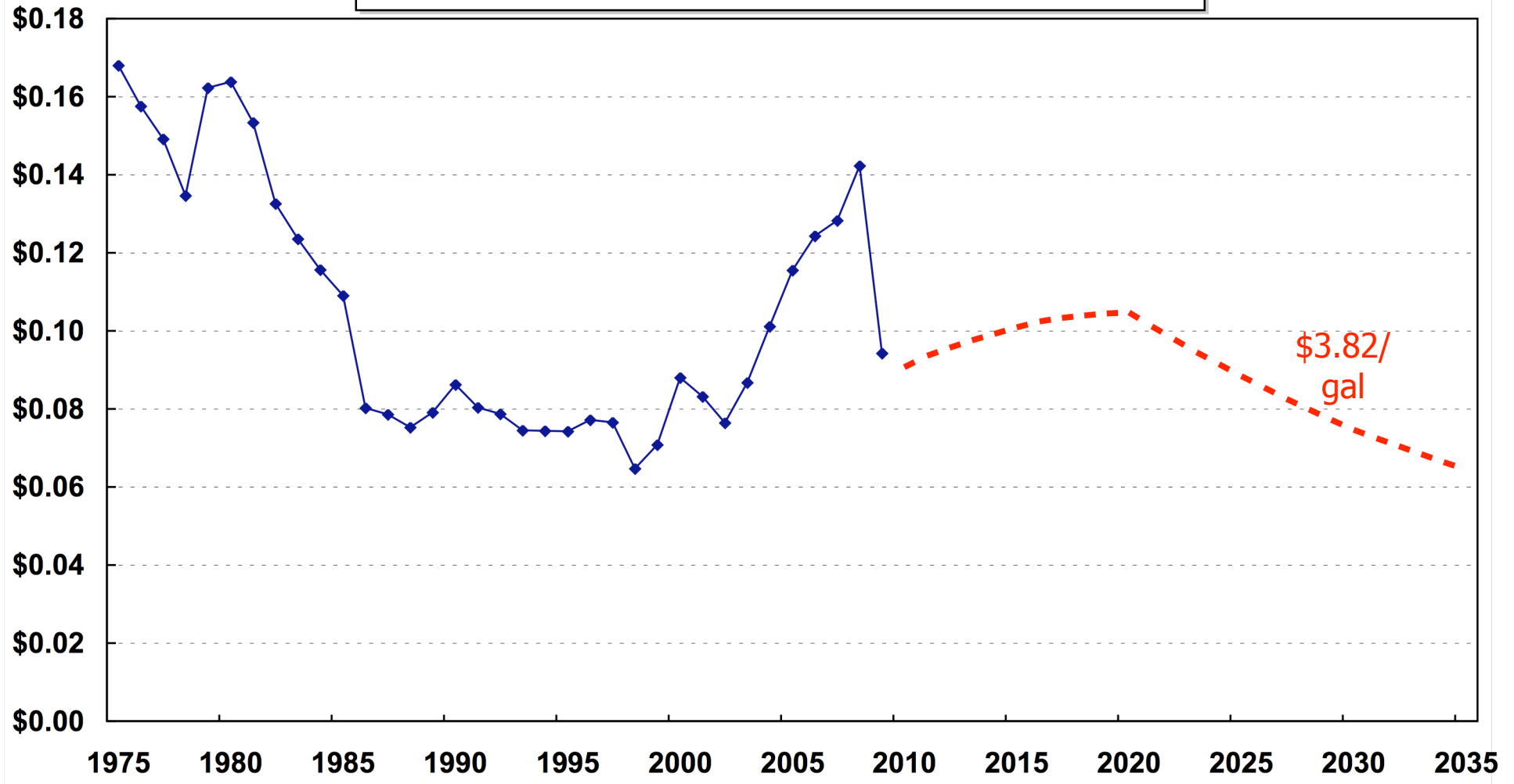


New Vehicle Fuel Economy

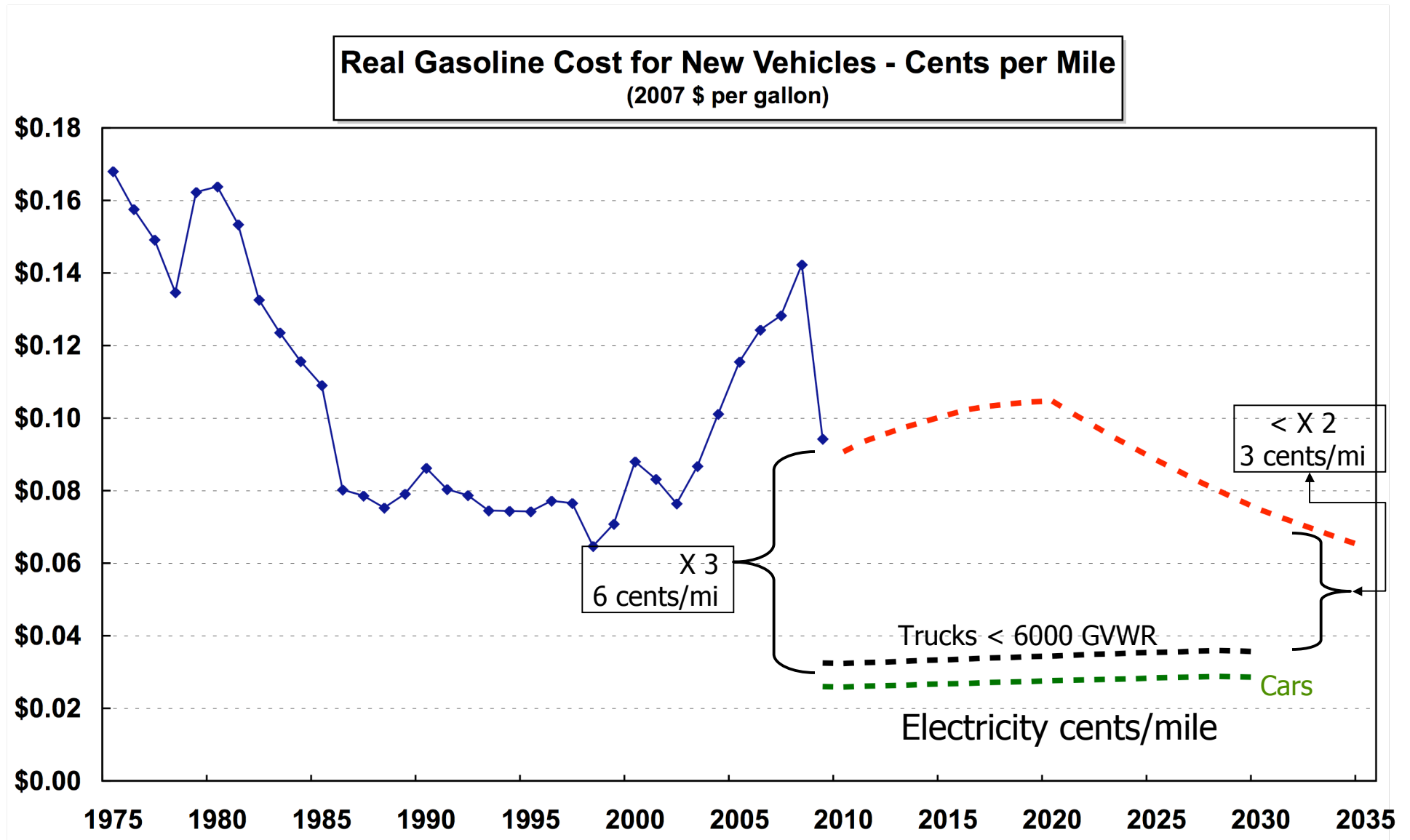


New Vehicle Gasoline Cost per Mile

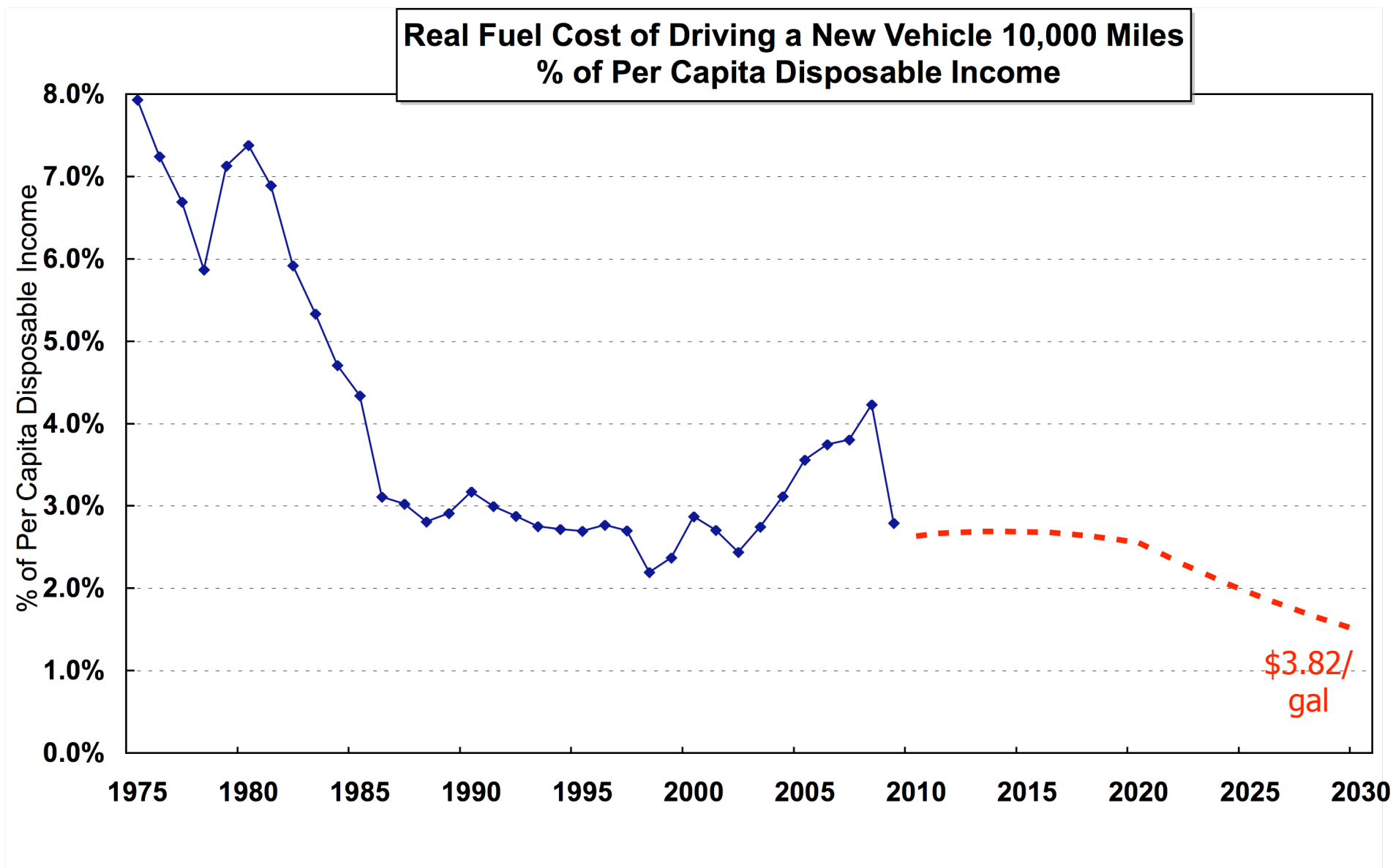
Real Gasoline Cost for New Vehicles - Cents per Mile
(2007 \$ per gallon)



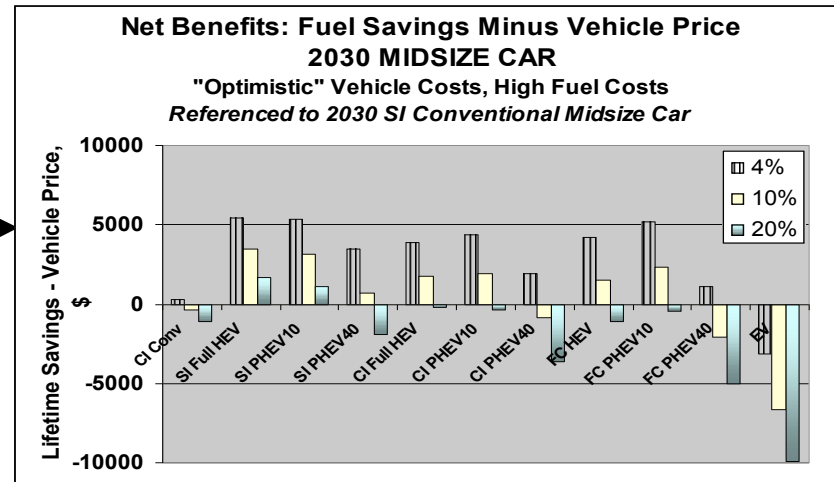
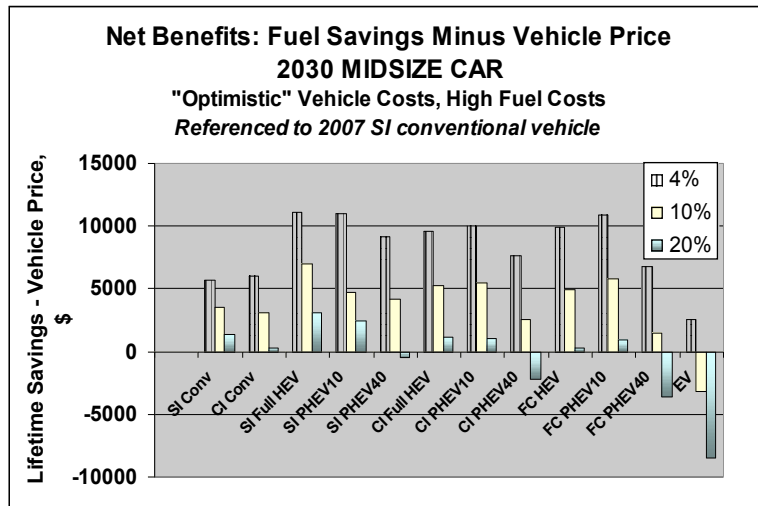
New Vehicle Gasoline Cost per Mile



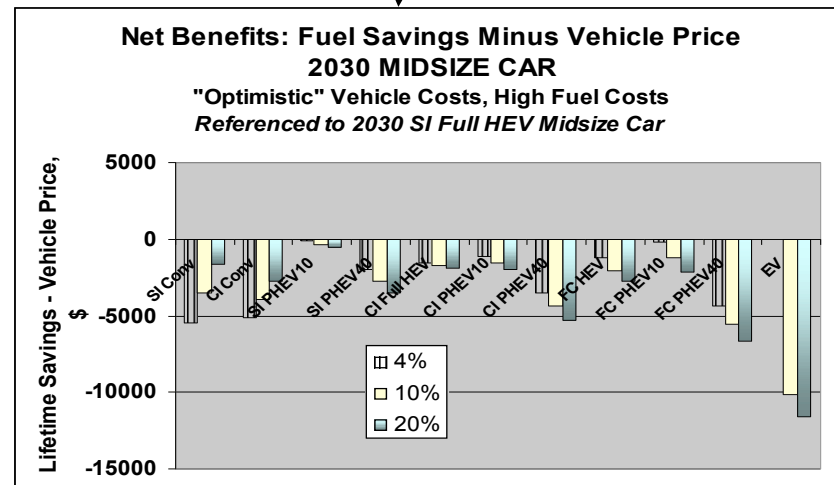
Real Fuel Cost - % of Disposable Income



In gauging the potential for advanced vehicles, remember that the competition is changing....



***What looks good
against today's
(conventional) car may
not look so good
against tomorrow's.***



Low Driving Cost Implications

- **Customers: Will demand more features and will not want smaller vehicles**
- **VMT: Limited only by congestion and value of personal time**
- **Mass transit and land use: Policies must focus on being more convenient and saving time**
- **Alternative fuels & technologies: Difficult to force on customers without significant fuel savings**

Re Sperling's Vision Challenge

- **Vehicles are the same as 80 years ago for one simple reason:
Fuel costs are a small part of the overall cost of owning a vehicle
- and they are getting smaller**
- **Litmus test: Vision, Leadership, and Will**
 - **Triple gasoline price**

Thank You