



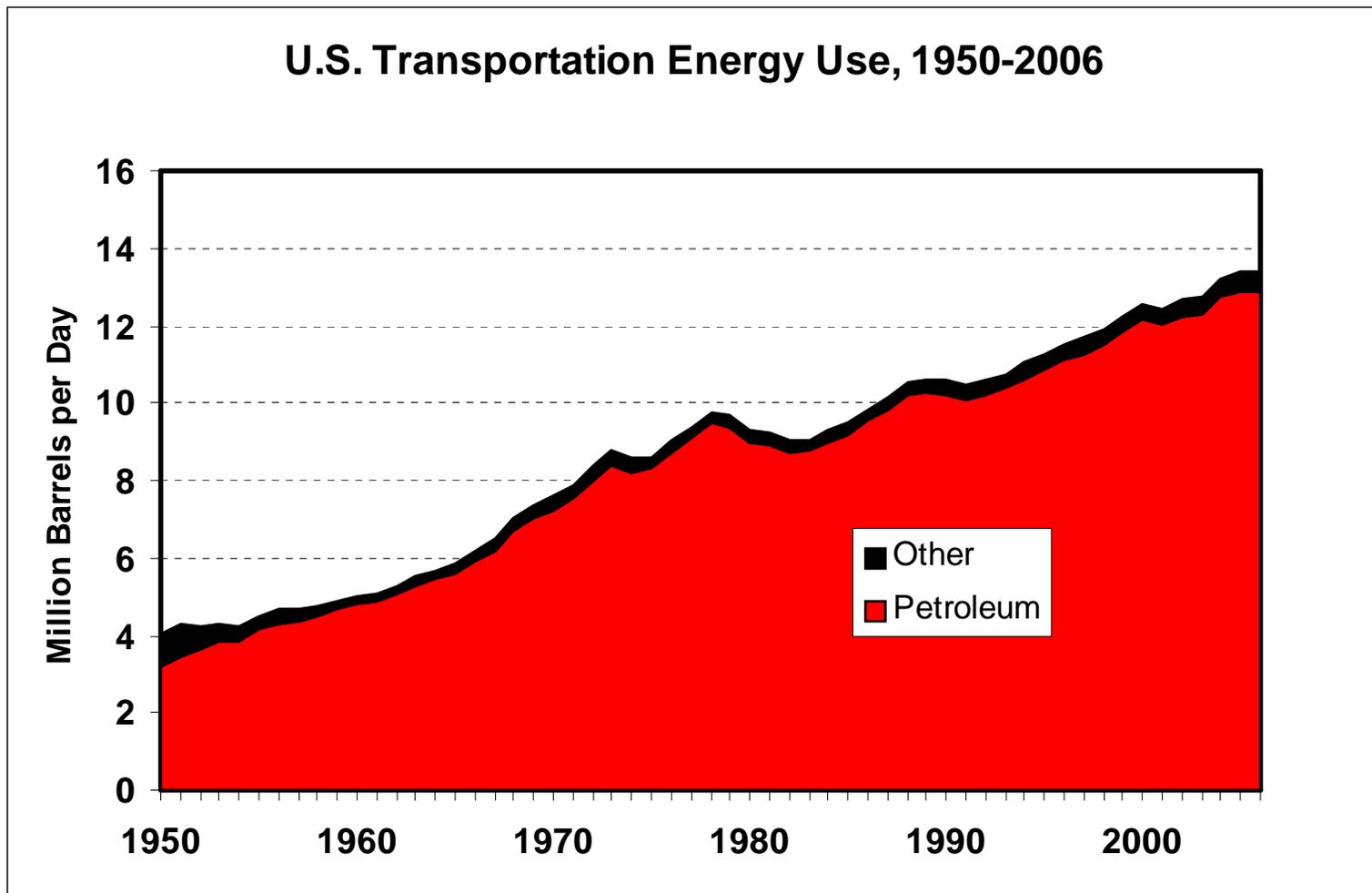
Going nowhere?

Will high energy prices change U.S. travel?

David L. Greene
Corporate Fellow
Oak Ridge National Laboratory

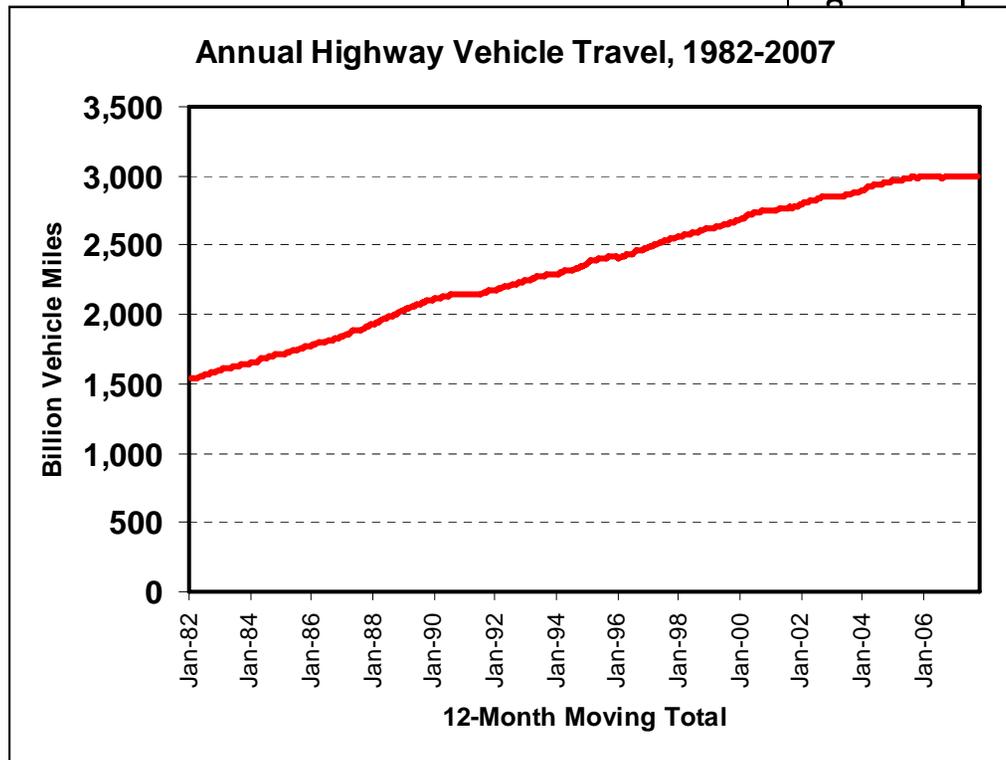
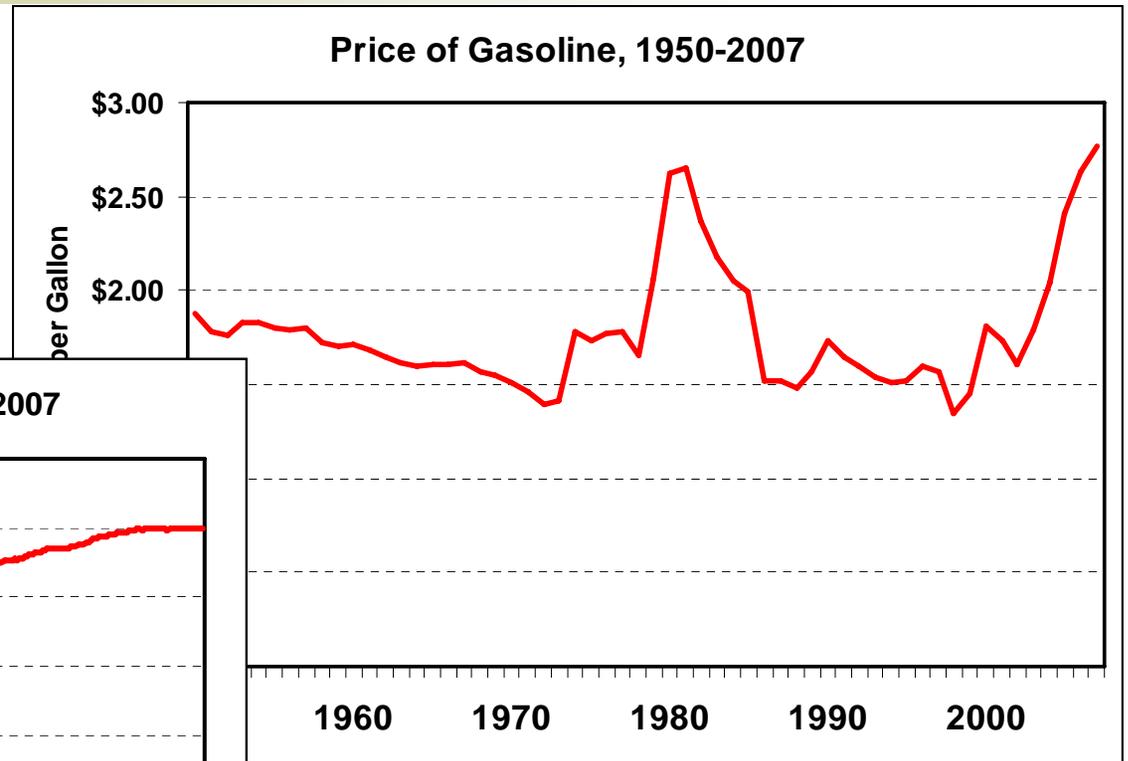
87th Annual Meeting of the TRB
January 16, 2008
Washington, DC

Our transportation system uses oil at the rate of over 6,300 gallons per second, and consumes more than any other nation's entire economy.



Source: Energy Information Administration, AER 2006, table 2.1e.

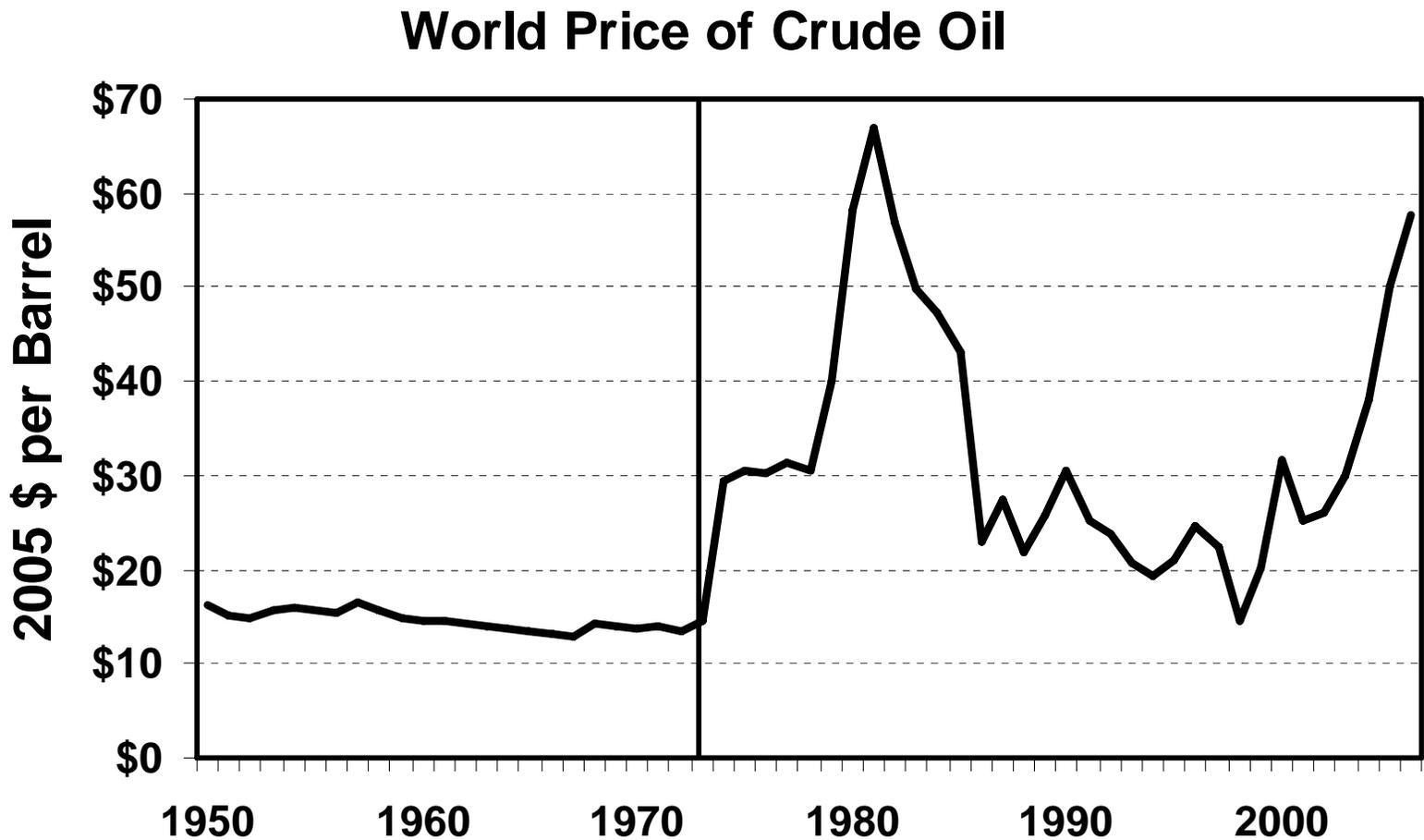
Gasoline prices are soaring, VMT is going nowhere.



[If you knew that...would you change?]

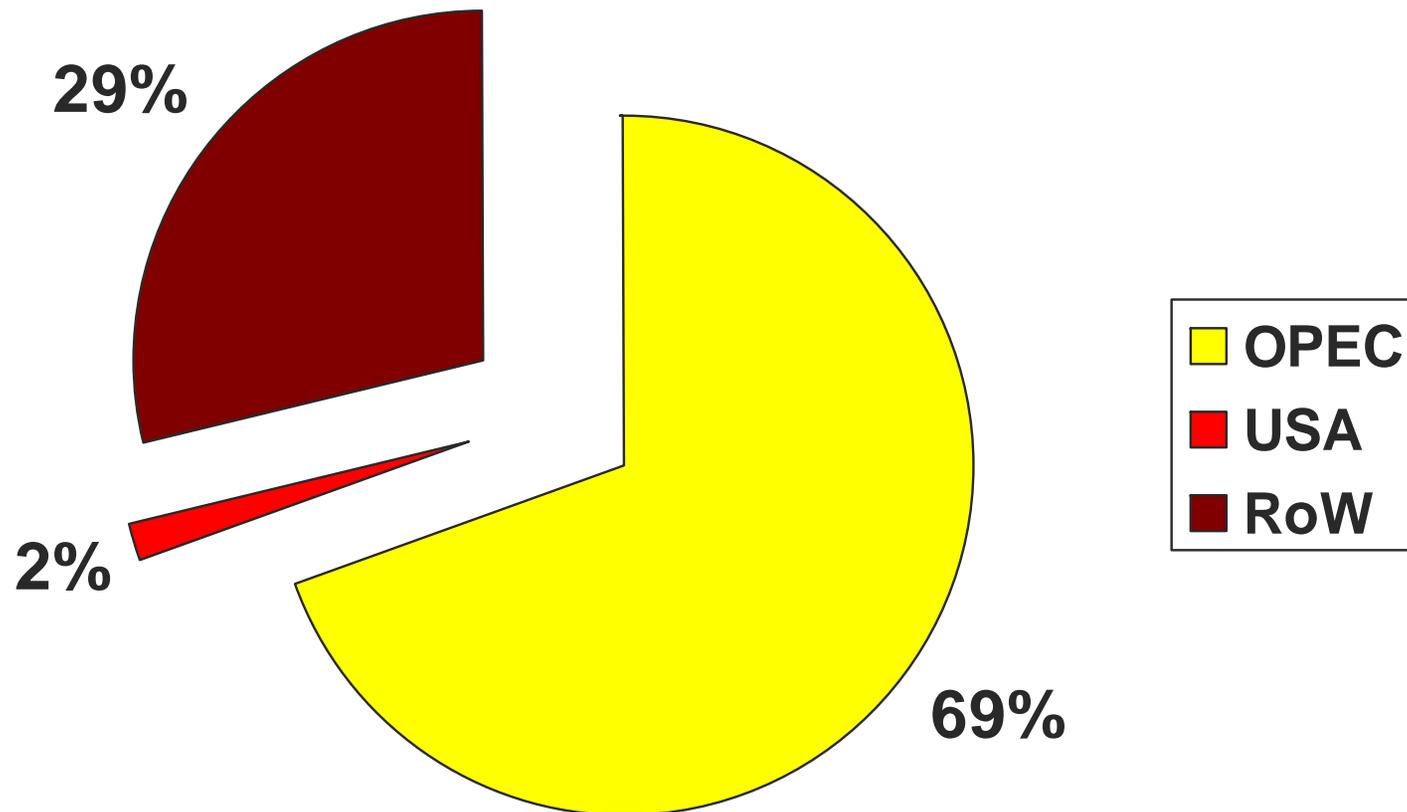
- What's going on in the world oil market?
- What about energy security?
- What about climate change?
- What will we change?

“The real problem we face over oil dates from after 1970: a strong but clumsy monopoly of mostly Middle Eastern exporters operating as OPEC.” Prof. M. Adelman, MIT, 2004.



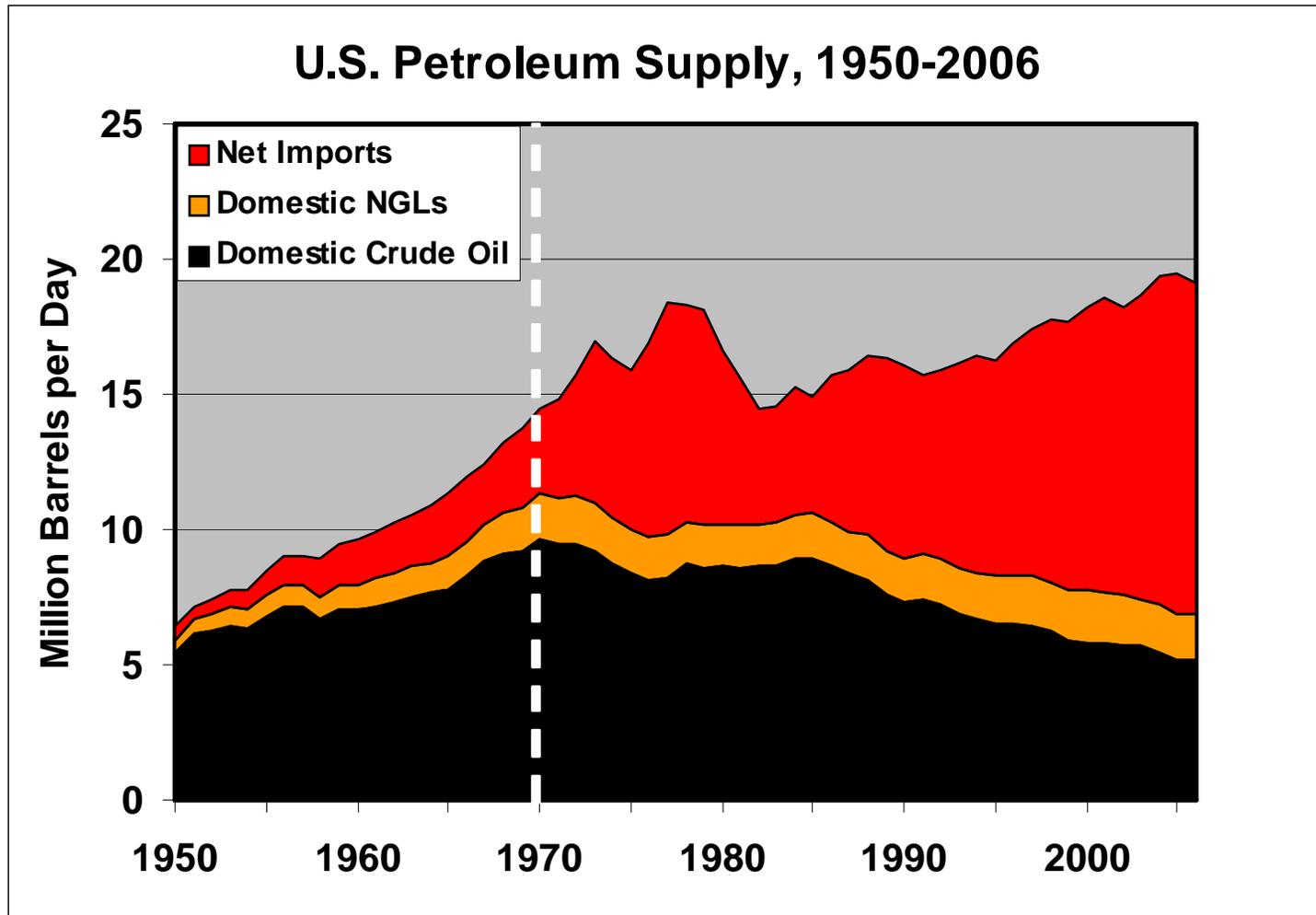
U.S. Energy Information Administration, 2006, Refiner Acquisition Cost of Crude Oil, Domestic First Purchase Price prior to 1968.

OPEC members own 69% of the world's proven oil reserves and over 50% of the estimated ultimate resources of conventional oil.

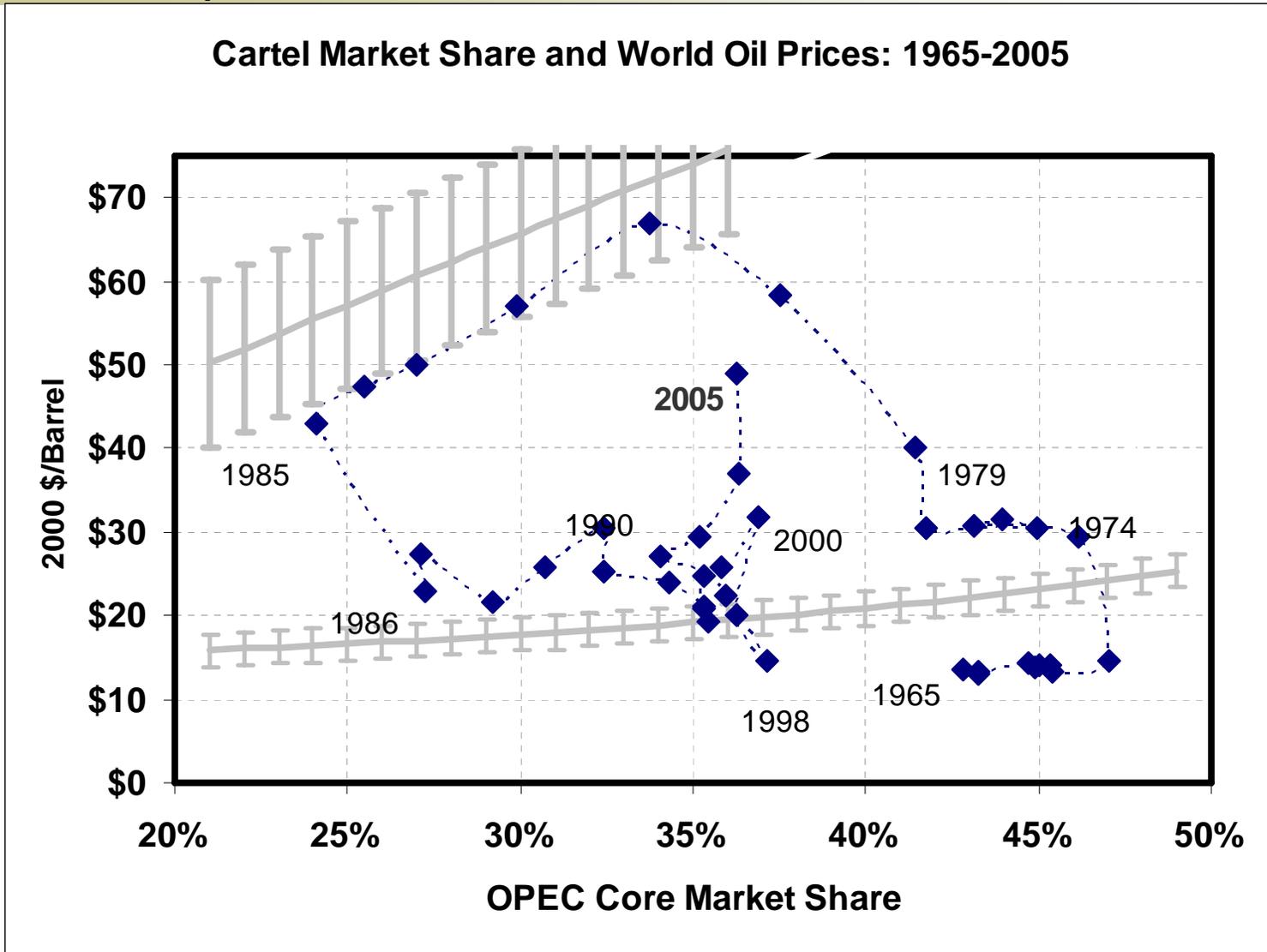


Source: U.S. Energy Information Administration, 2006.

The cartel's market power was strengthened by growing world demand, its increasing market share and...the peaking of US crude oil production in 1970.

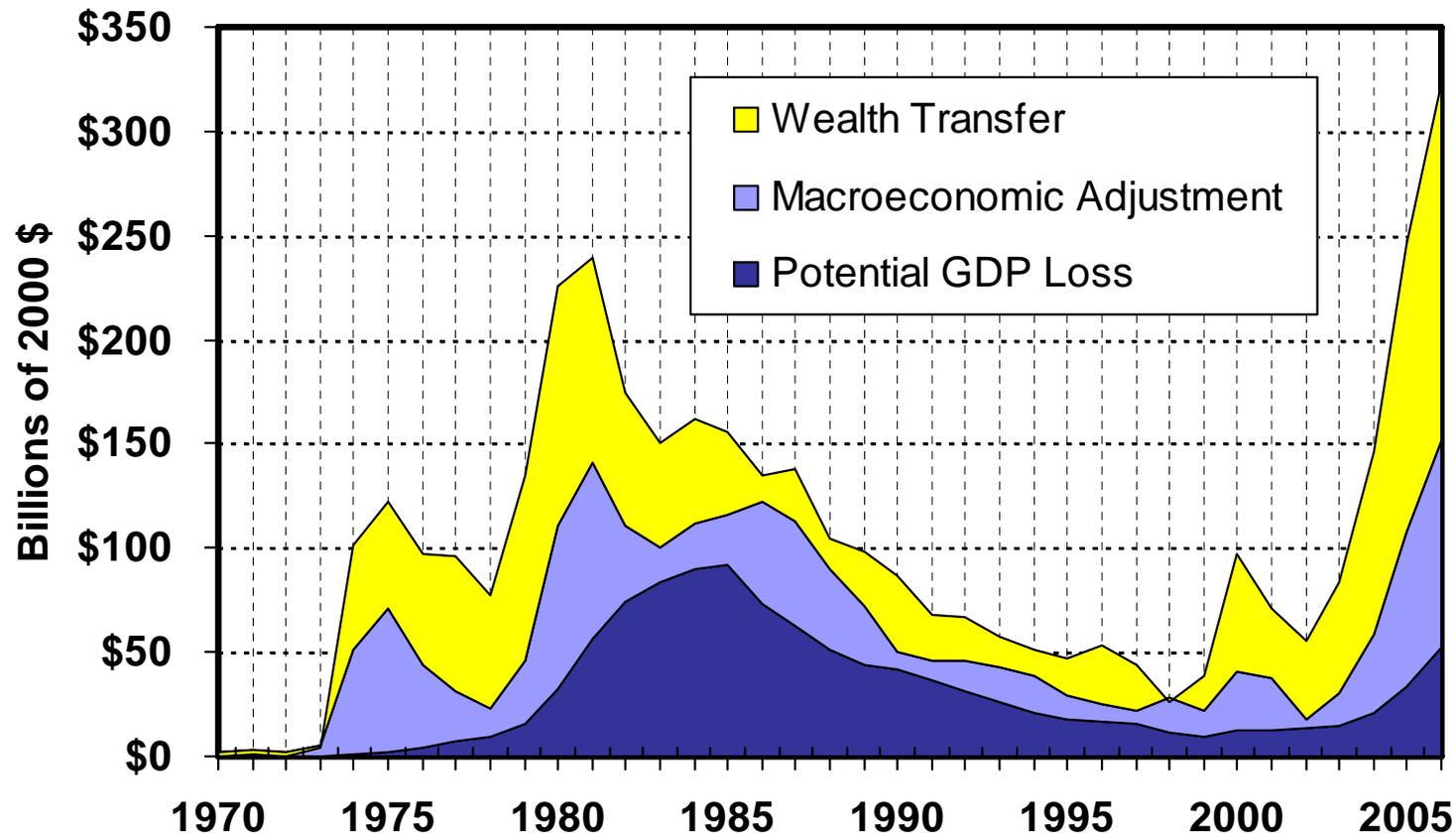


The cartel has much greater market power in the short run than in the long run. The result is volatile world oil prices.

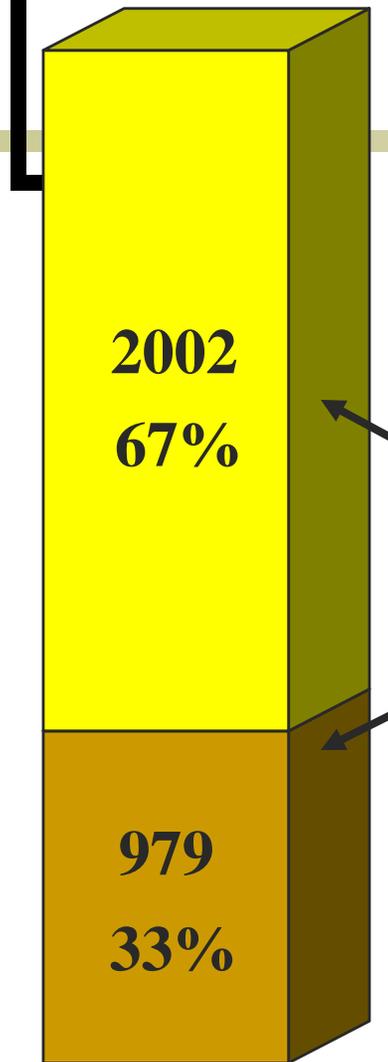


The total economic costs of oil dependence (versus a competitive oil market) exceed \$4 trillion since 1970 (Greene & Ahmad, 2005). Today, costs are in the vicinity of half a trillion dollars per year.

Costs of Oil Dependence to the U.S. Economy, 1970-2006
Competitive World Oil Price Constant at \$13/bbl



The RATE of world oil use is alarming!



Billions of Barrels

The 2007 NPC report expects 1.1 trillion barrels of oil production over the next 25 years. More than consumed in in all of human history.

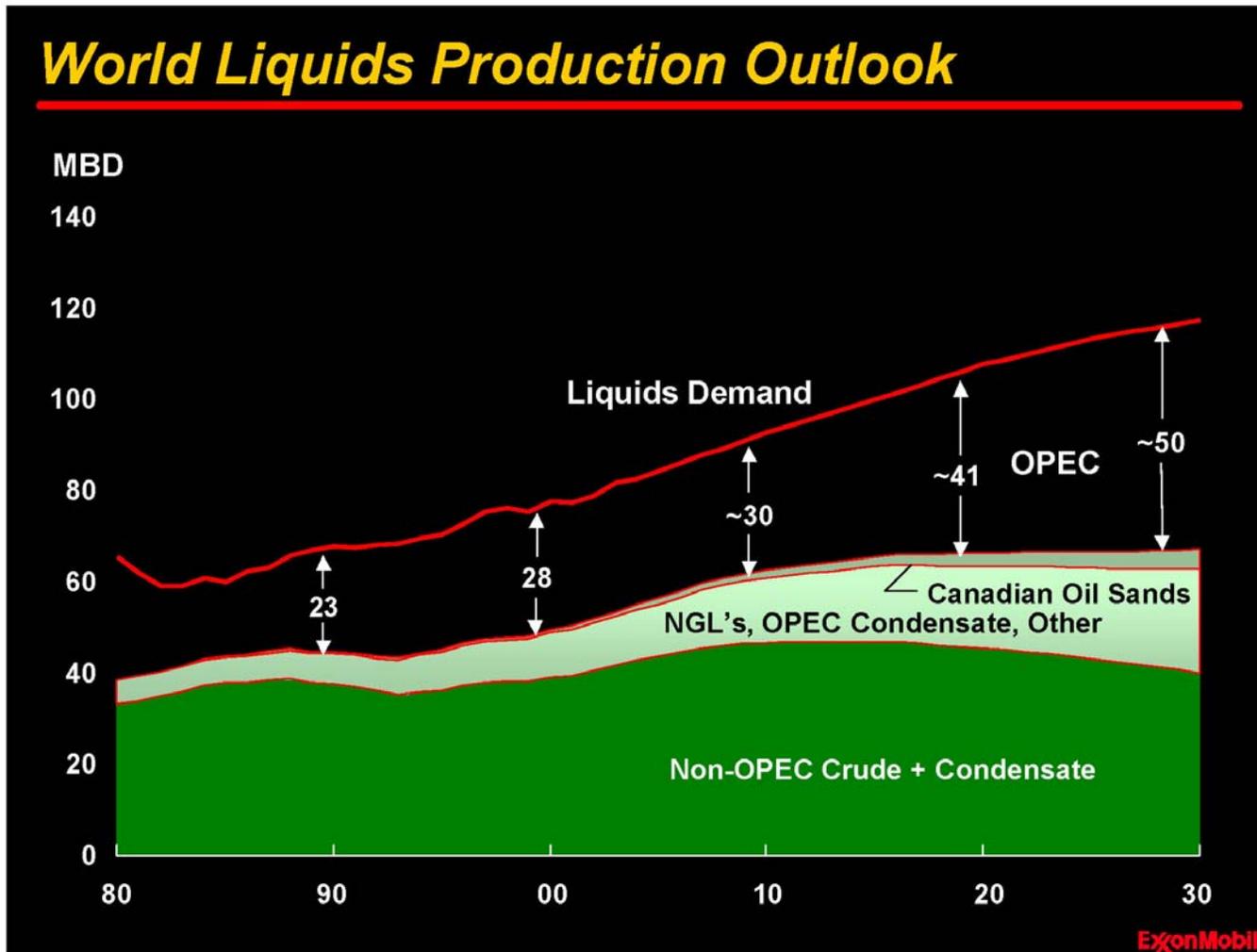
Remaining recoverable crude oil*

Cumulative Production to end of 2005

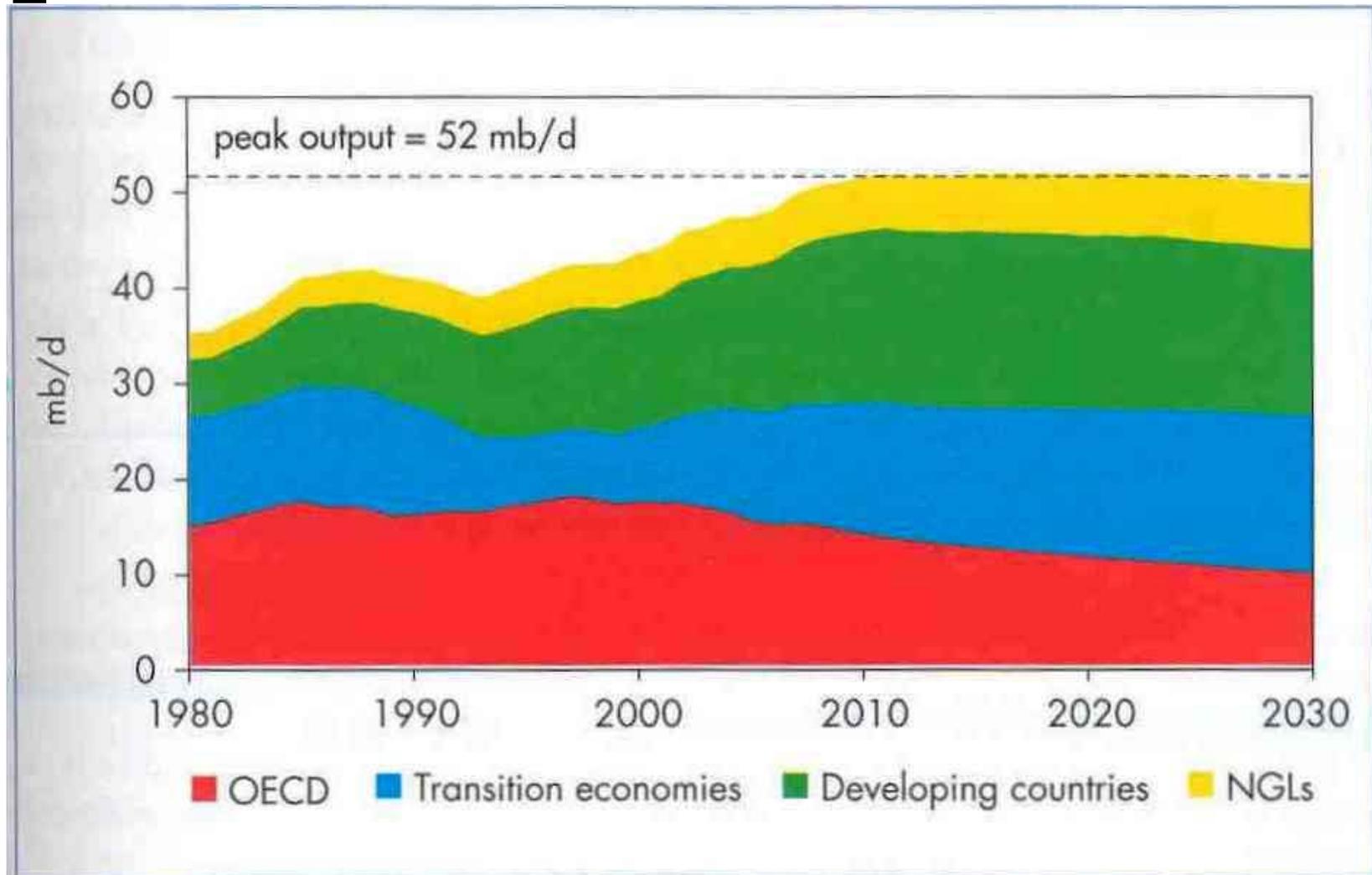
Cumulative Production to the end of 1995 was 710! Over 1/4 of all oil ever consumed was consumed in the last 10 years.

* From USGS 2000, USGS 1995, and MMS 1996

Projections of just 2 years ago expected peaking of non-OPEC supply with OPEC filling the gap. This would increase their market share and market power.

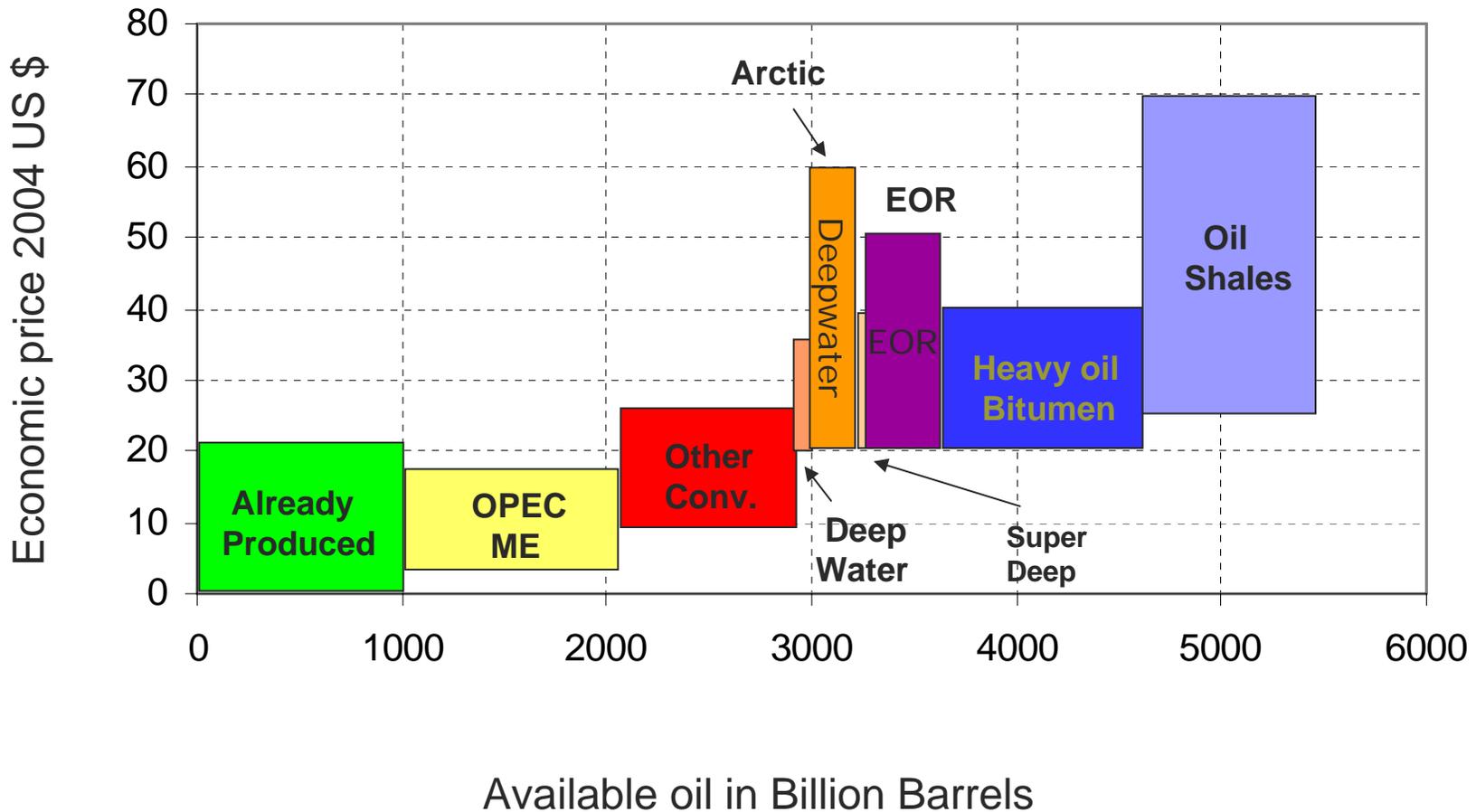


IEA's WEO 2006 foresees a non-OPEC plateau with less OPEC supply and more unconventional resources filling the gap. This, would boost OPEC's market power and increase GHG emissions.

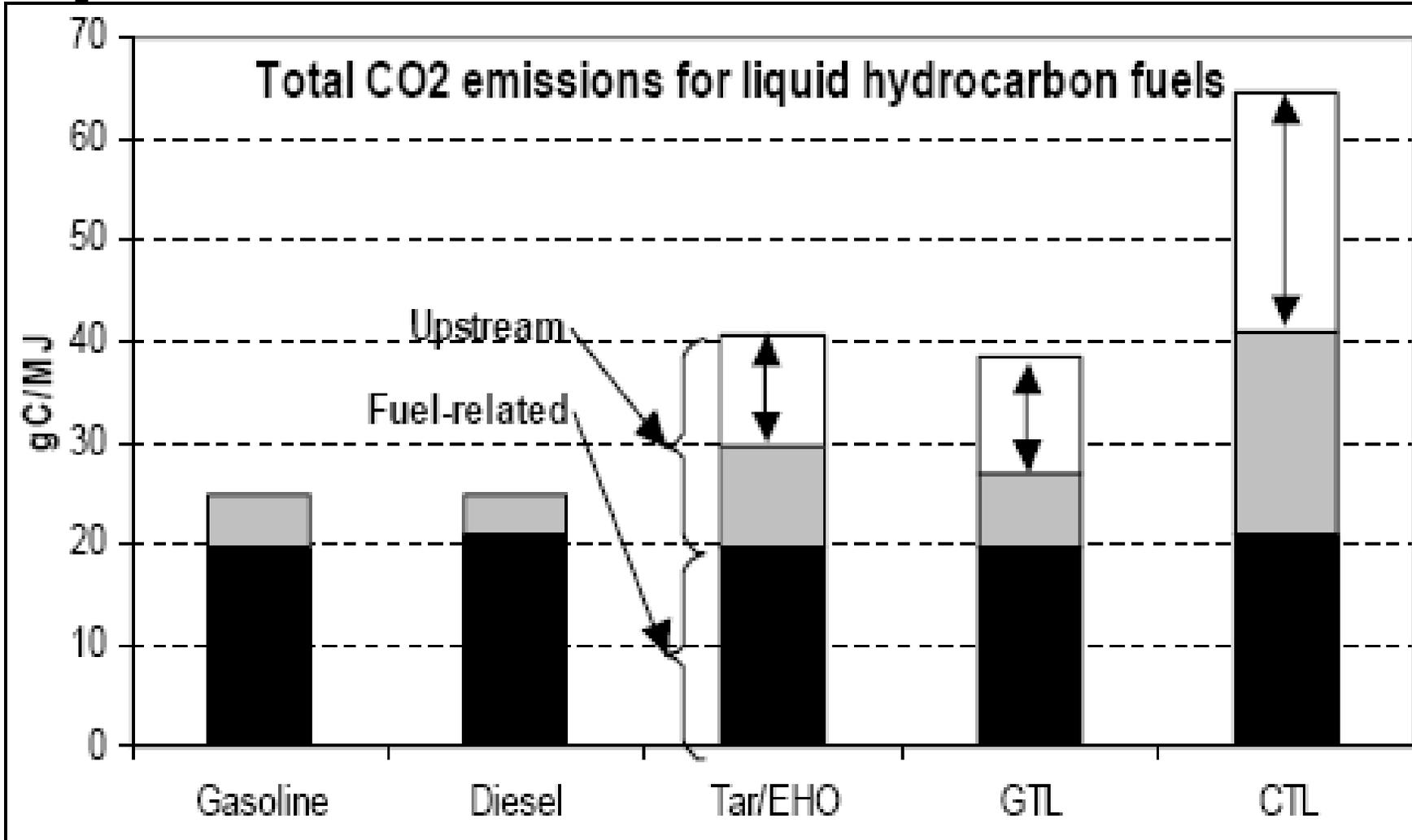


The path of least resistance? Unconventional oil resources are vast, compatible with the existing infrastructure, at prices we have shown we are willing to pay. And then there is coal.

IEA "Resources to Reserves" 2005



But without carbon capture and storage, unconventional oil and liquid fuels from coal will produce 20% to 100% more greenhouse gas emissions.



Source: Farrell, 2006.

Carbon Reservoirs

Atmosphere 800 GtC (2004)

Biomass
~500 GtC

N. Gas
~260 GtC

Oil
~270 GtC

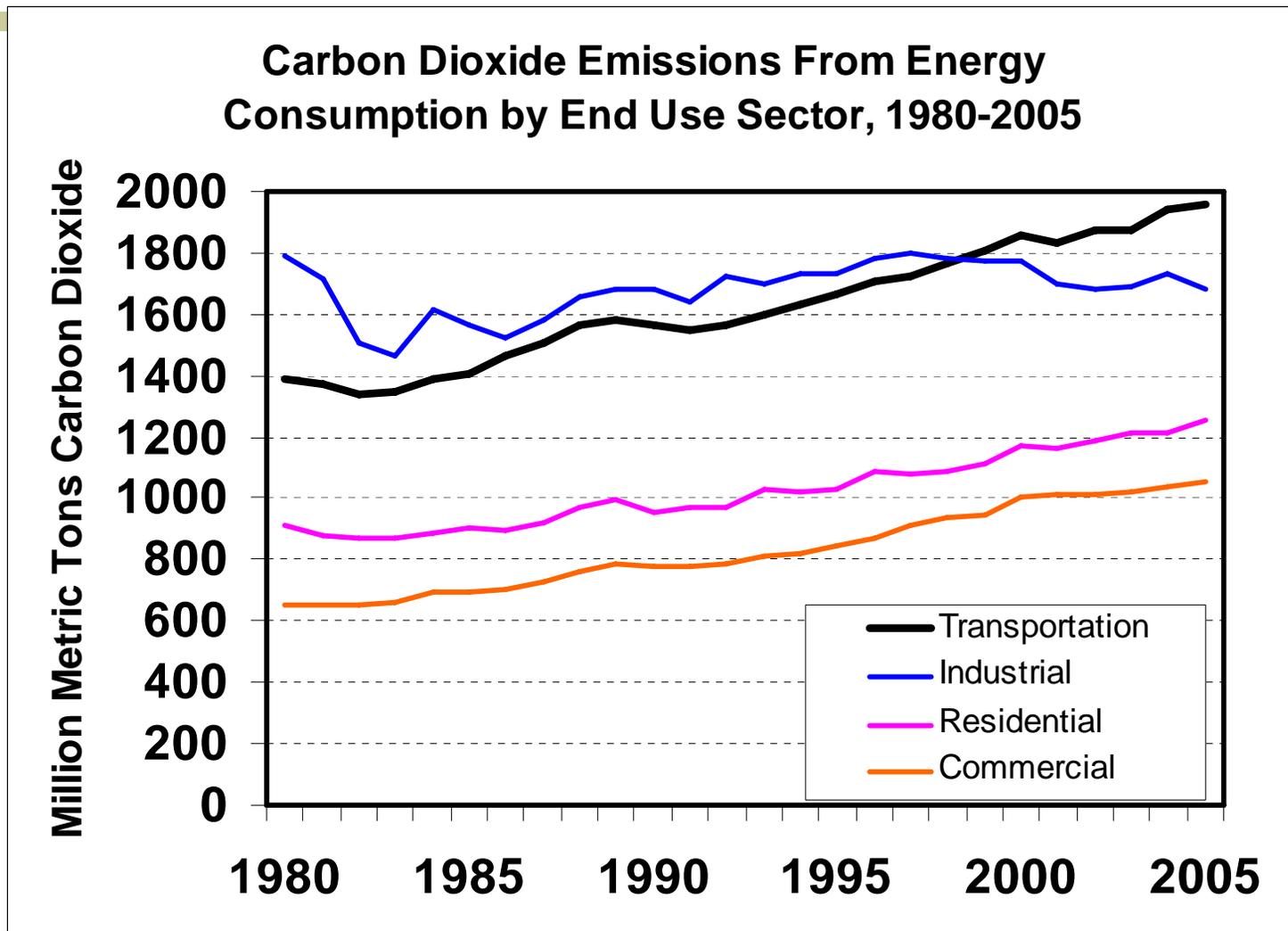
Soils
~1,500 GtC

Coal
5,000 to 8,000 GtC

Unconventional Fossil Fuels
15,000 to 40,000 GtC

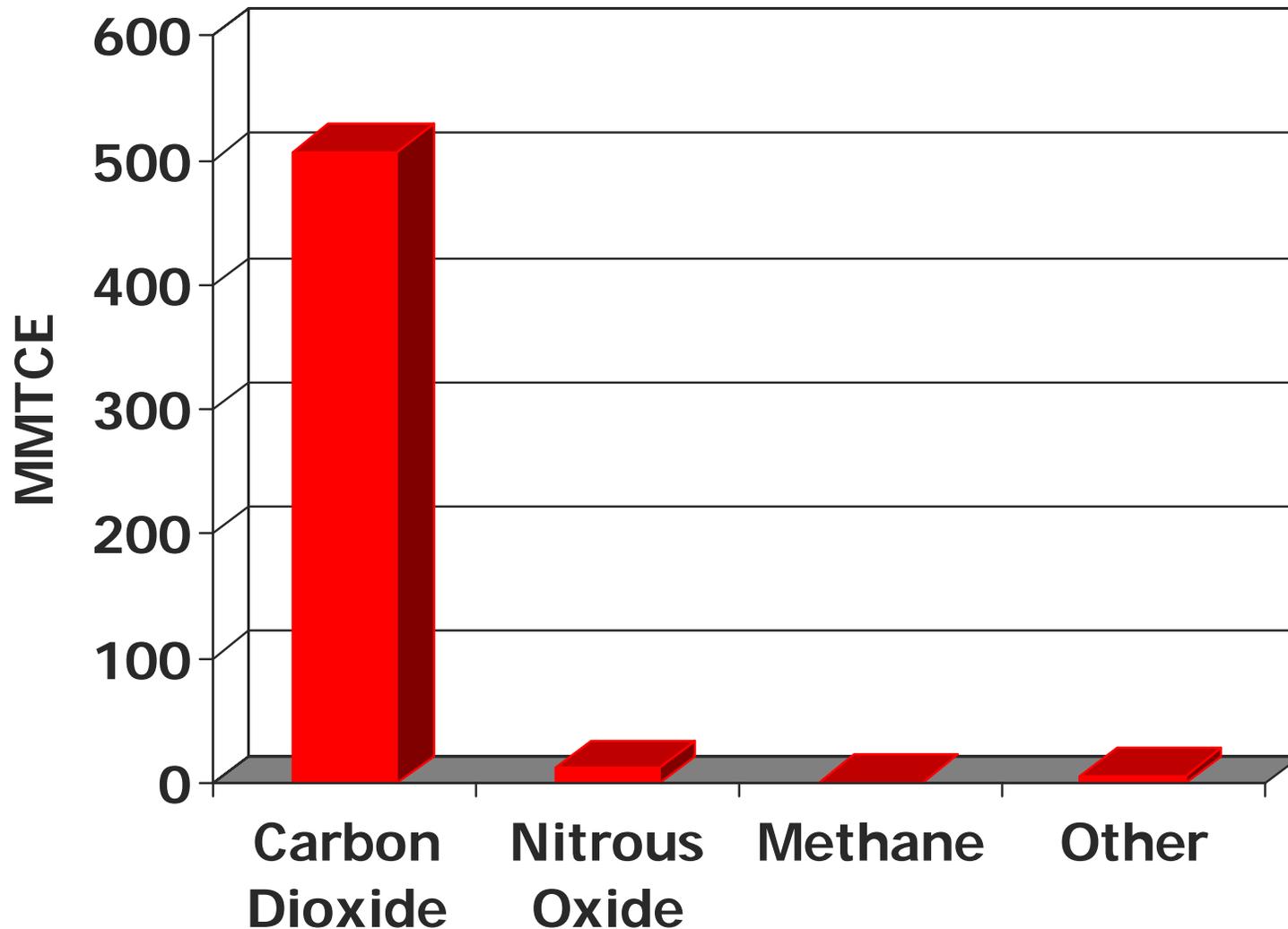
Source: Edmonds, 2005

Transportation will have to reduce its GHG emissions: transportation is the largest emitter of CO₂ of all the end use sectors – more than any nation in the world except China.



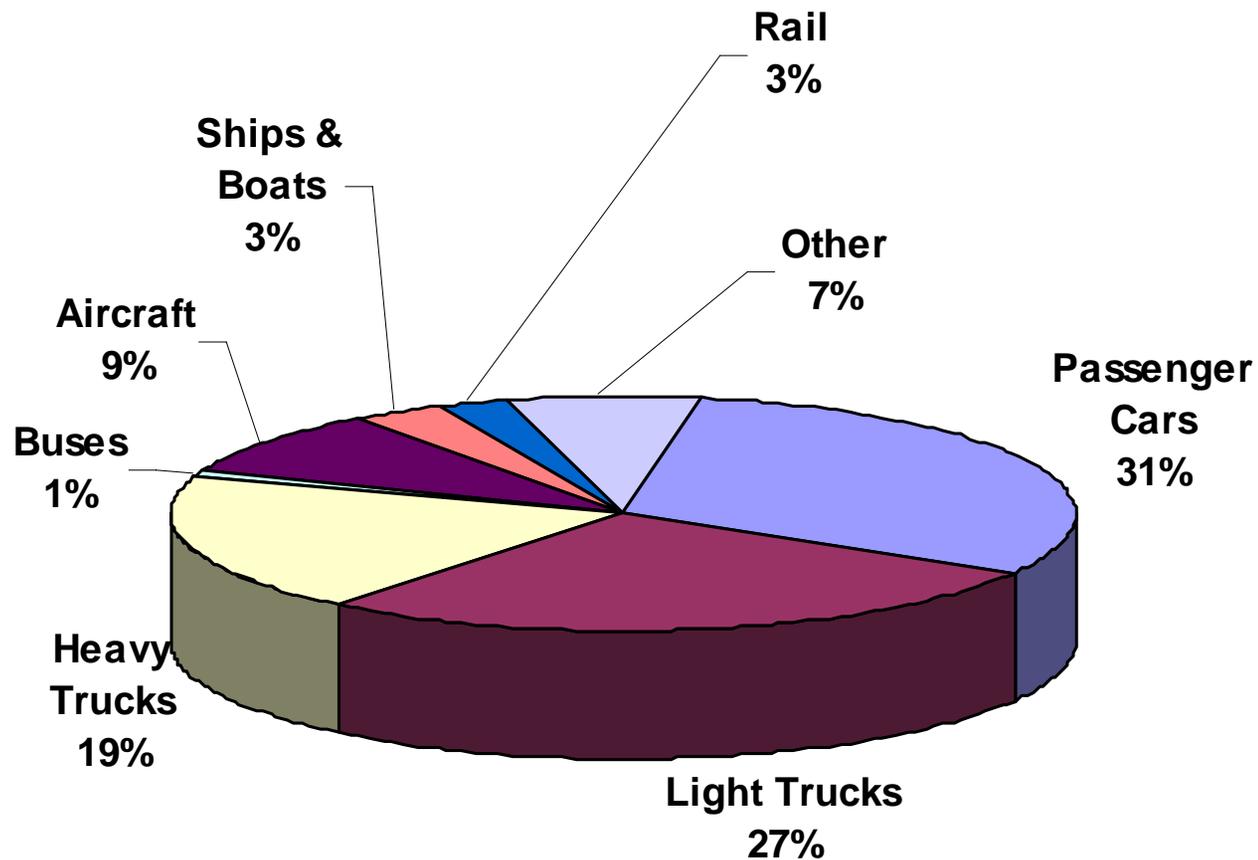
Source: USDOE/EIA, Annual Energy Review 2006, table 12.2.

Nearly all of transportation's GHG emissions are CO₂ from the combustion of fossil fuels.



It's us. Highway vehicles, especially passenger cars and light trucks, account for most (78%) transportation C emissions.

Transportation GHG Emissions by Mode, 2005



Source: USEPA, 2007, U.S. GHG Inventory, table 2-17.

But will all this have a significant impact on travel?

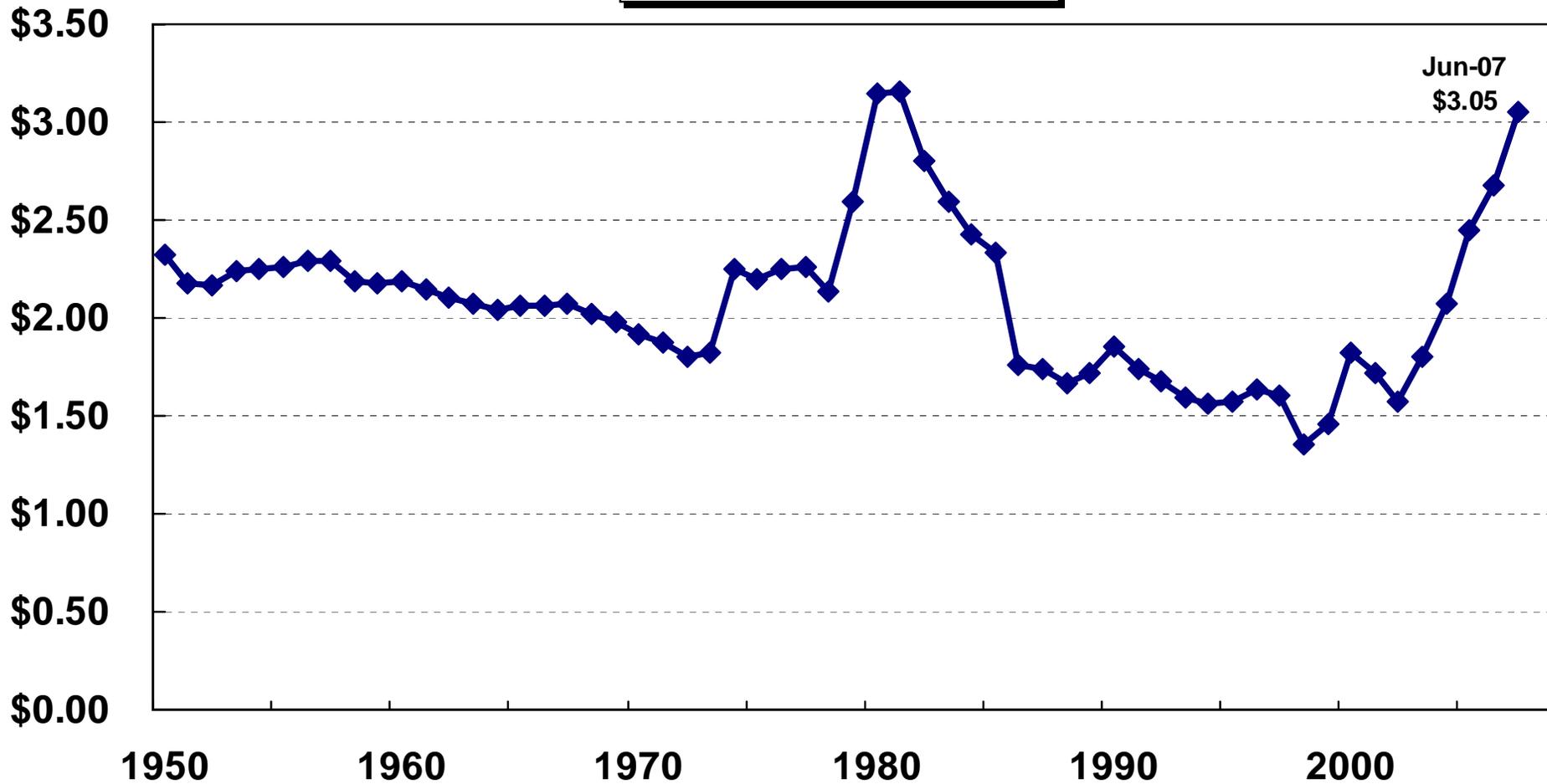
- At \$100/bbl, oil is almost \$2.50 per gallon of gasoline (42 gals/bbl).
- Given the availability of alternatives, the “long-run” price of oil should not exceed \$100/bbl, *IN THEORY*.
- In reality, massive investments must be made in a very uncertain oil market.
 - OPEC market influence
 - Greenhouse gas mitigation regime
- Recent studies show a *decreasing* sensitivity of travel to the price of fuel.
WHY?



Real gasoline prices are as high as ever.



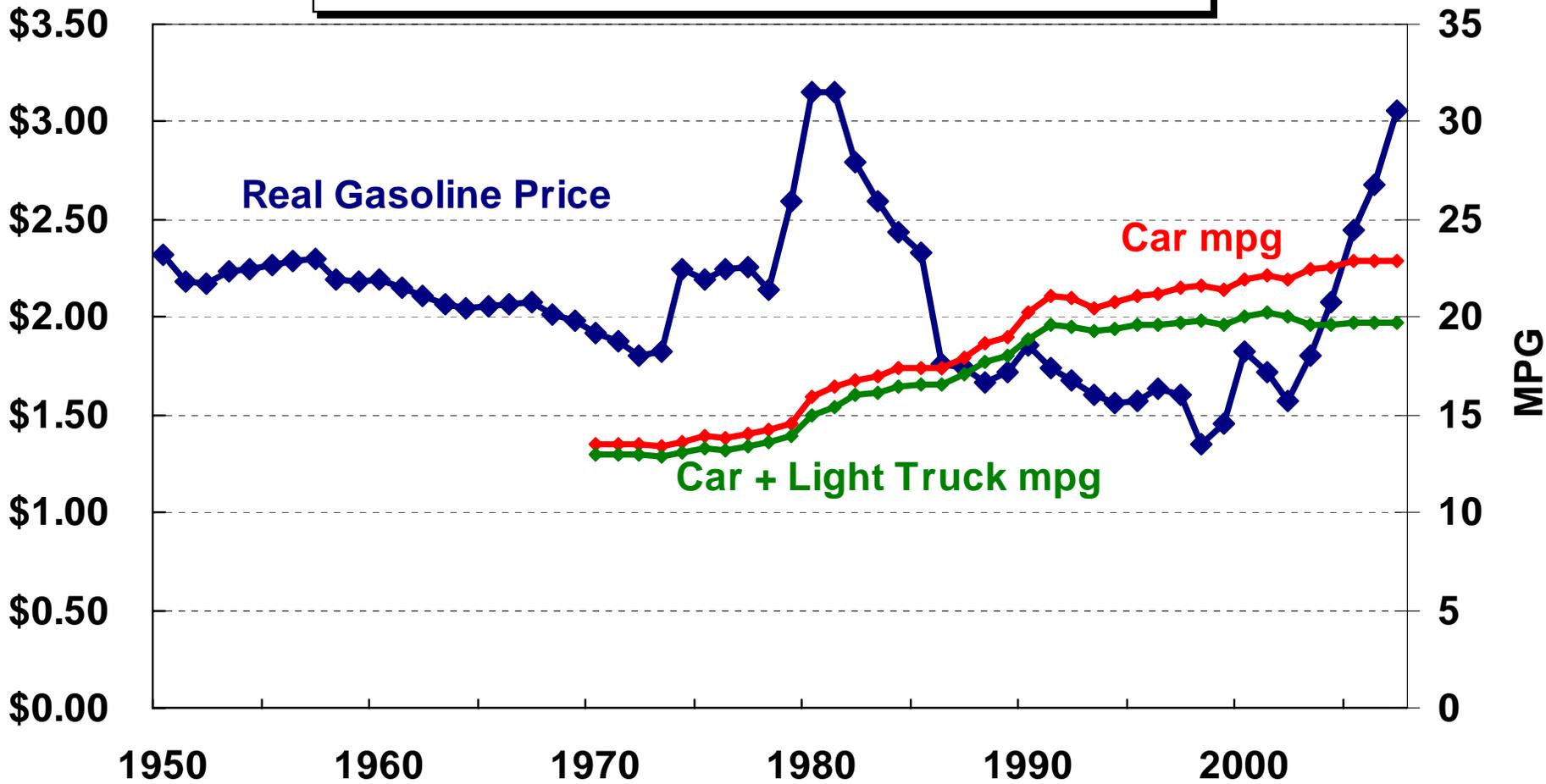
Real Gasoline Prices
(2007 \$ per gallon)



Motor Gasoline Retail Prices, U.S. City Average, adjusted using CPI-U

But fuel economy is higher today than in 1980.

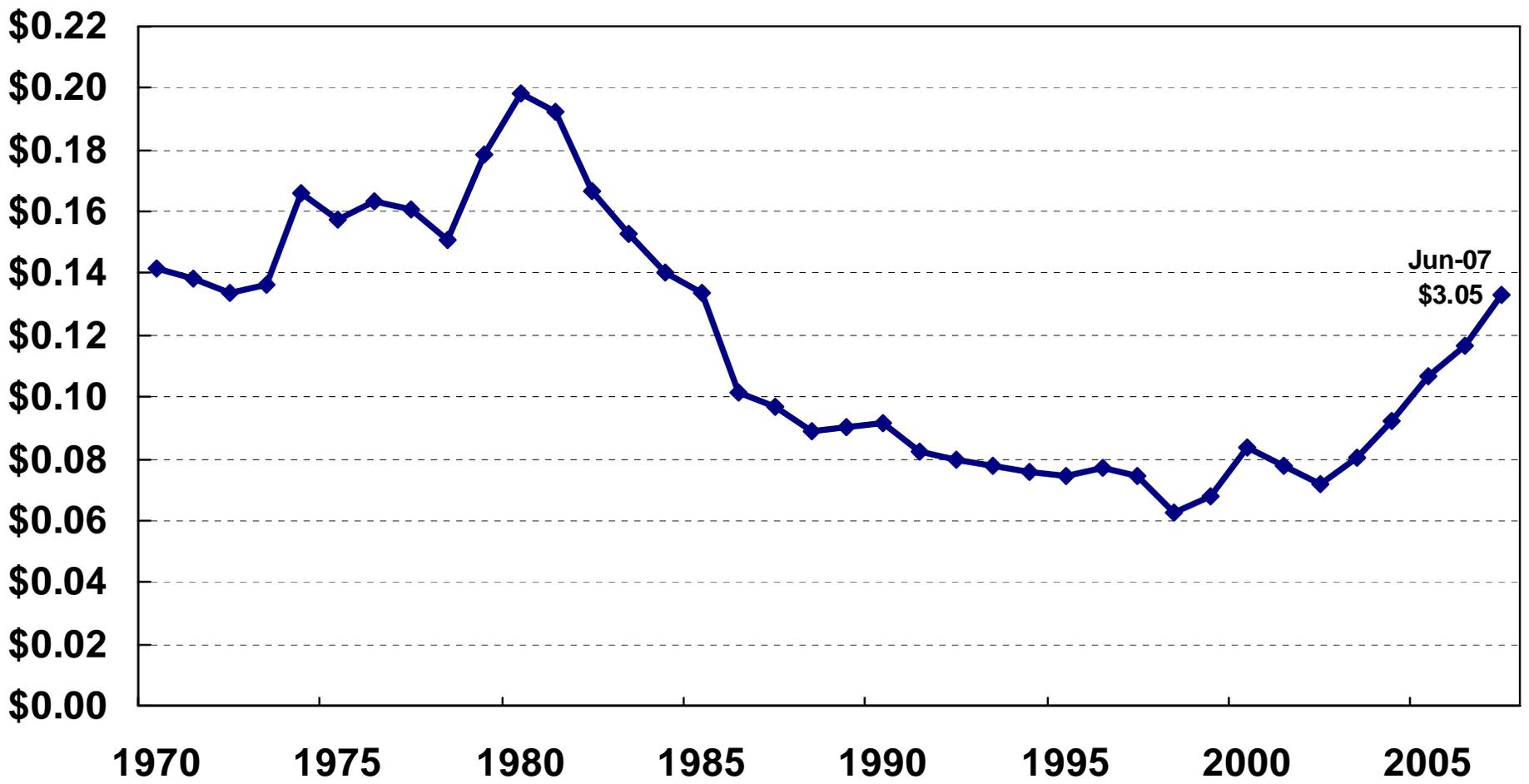
Real Gasoline Prices and In-Use Fleet MPG
(2007 \$ per gallon)



In-Use MPG from Transportation Energy Data Book: 2007

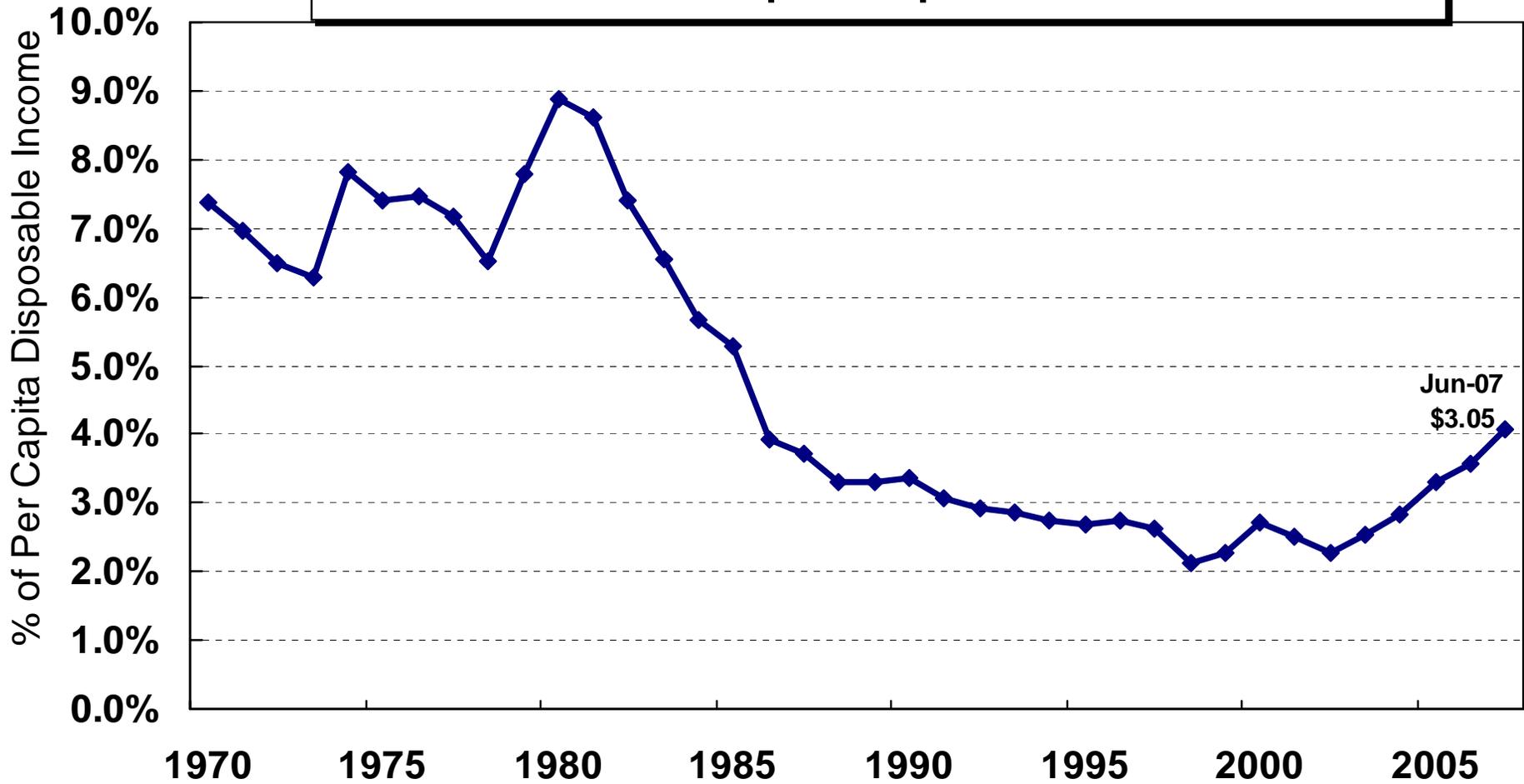
As a result gasoline cost per mile is lower.

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



And real fuel cost as a % of disposable income is lower still.

**Real Fuel Cost of Driving a Passenger Car 10,000 Miles
% of Per Capita Disposable Income**



BEA, Table 2.1, Personal Income and It's Disposition

[What will we change?]

- Travel
- Energy Efficiency
- Carbon Intensity of Energy

- All of the above?

[THANK YOU.]
