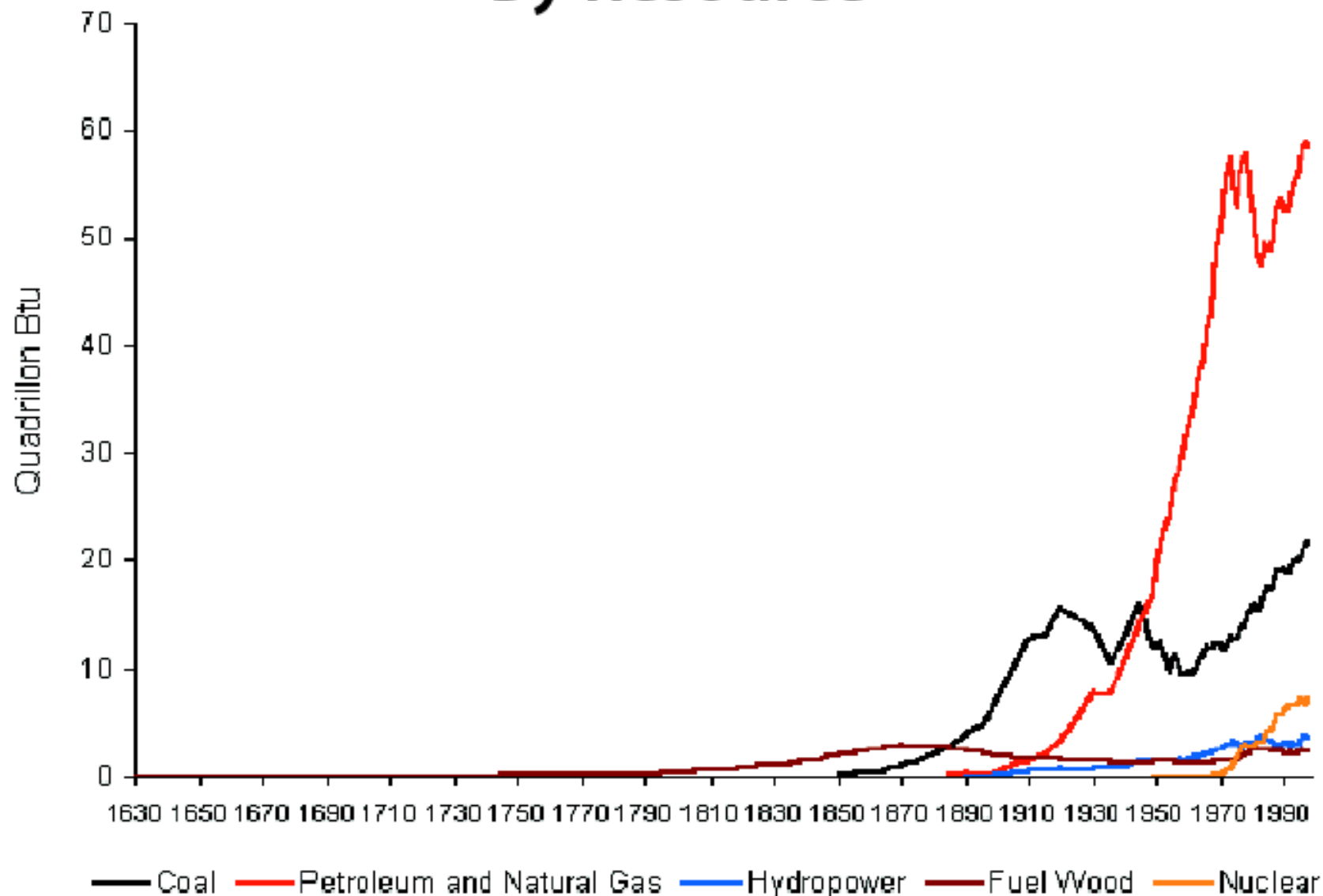


Peak Oil and the Global Economy: The Hidden Fundamental

Melissa Ahern, MBA, Ph.D.
Northwest Climate Change Center



US Consumption of Energy By Resource



U.S. Vehicles

Source: www.postpeakliving.com

Fleet	Size	Median Lifetime (years)	Cost to Replace Half of Fleet (2006 \$)
Automobiles	140 million	17	\$1.6 trillion
Light Trucks, SUVs, etc.	60 million	16	\$1.3 trillion
Heavy Trucks, Busses	7.5 million	28	\$1.7 trillion
Aircraft	8,500	22	\$0.3 trillion

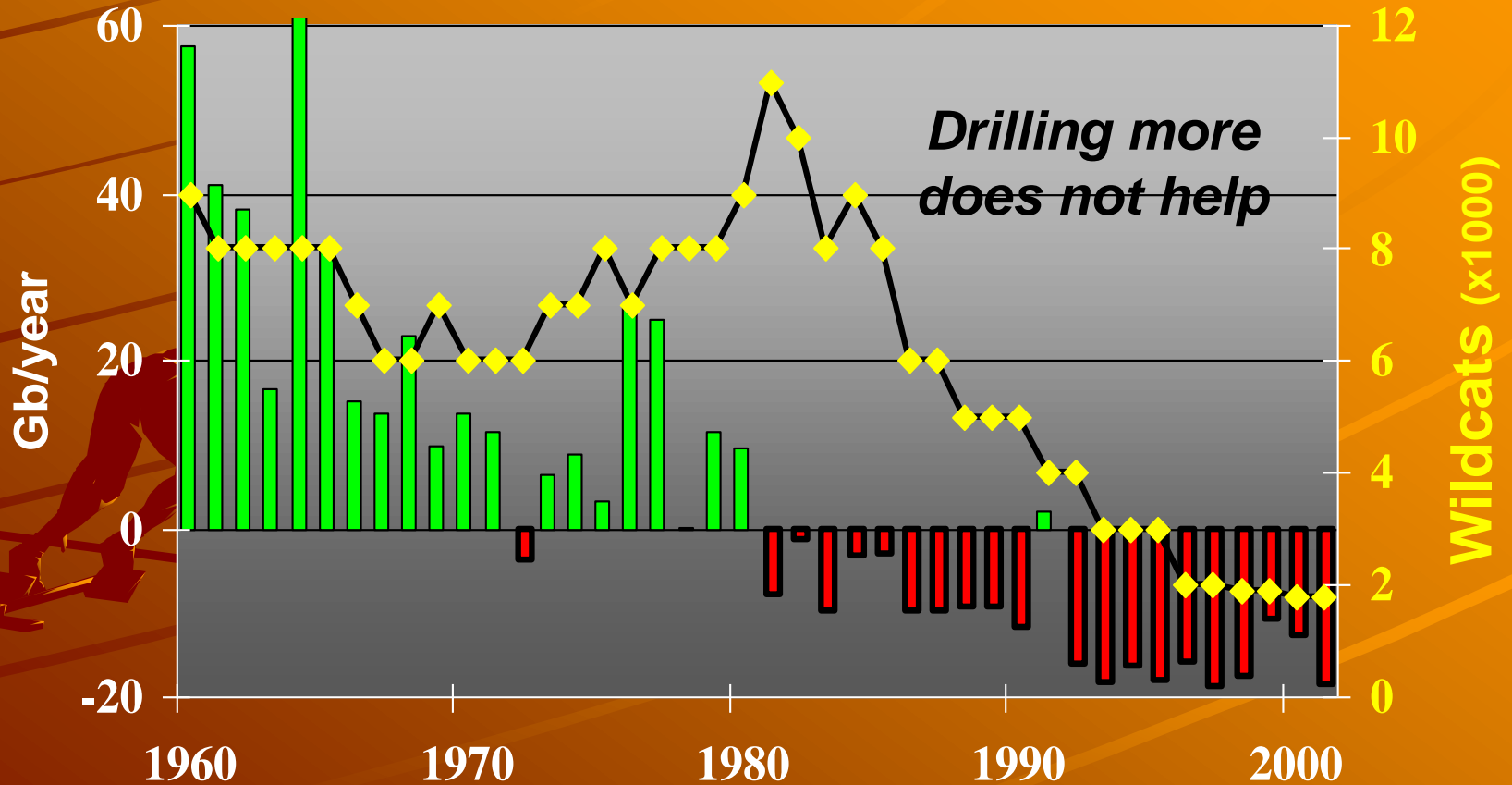
Source: Management Information Services

Geophysics of Oil Production

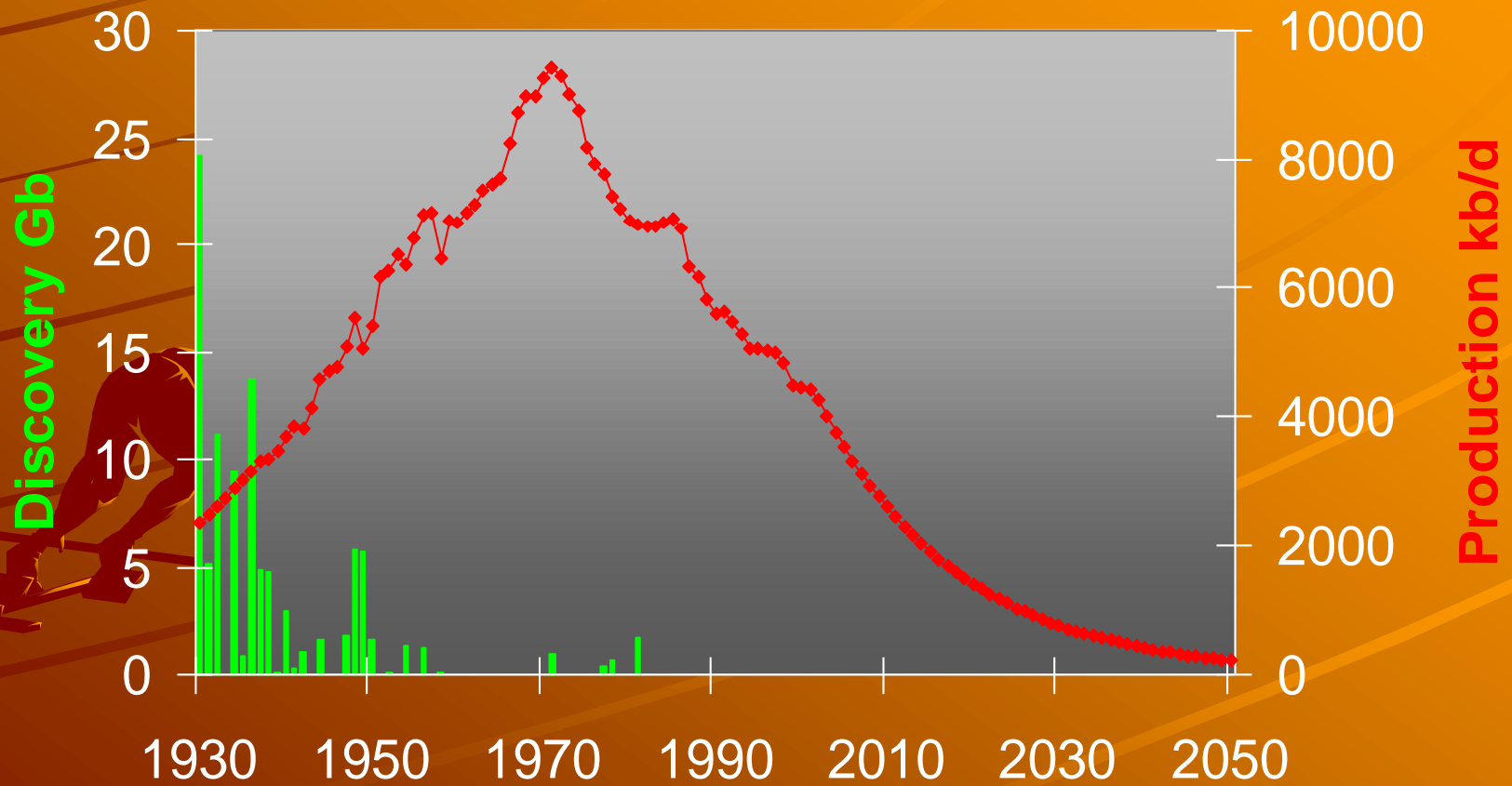
- ✦ Energy sources must produce more energy than they consume. Otherwise they are called "sinks"
 - Increasing energy inputs are required to produce additional oil in a field
 - ✦ Deeper drilling, more water cut, slower flow rate
 - At some point, more than one unit of energy needed to produce only one unit
 - At that point, oil field shuts down



The Growing Gap between Discovery and Consumption

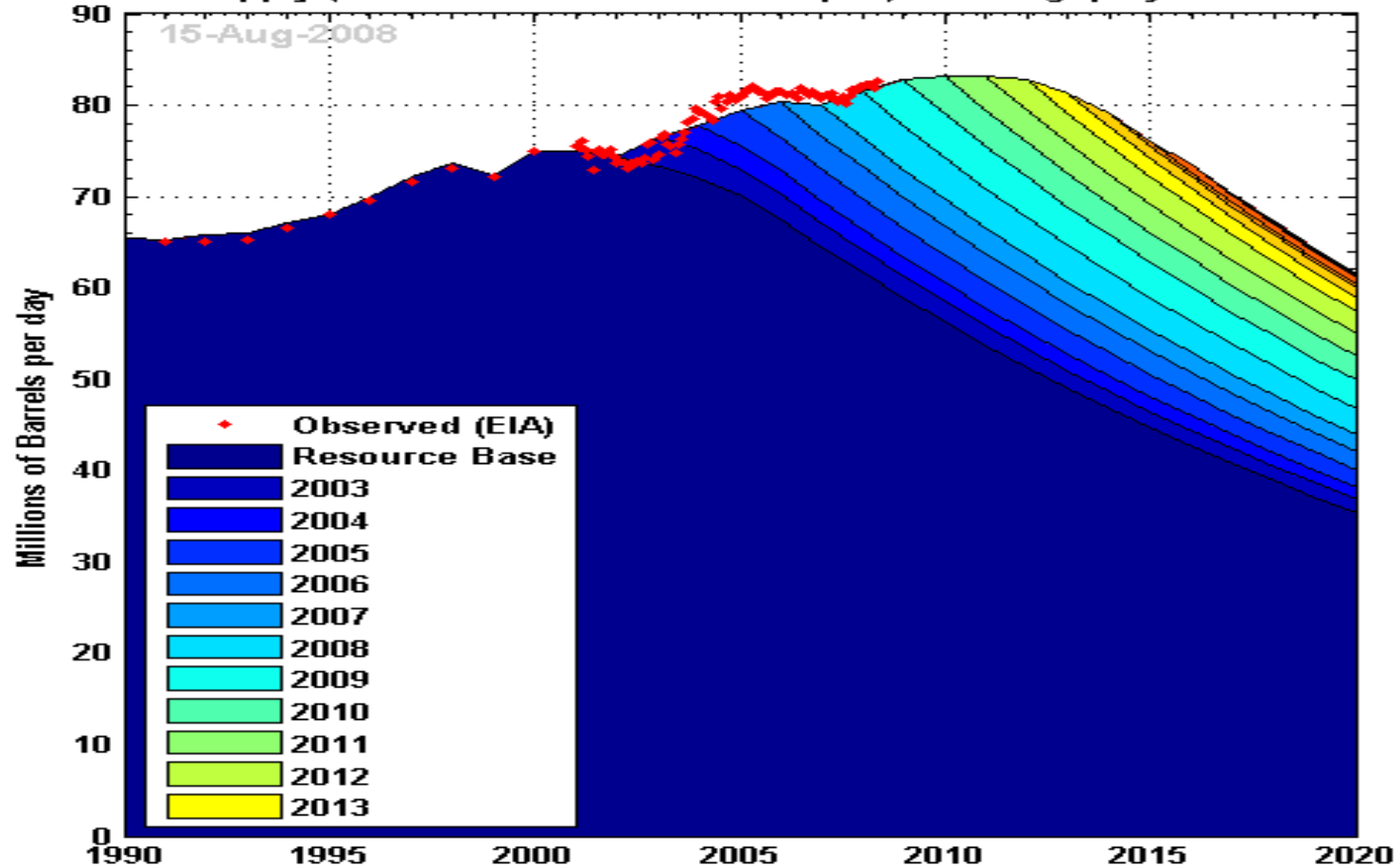


US-48



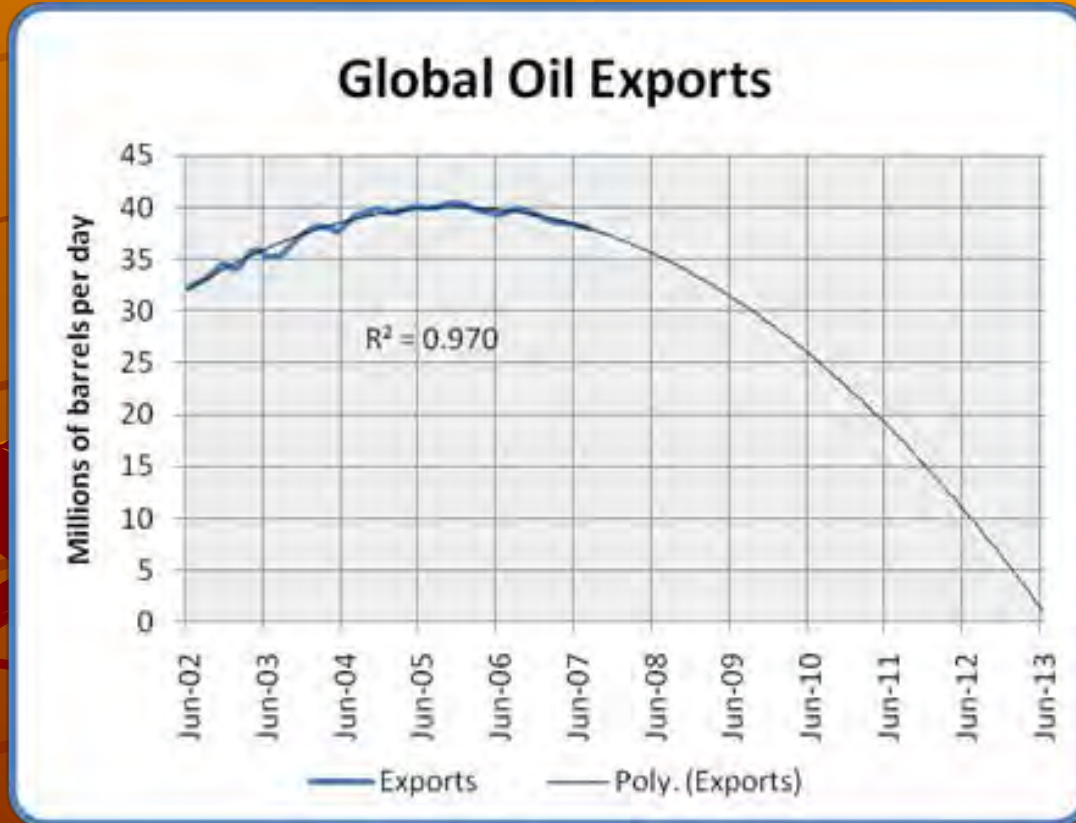
Megaprojects (Source: www.theoildrum.com)

World Oil Supply (Crude Oil + Natural Gas Liquid) and Megaproject Contributions



Declining Exports

Source: www.theoil Drum.com

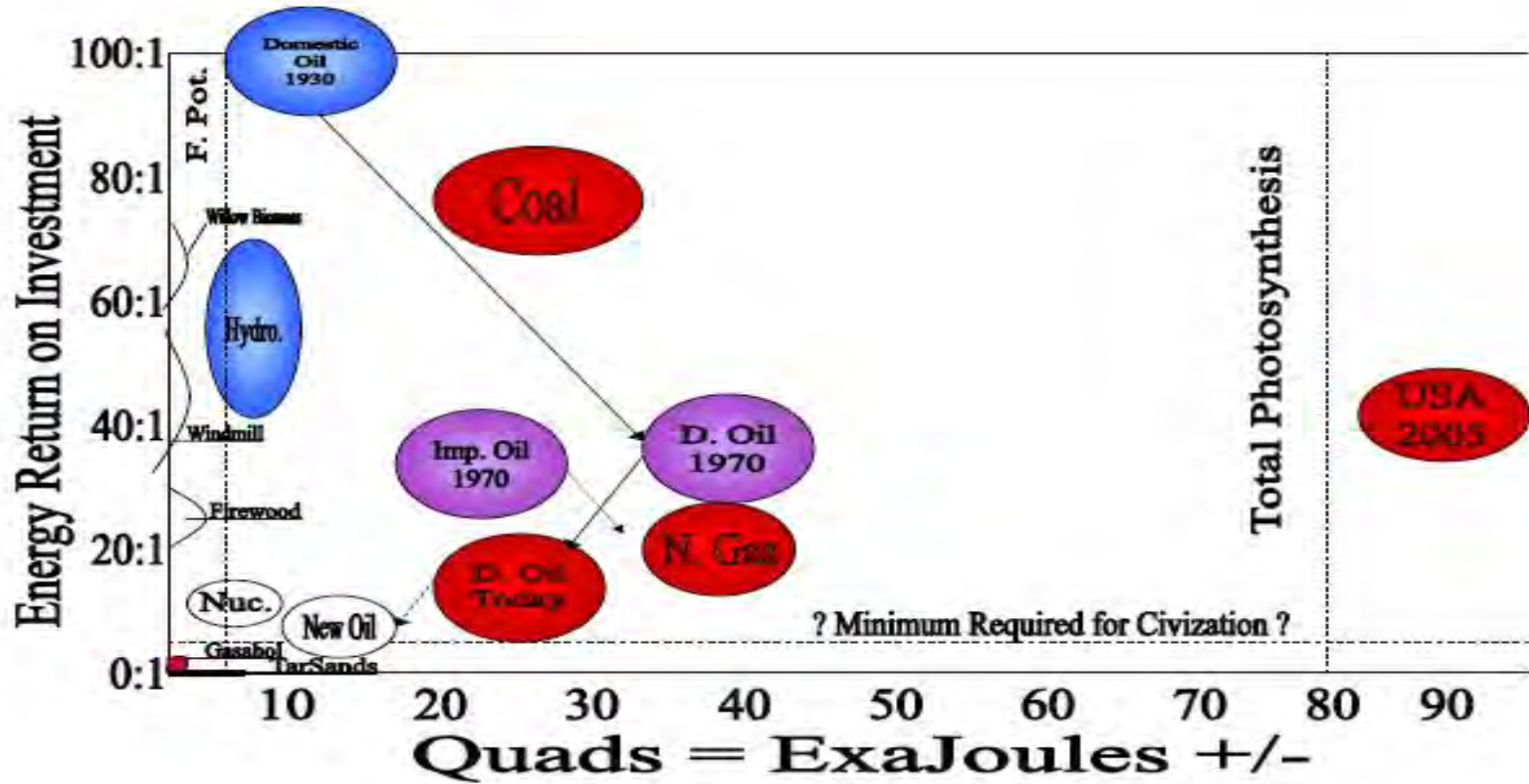


Growing Consensus

- ◆ Peak conventional oil NOW
- ◆ Peak all-liquids within 5 years
- ◆ Peak exported oil NOW



Energy-In Vs. Energy-Out



Demand and Supply: Upside and Downside Price Risk

- ◆ High oil prices stifle economic growth
- ◆ Low oil prices drive out production of higher-cost oil (\$100 marginal cost)



Inelastic oil demand

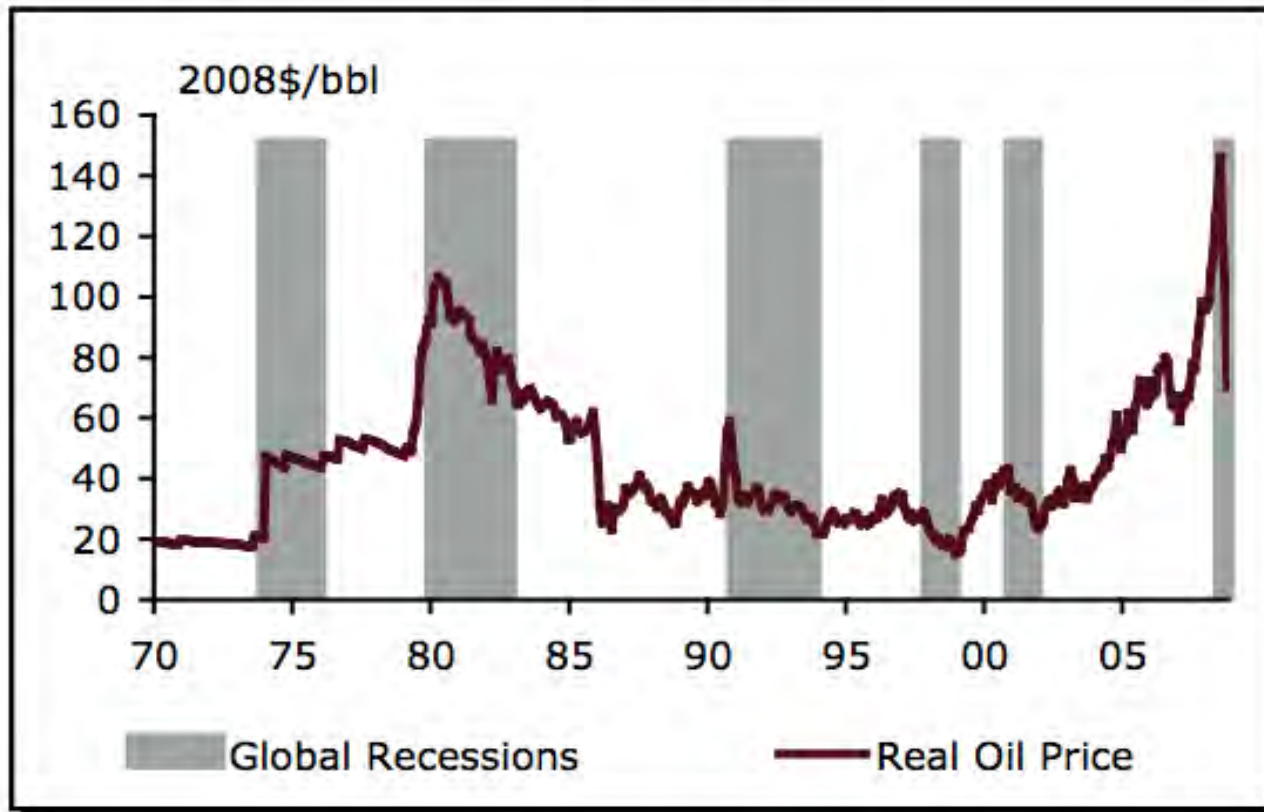
- ✦ Most important energy source
 - ✦ Drives the domestic and global economies
 - ✦ Highest BTU, easy to move
- ✦ Demand for oil is highly inelastic
 - ✦ 80%-95% of all global transport
 - ✦ Petrochemicals and lubrication
 - ✦ Goods transport
 - ✦ Food production and distribution
 - ✦ Oil or gas for fertilizers, agrichemicals, tilling, cultivation and transport



The Economy and Oil

Source: CIBC World Markets, Jeff Rubin, October 31, 2008

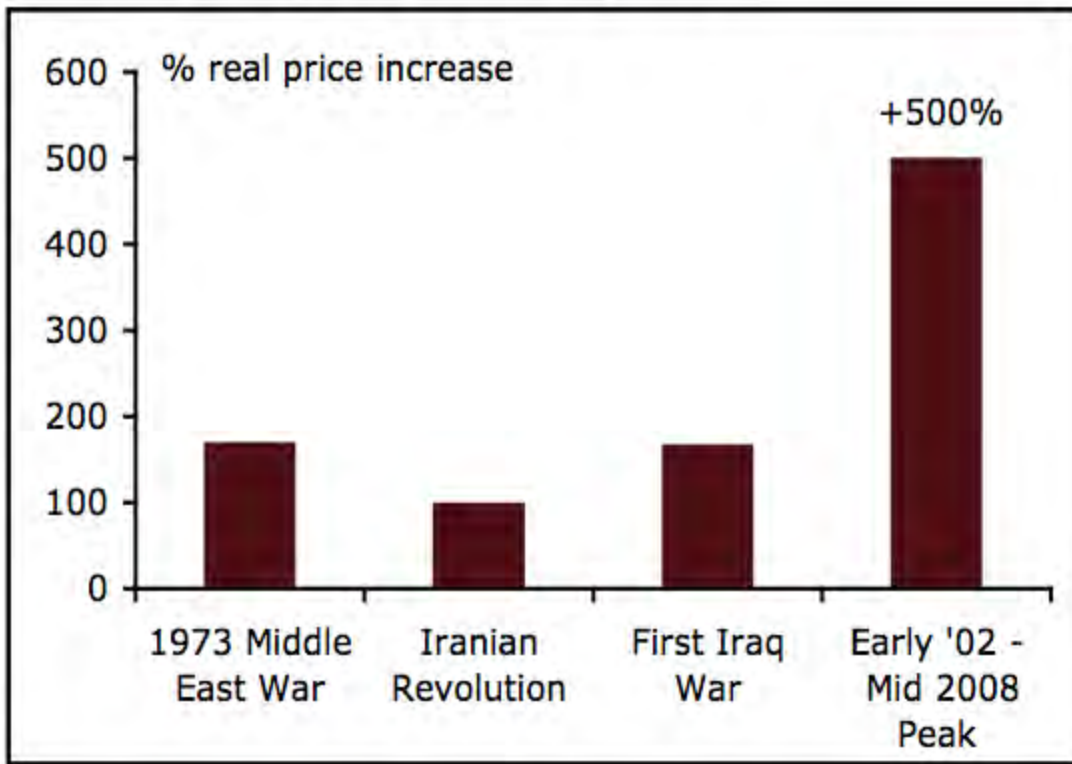
Past Recessions and Oil Spikes



Recent Oil Spike vs. Past Spikes

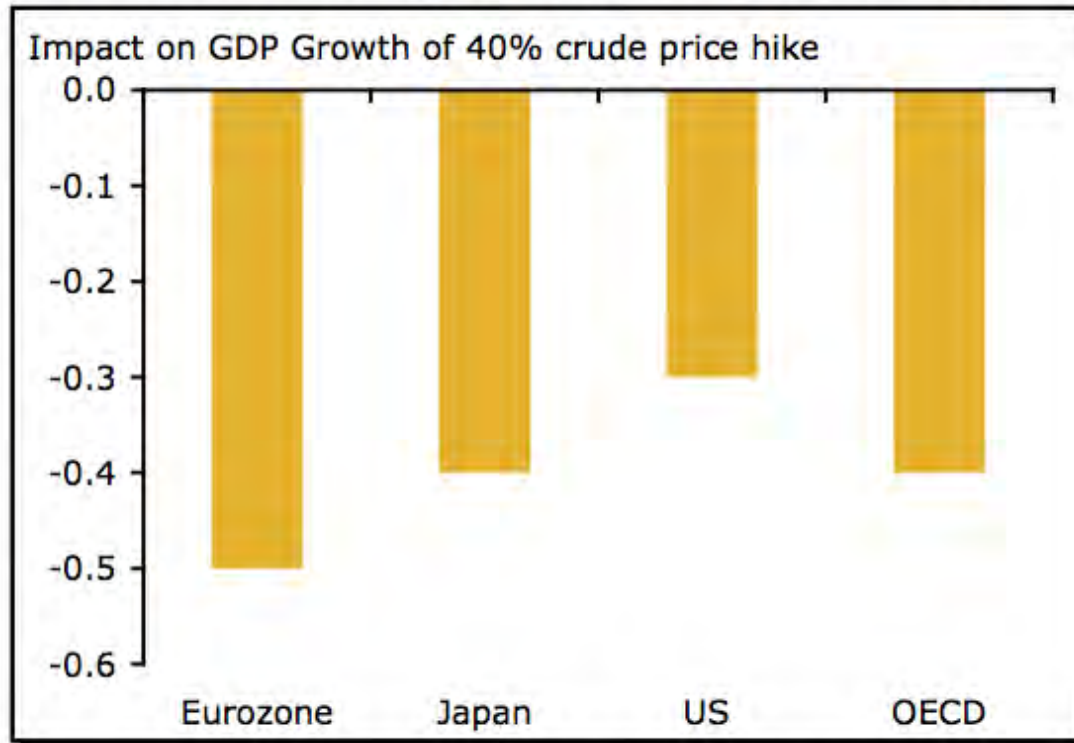
Source: CIBC World Markets, Jeff Rubin, October 31, 2008

Recent Oil Spike vs Past Spikes



Oil Price Sensitivity of Different Economies

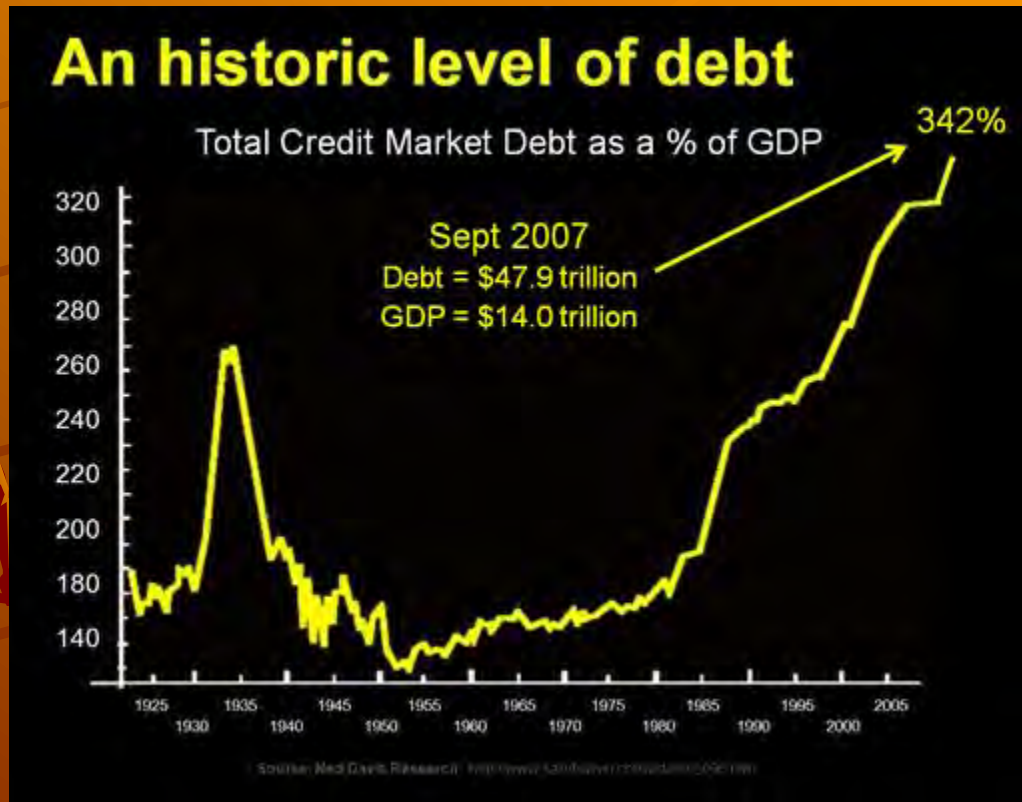
Oil Price Sensitivity of Different Economies



Source: IEA, "Analysis of the Impact of High Oil Prices on the Global Economy"

Debt Makes Everything Harder

Source: The Crash Course, www.chrismartensen.com



Solutions??

Alternative	Not a solution because...	Barrels per Day
Nuclear	Provide electricity not liquid fuel	0
Wind		
Solar		
Tidal		
Geothermal		
Hydrogen	Not economic and no infrastructure	0
Ethanol, Biodiesel	Not economic and does not scale	848,000
Shale Oil	Not commercial	0
Tar Sands	Not scalable	1,550,000
Coal-to-Liquid	Extremely expensive, long lead time	<200,000

What to do?

- ✦ Electrified Transportation
 - Use renewables for power
- ✦ Conservation
 - Best new source of energy
- ✦ Use alternative sources that have best **EROI**

