

RMS-AAPG and COGA

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**Global Energy
Myths, Realities and Paradoxes**

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The Global Energy Road

- **Fossil fuels are the bridge to an alternate energy future.**
- **Alternate energies will take time, technology, and money to scale up.**
- **The cost to reduce carbon is high; everyone must play and pay or we risk the global economy.**

Webster's Online: Myth

Main Entry: myth Pronunciation: \ˈmɪθ\ Function: *noun*

Etymology: Greek *mythos* Date: 1830

1 a: a usually traditional story of ostensibly historical events that serves to unfold part of the world view of a people or explain a practice, belief, or natural phenomenon b: [parable](#), [allegory](#)

2 a: **a popular belief** or tradition that has grown up around something or someone; *especially* : one embodying the ideals and institutions of a society or segment of society <seduced by the American *myth* of individualism — Orde Coombs>

2 b: **an unfounded or false notion**

Webster's Online: Paradox

Main Entry: par·a·dox Pronunciation: \ˈpər-ə-ˈdäks, ˈpa-rə-\ Function: *noun* Etymology: Latin *paradoxum*, from Greek *paradoxon*, from neuter of *paradoxos* contrary to expectation, from *para-* + *dokein* to think, seem — more at [decent](#) Date: 1540

1: **a tenet contrary to received opinion**

2 a: **a statement that is seemingly contradictory or opposed to common sense** and yet is perhaps true

2 b: a self-contradictory statement that at first seems true

2 c: an argument that apparently derives self-contradictory conclusions by valid deduction from acceptable premises

Ten Energy Myths

6. **“Big Oil” controls the price of oil and gasoline and makes “obscene” profits.**
7. **Cutting oil imports will stabilize gasoline prices.**
8. **Global production of oil and natural gas are “peaking” and we are running out of fossil energy soon.**
9. **All coal is dirty.**
10. **The cost of energy increasing.**

Ten Energy Myths

- 1. The US can be energy independent in the next 25 years.**
- 2. “Renewable energy” can reduce dependence on fossil fuels significantly in the next 25 years.**
- 3. The economy will adapt easily to a rapid, federally imposed energy transition.**
- 4. Energy efficiency and savings (alone) will solve the problem.**
- 5. There is plenty of low cost (conventional) oil ready to be found.**

Energy Paradoxes

Crisis/Policy Paradox

Sound energy policy is necessary to prevent an energy crisis, yet crisis is seemingly necessary to cause policy to be considered.

Energy Paradoxes

Economy/Carbon Paradox

Emissions from the combustion of fossil fuels enhance global warming which harms the economy, yet a healthy economy relies on fossil energy today.

or

The road to an alternate (clean) energy future must be paved with fossil energy.

Energy Paradoxes

Government/Markets Paradox

Government policies are needed to enhance free market behavior.

Energy Paradoxes

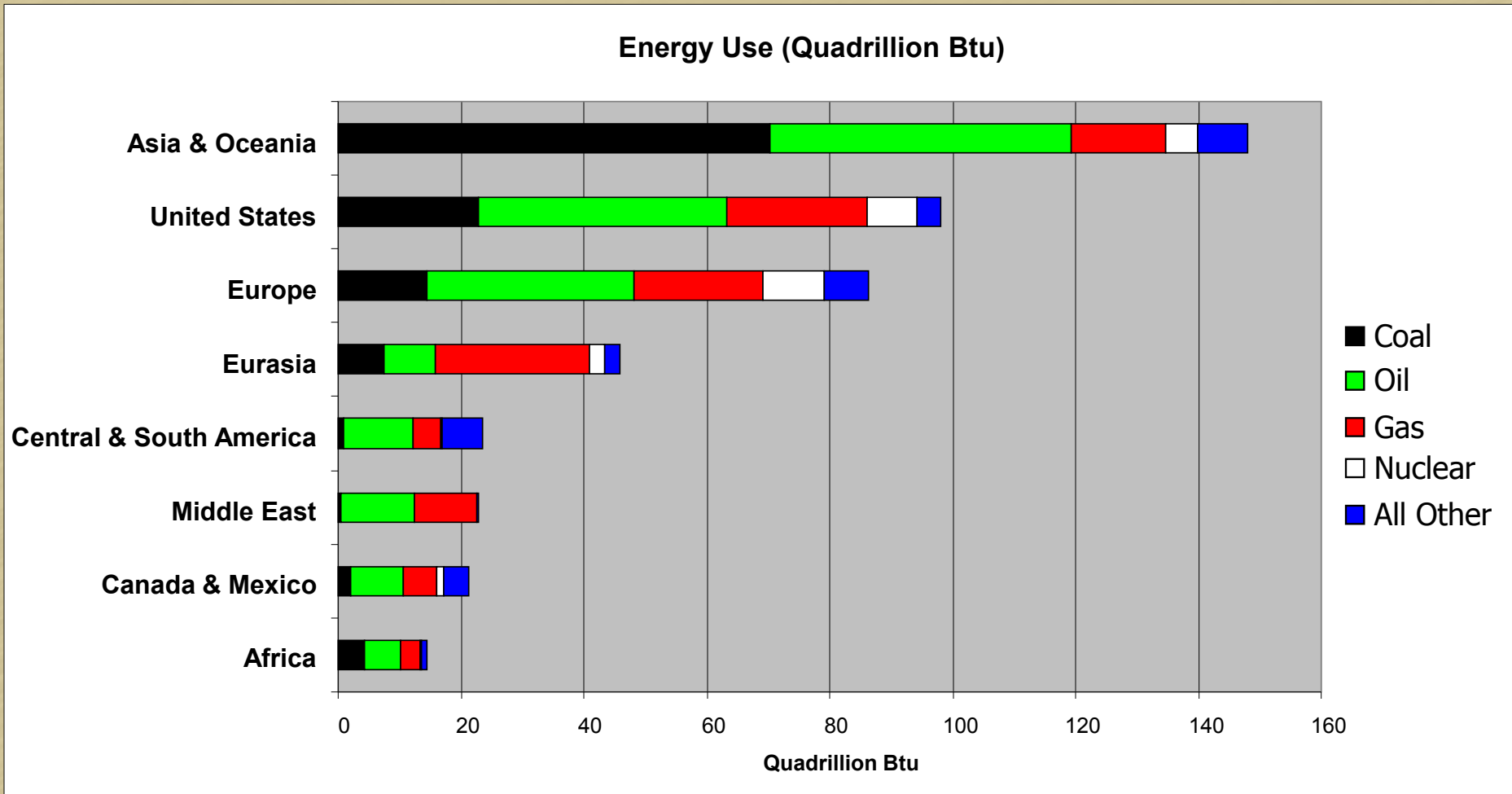
Nationalization/Globalization Paradox

The US should be energy independent in order to remain a global leader in an interdependent world.

Myth 8

Global production of oil and natural gas are “peaking” and we are running out of fossil energy soon.

Global Energy

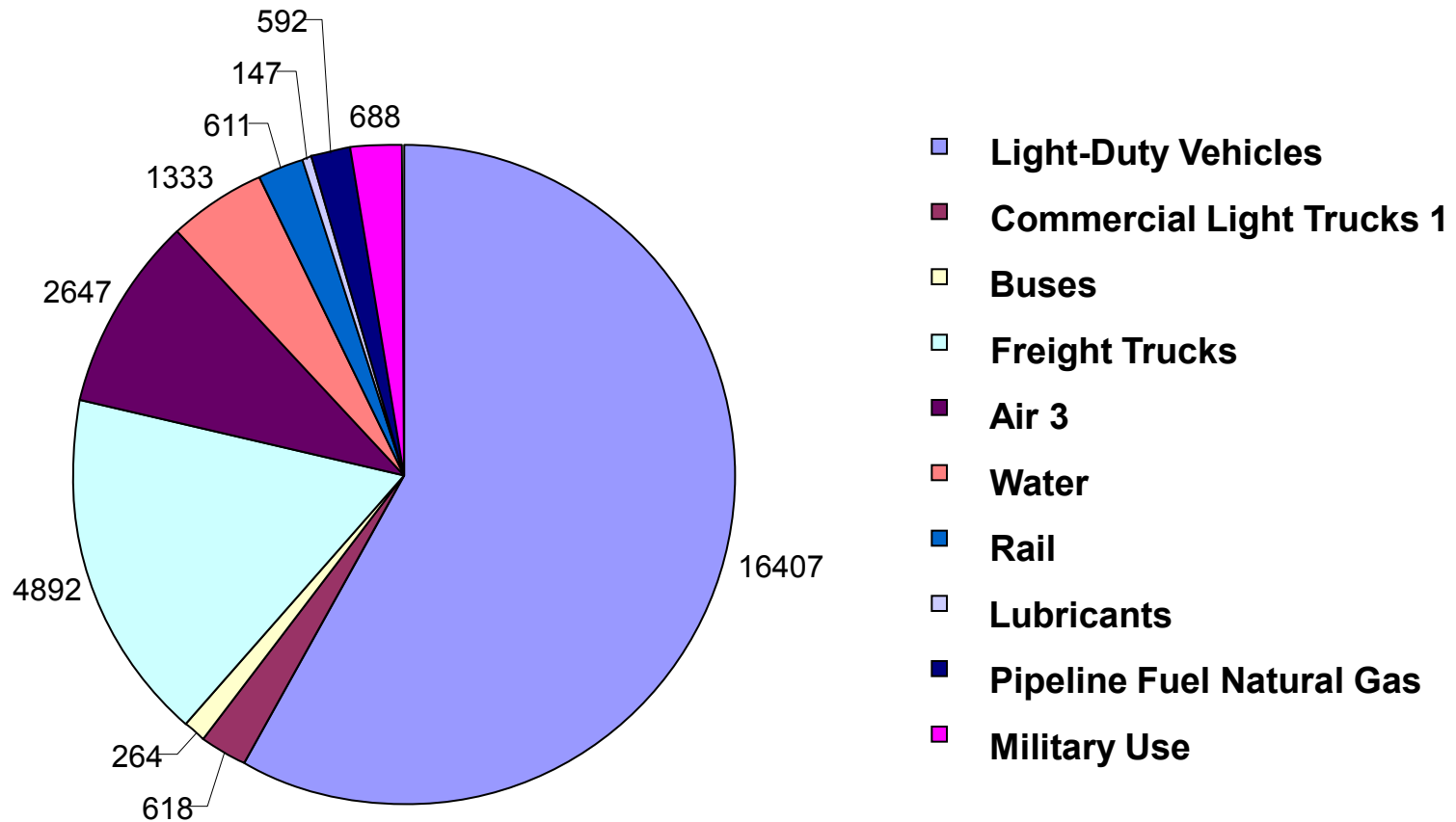


Data: EIA, October 2007

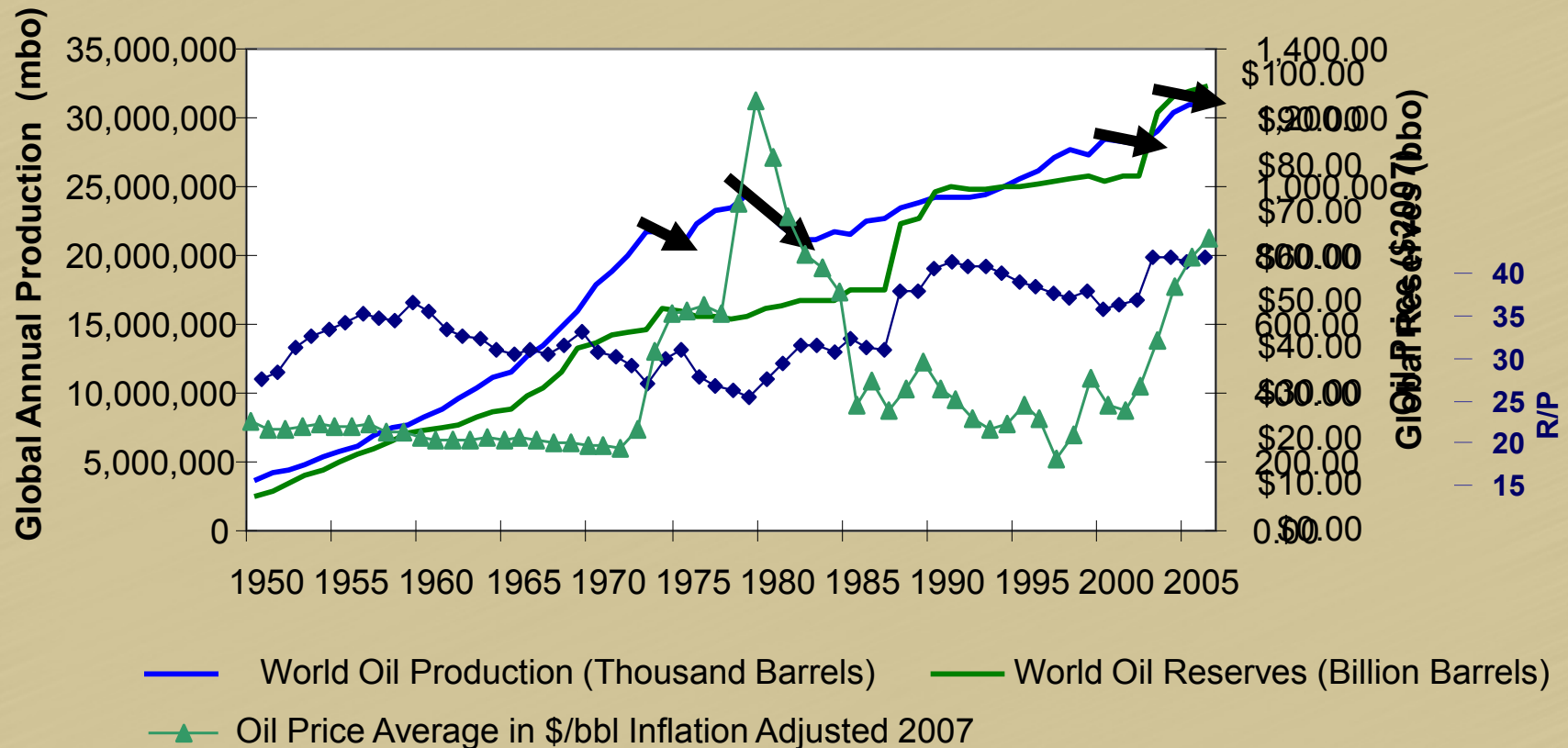
We depend upon fossil fuels today.

US Energy Mix

US Transportation Energy Demand (2006 Btu)



Global Reserves and Production



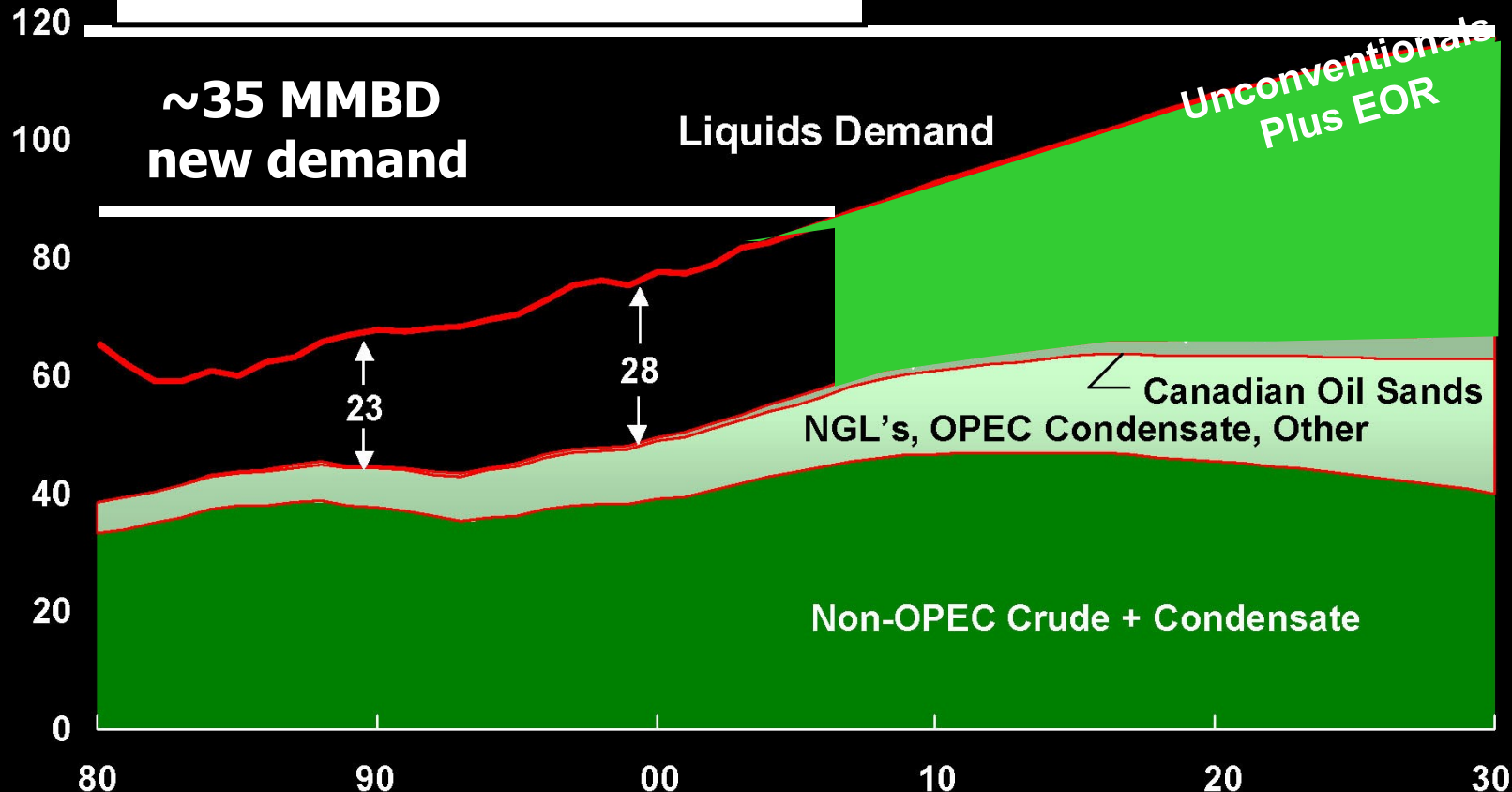
Source: 1980-2007 Energy Information Administration As of January 2008
 (www.eia.doe.gov/pub/international/iealf/crudeoilreserves.xls), 1950-1980
 OPEC (http://www.opec.org/library/)

World Liquids Production Outlook

MMBD

If China and India grow from 1 B/P/Y today to 5 B/P/Y by 2030, it will create 48 MMBD of new demand

The Conventional Oil
“Wedge”



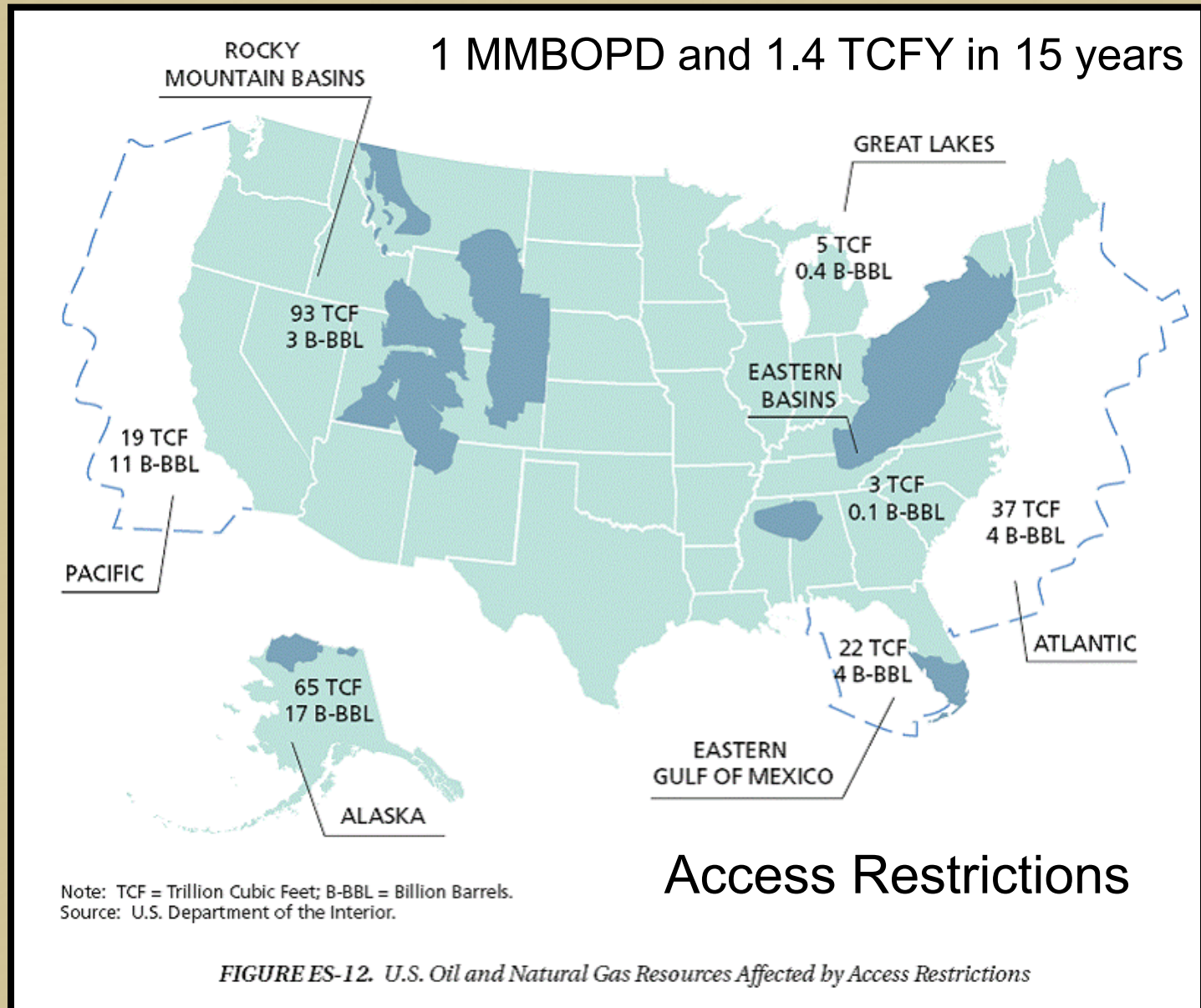
ExxonMobil

Options to Conventional Oil

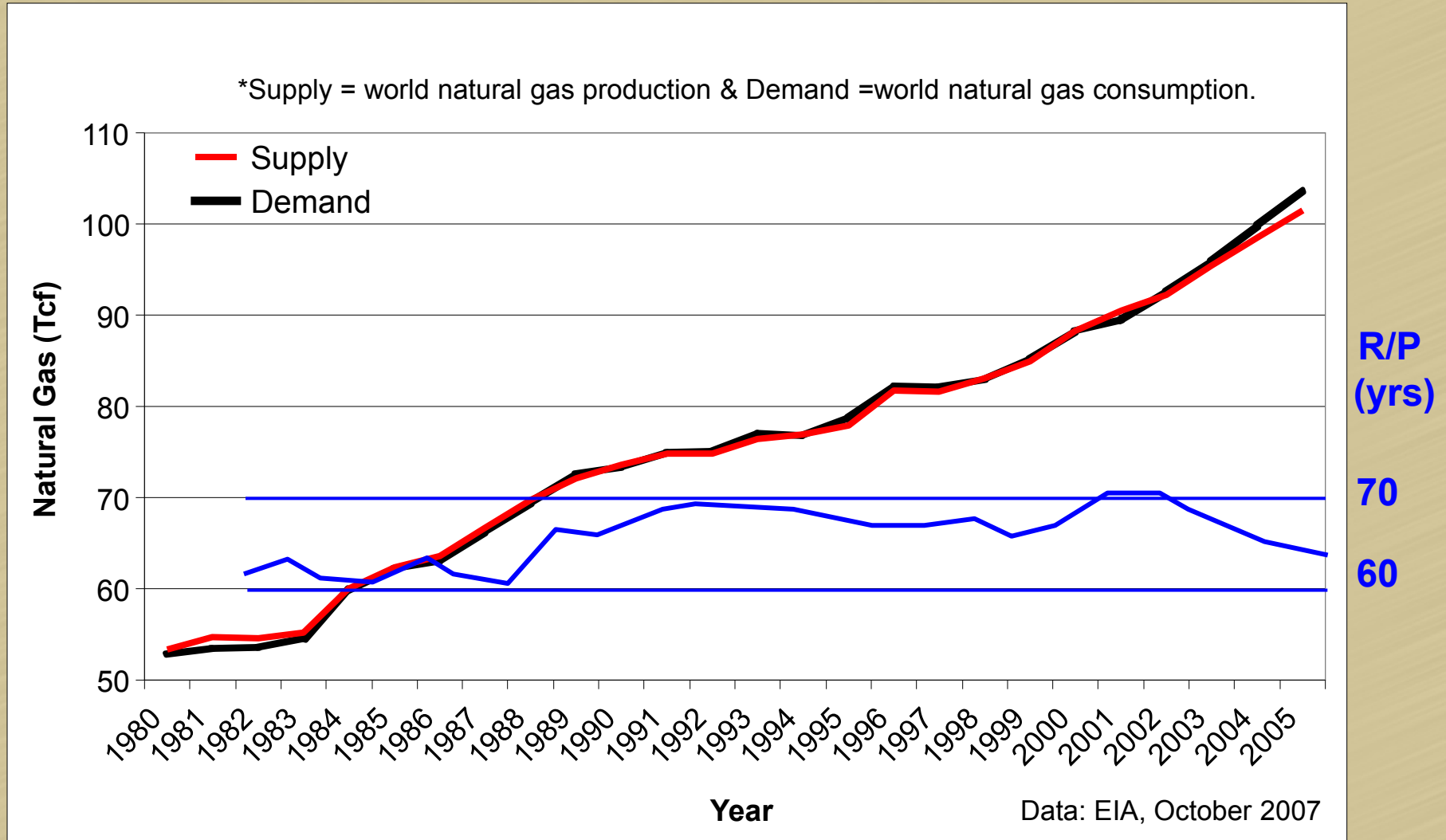
<u>Option</u>	<u>Time to Initiate</u> <u>(Yrs)</u>	<u>Impact (+10 Yrs)</u> <u>(MM bpd)</u>
– Enhanced Oil Recovery	5	3
– Heavy Oils / Oil Sands	3	8
– Shale Oil	10	2
– Coal Liquids	4	5
– Gas-To-Liquids	3	2
– Biofuels	2	1
		21

after Hirsch et.al, 2005

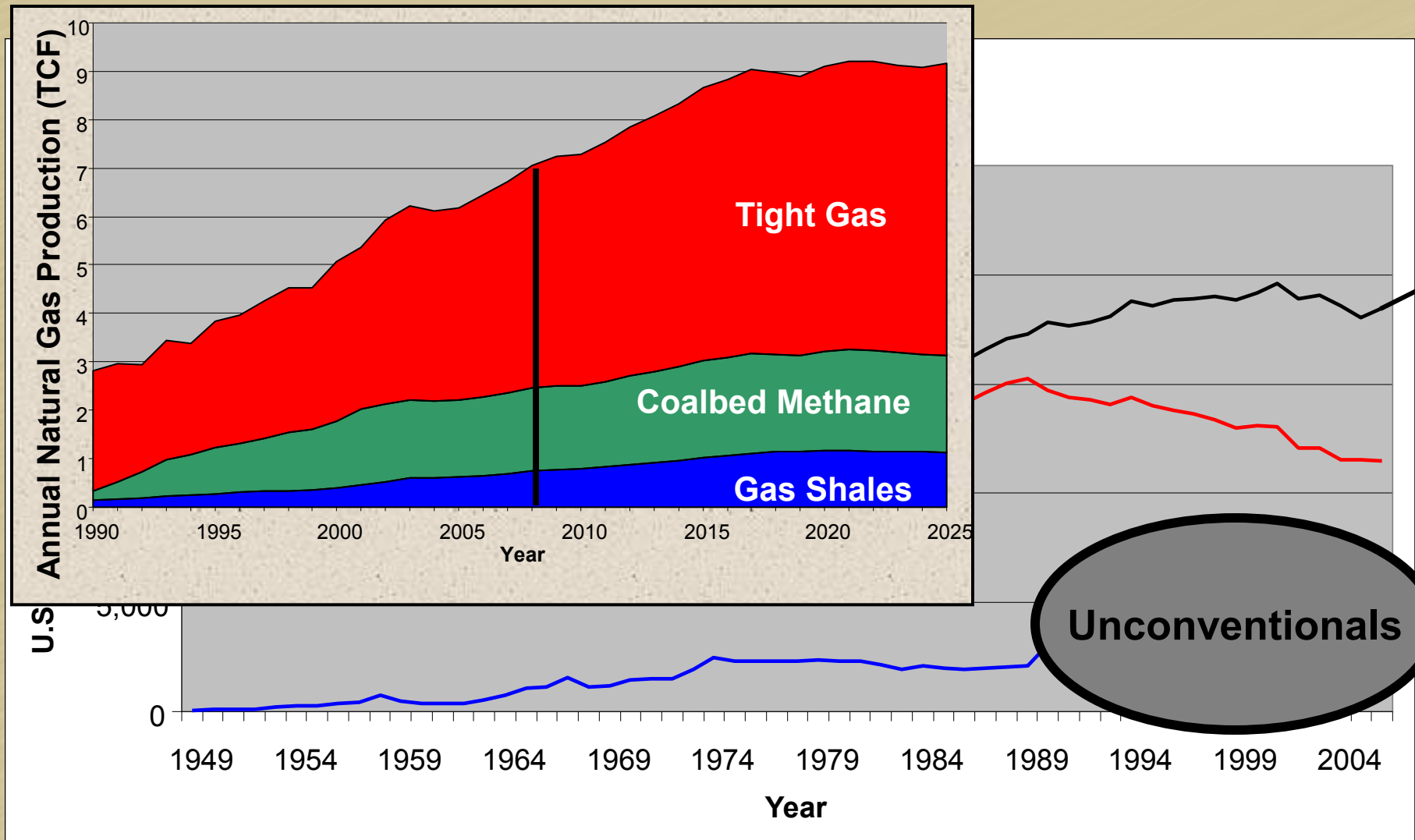
One More Option to Conventional Oil...



Global Natural Gas Supply and Demand



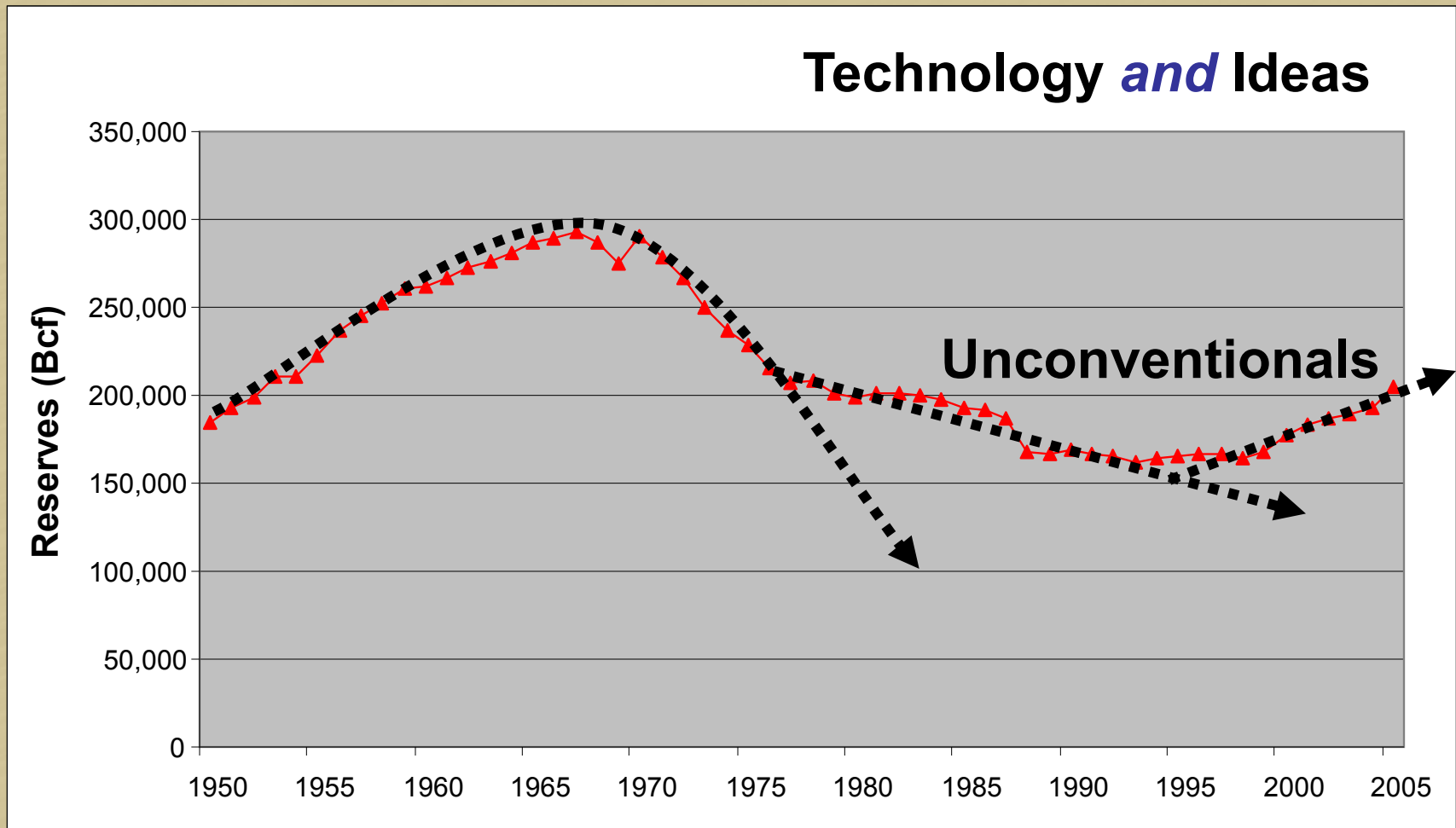
U.S. Natural Gas Production



Conventionals: EIA (1949-1990) and NPC (1991-2015)

Unconventionals: 1970-1988 data from GRI, 1999. Updated data from 1989-2005 is from EIA, 2007

US Dry Natural Gas Reserves



Source: Energy Information Administration (EIA)

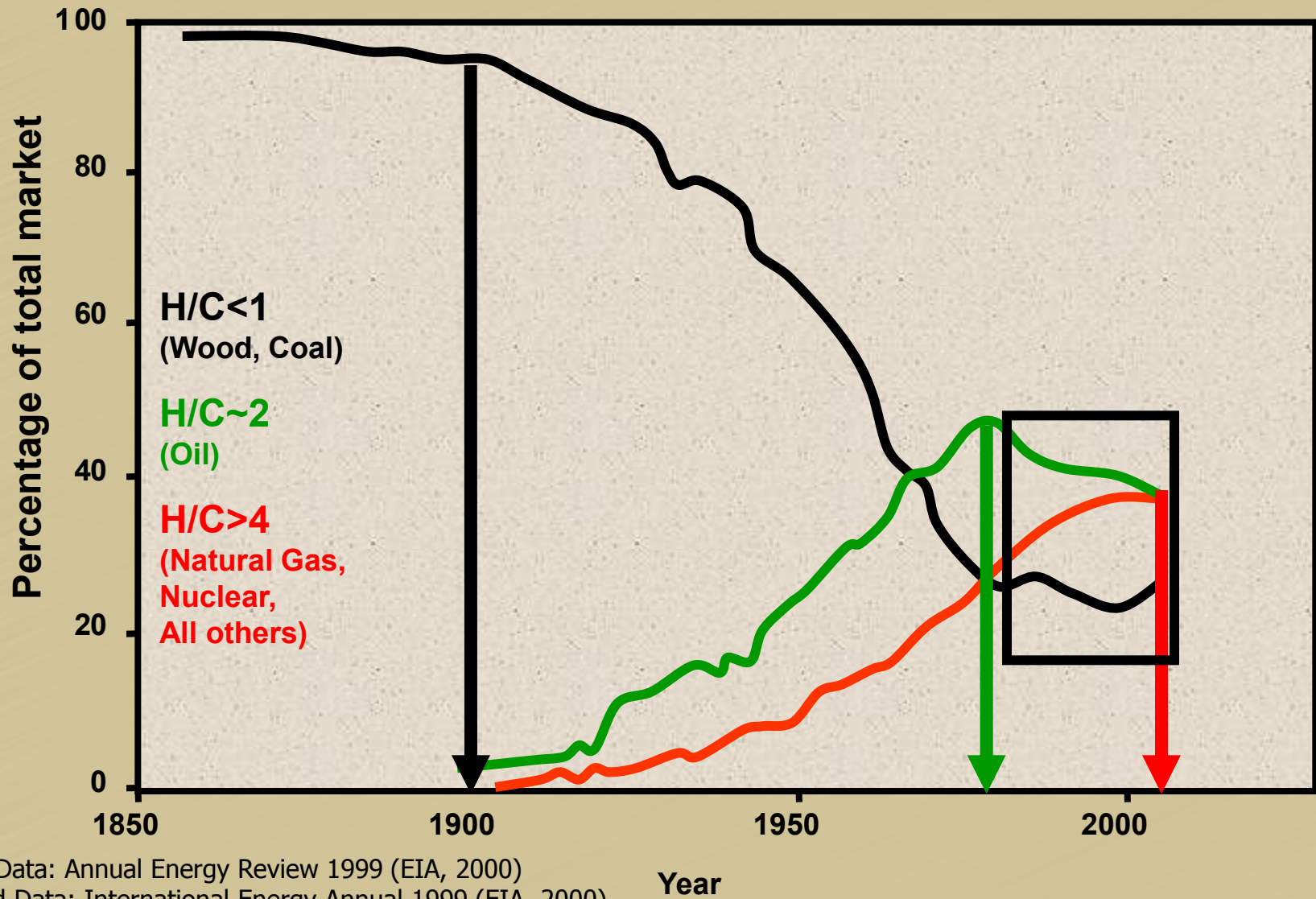
Myth 8 Realities

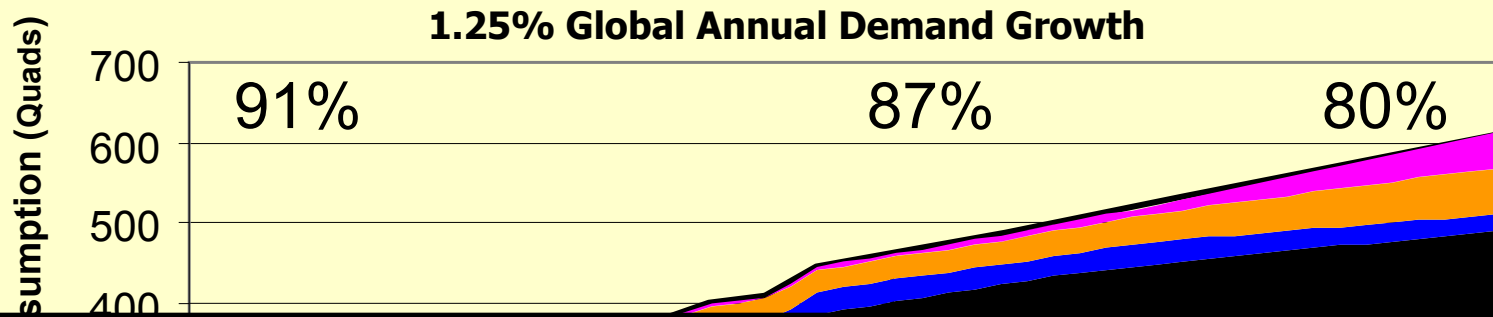
- **Easy to produce (but hard to find!)
conventional oil will plateau and then decline;
i.e. the conventional oil “plateau”**
- **Global natural gas production is a few decades
away from a plateau**
- **Easy to find (but hard to produce!)
unconventional oil and natural gas are playing
a growing role (function of environmental
policy, economics and technology)**
- **Fossil fuel resources combined (oil, natural gas
and coal) could provide over two hundred
years at current consumption rates**

Myth 2

**“Renewable energy” can
reduce dependence on fossil
fuels significantly in the next
25 years.**

Global Energy Consumption

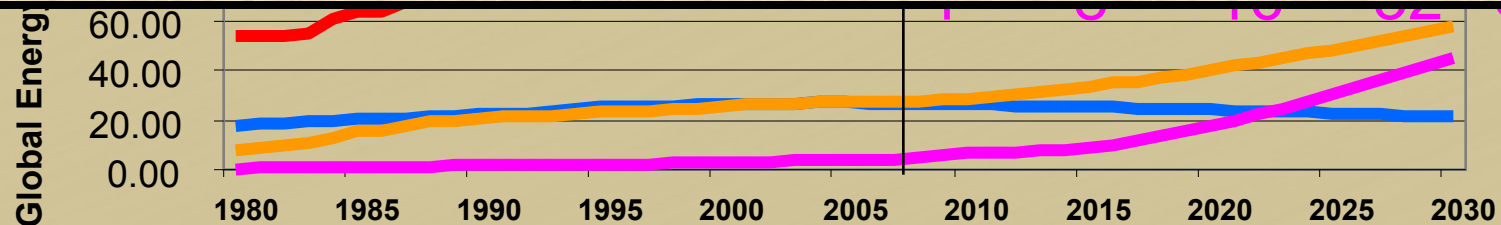




Sound energy policy is necessary to prevent an energy crisis, yet crisis is seemingly necessary to cause (poor) policy to be considered.

and

The road to an alternate (clean) energy future must be paved with fossil energy.



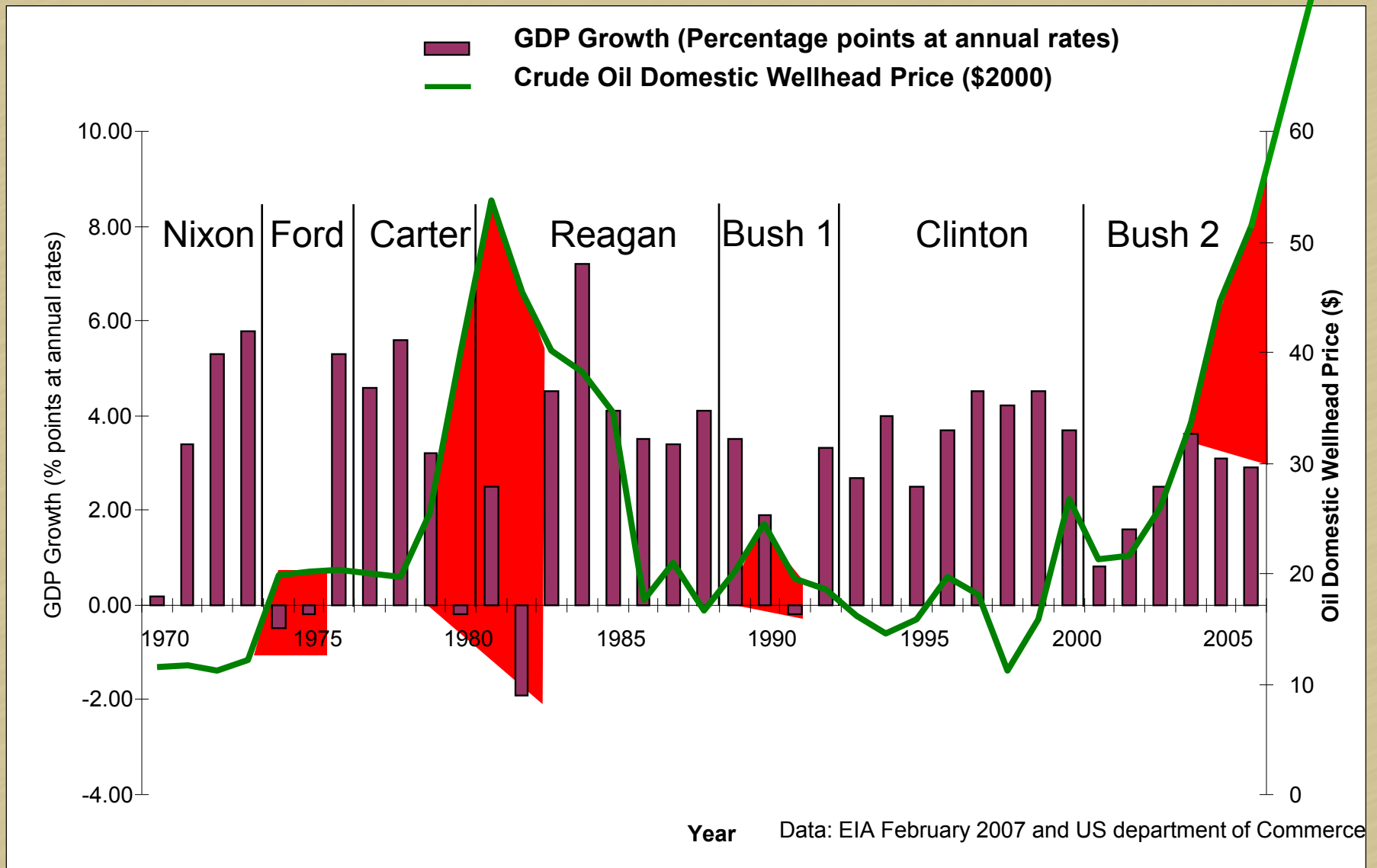
Myth 2 Realities

- **Energy is not “renewable”**
- **One of the great challenges of alternate energy is scale**
- **Energy transitions take time and are expensive**
- **Oil is beginning to plateau**
- **Disruptive breakthroughs in electricity storage and transmission are needed to facilitate alternate energy**

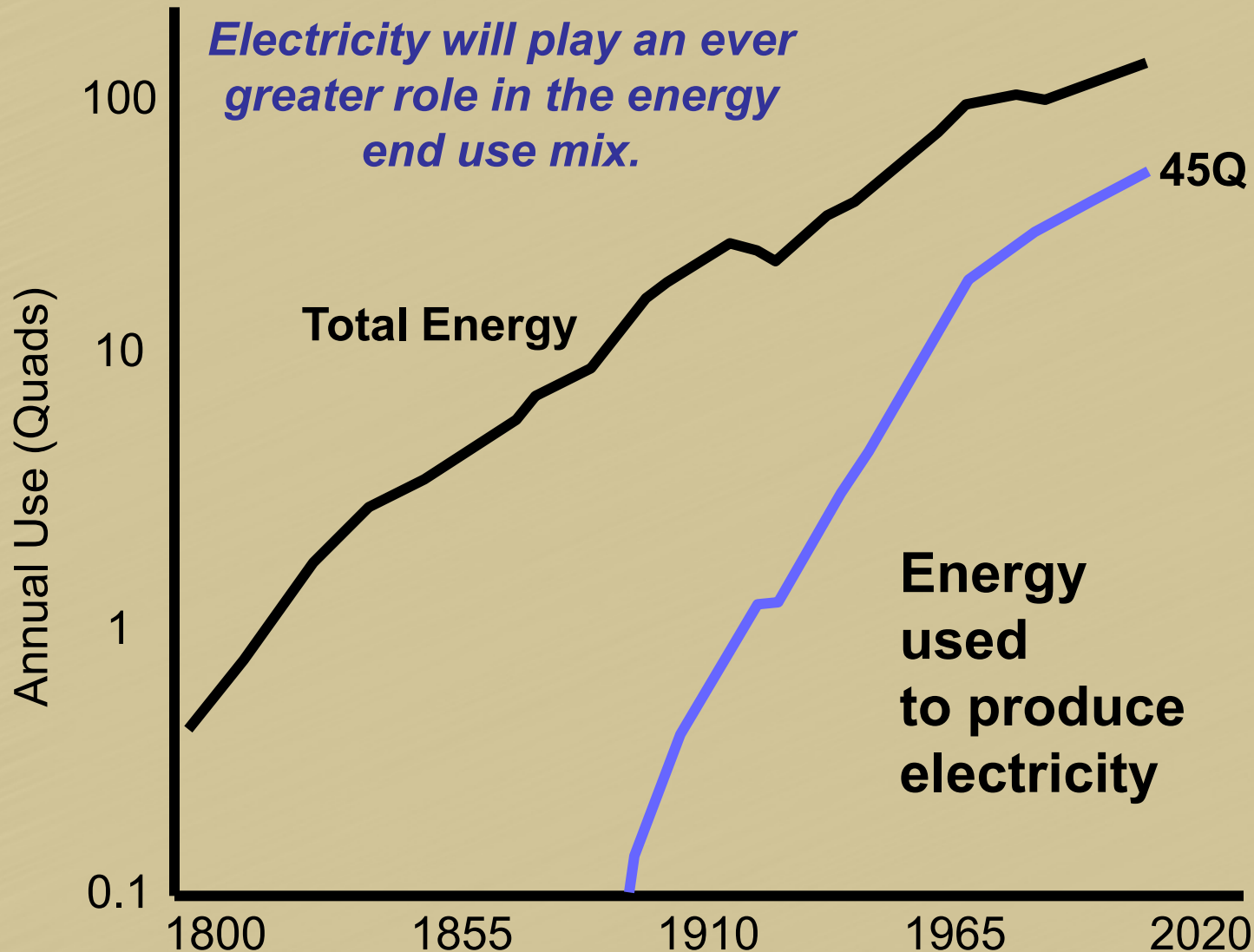
Myth 1

**The US can be energy
independent in the next
25 years.**

US Economy and Oil Price



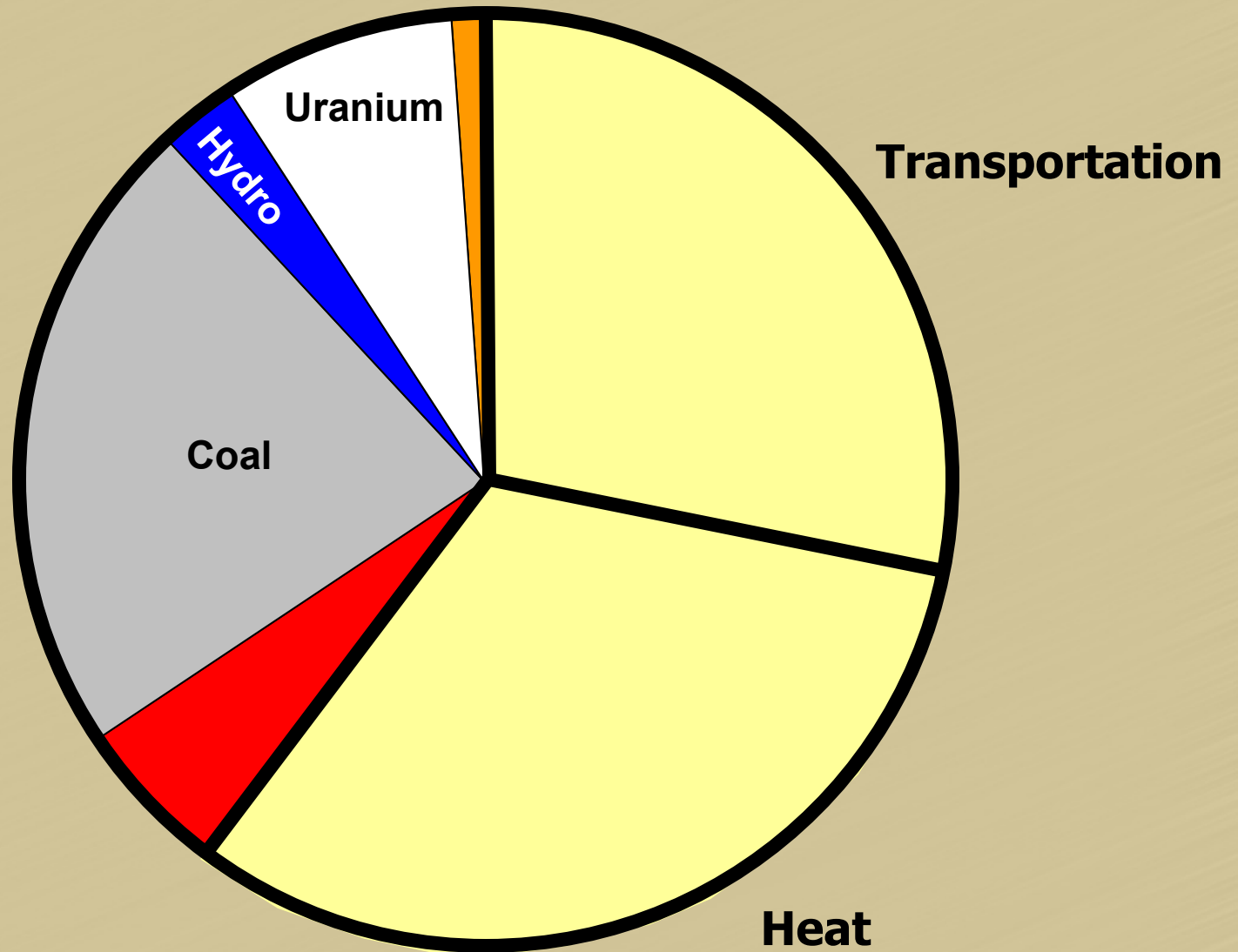
Electricity's Role



After Huber and Mills, 2005.

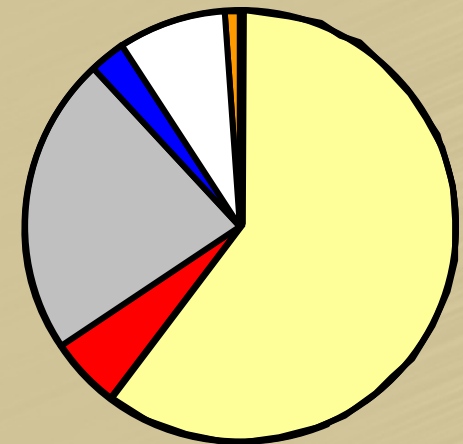
Data: EIA, Annual Review, 2003. US Census Bureau, Historical Statistics of the US Colonial Times to 1970

Electricity

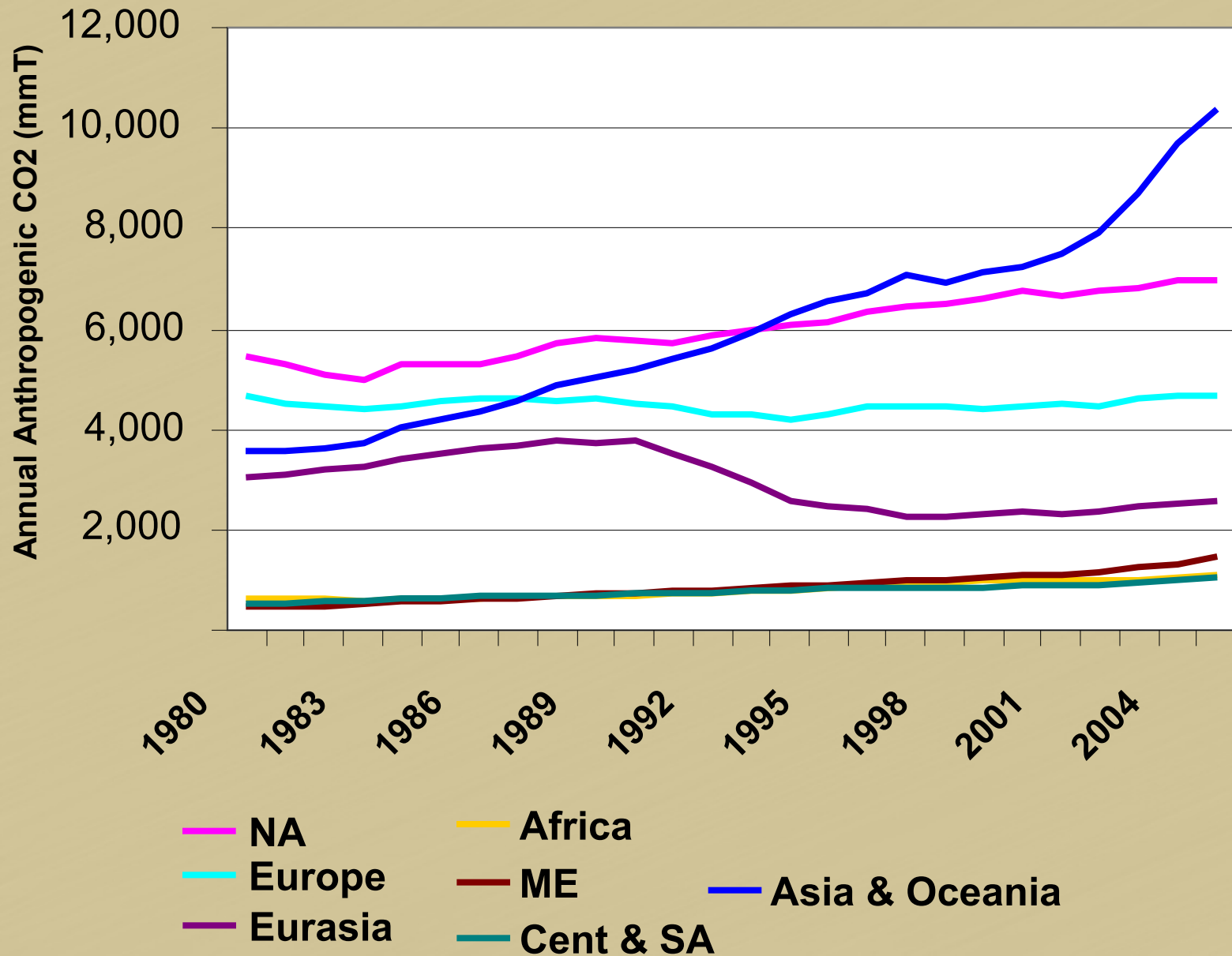


Electricity Options

- **Natural Gas**
 - Abundant, reliable, price volatility, and cleaner
 - *Challenges: Global deliverability (LNG) and Access*
- **Coal**
 - Abundant, reliable, cheap and dirty
 - *Challenge: Sequestration (IGCC w/CCS), financing, public perception*
- **Nuclear**
 - Abundant, reliable, moderate price and cleaner
 - *Challenges: Waste disposal, security, public perception*
- **Renewables**
 - Cleaner, less reliable and more expensive
 - *Challenge: Capacity impacts cost and reliability*
- **Efficiency**
 - Fuel, lighting, electronics, insulation
 - *Challenge: Rebound effect*



Global Carbon Emissions



GDP/Carbon Emissions

2.50

Emissions from the combustion of fossil fuels enhance global warming which harms the economy, yet a healthy economy relies on fossil energy today.

and

Government policies are needed to enhance free market behavior.

— NA

— Africa

— Eurasia

— Asia & Oceania

— Europe

— ME

— Cent & SA

Myth 1 Realities

- **The world is “flattening;” resource interdependence is becoming the norm**
- **Independence requires realistic, scalable alternatives, which take time and are very expensive (\$ trillions)**
- **Concerns about climate and security have placed the public sights squarely on fossil energy, especially coal and oil**
- **Energy and economies are inextricably linked and mandated transitions don’t really work**

Summary Thoughts

- **The Three E Waltz (Energy, Economy, Environment) is a sensitive dance**
- **Oil and natural gas provide nearly 2/3 of the world's energy**
- **We need to be realistic about a carbon constrained world**
 - **It is coming, it will take time, it won't be cheap**
 - **Everyone needs to play and pay**
 - **Research funding and talent are vital**
 - **Government, private, academic partnerships**