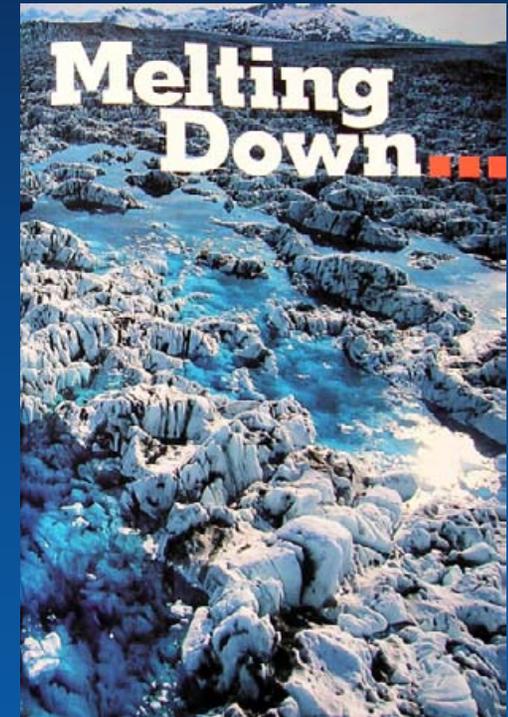
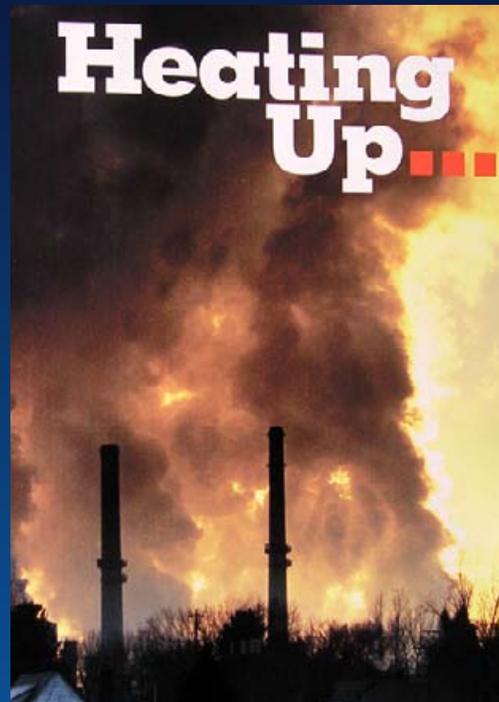
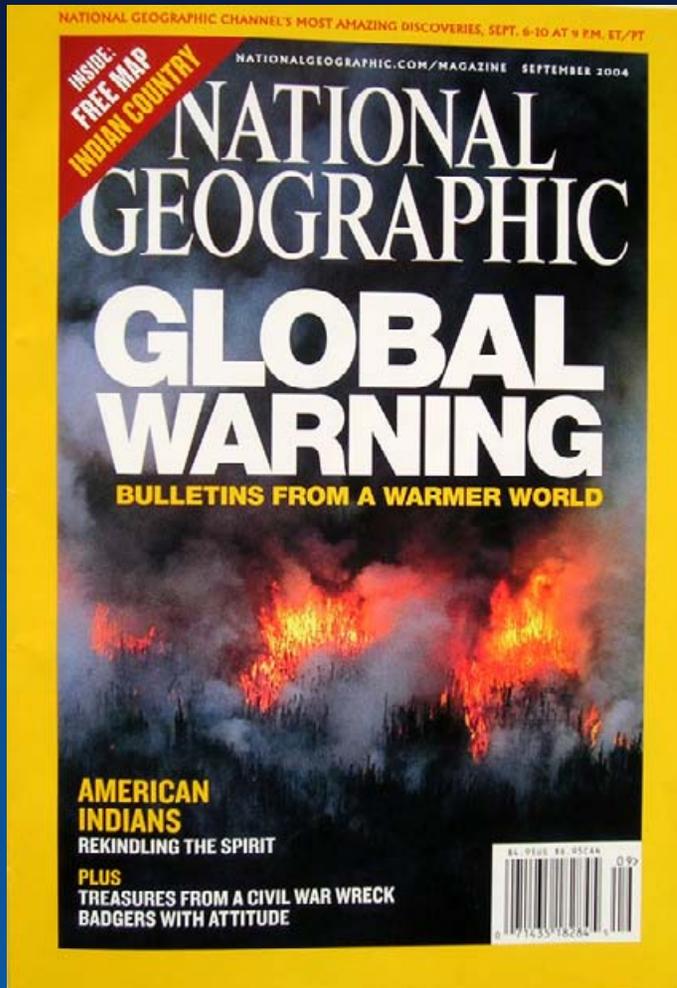


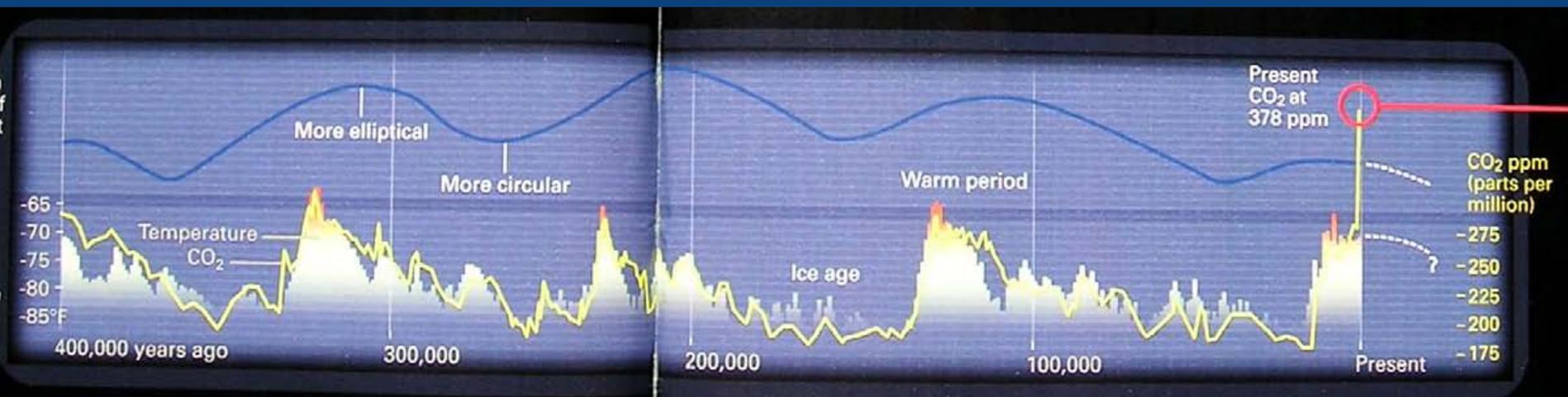
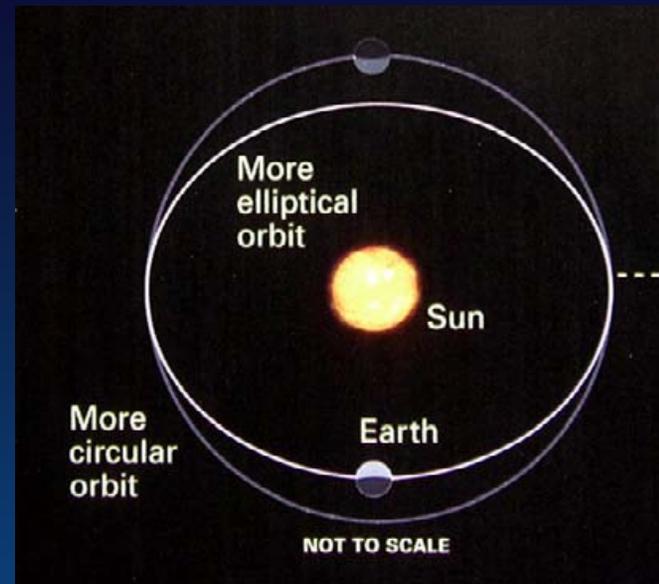
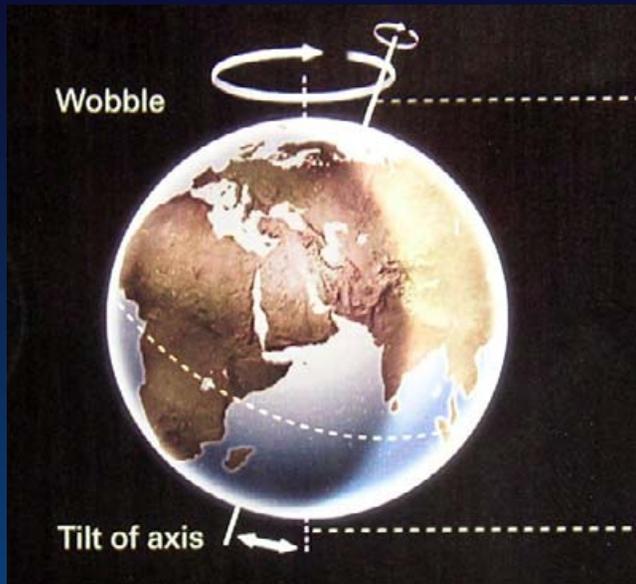
The Global Energy Picture & the Importance of Tribal Community Energy Planning

Roger Taylor
Tribal Energy Program Manager
NREL

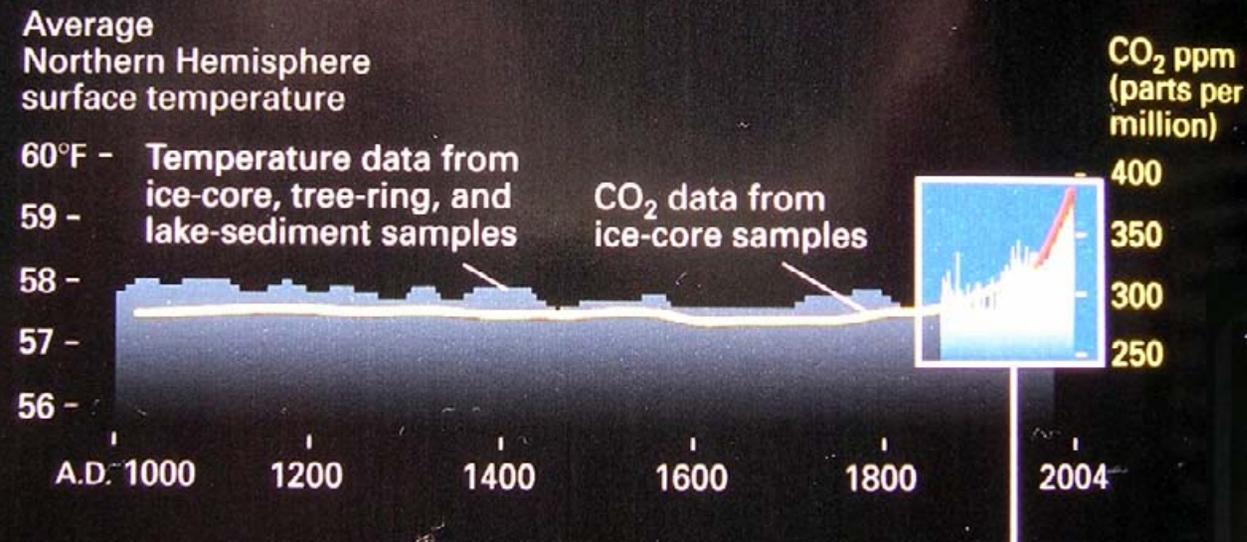
Climate Change

We Live in a Changing World





Unprecedented Levels of CO₂



Warming Temperatures

Reducing Ice Pack
9%/year

ICE MELTING EVERYWHERE

Alaska, U.S. – glaciers melting and permafrost thawing, destabilization of infrastructure.

Greenland – expanding melt region, glaciers moving faster, melting into ocean.

Arctic – thinning and shrinking ice cap and sea ice, thawing permafrost.

Europe – Alpine mountain glaciers show significant shrinking and thinning, soot accumulation, and destabilization as permafrost melts.

Montana, U.S. – Glacier National Park glaciers could disappear by 2030.

S. America – Andes glaciers and Patagonia ice fields are melting faster than anywhere else.

Asia – Himalayan glaciers melting, filling and bursting glacial lakes.

New Zealand – retreating glaciers have lost a quarter of their area since the mid-19th century.

Antarctic – collapse of ice shelves, increased melting, faster movement of ice into ocean.

Africa – Mt. Kilimanjaro's ice cap may melt completely by 2015.

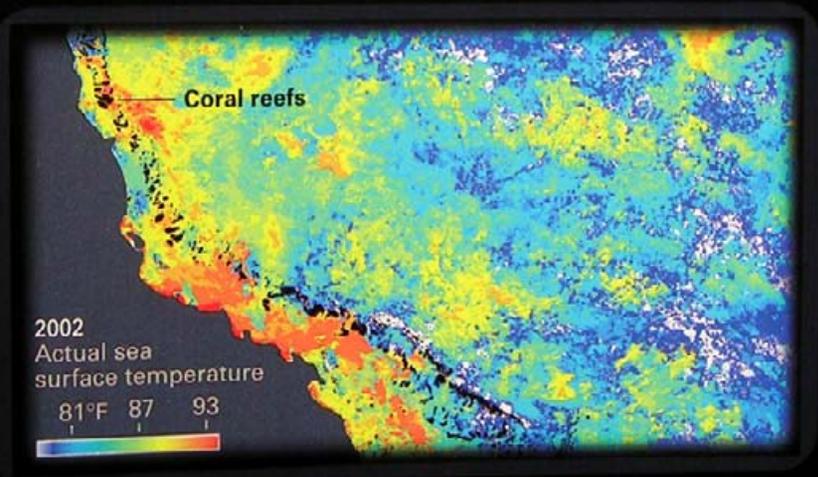
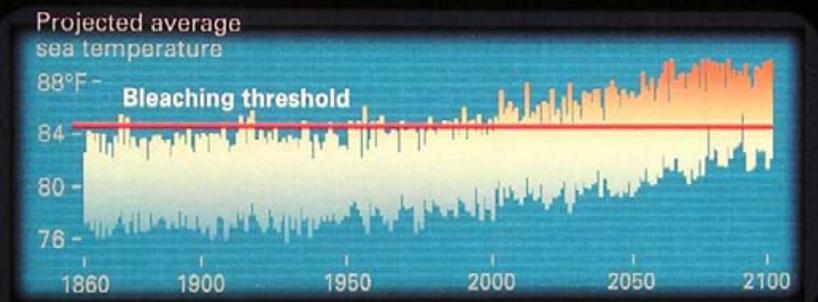
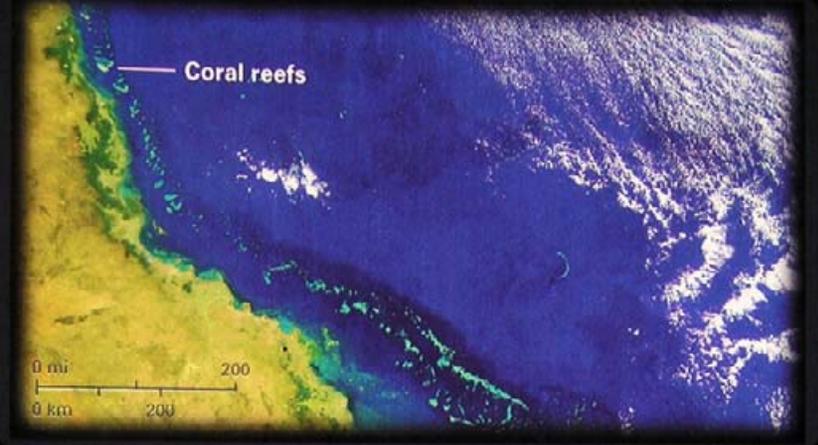
(Image Courtesy NASA Earth Observatory)

For more information, see Earth Policy Institute's 2005 Eco-Economy Indicator, "Ice Melting Everywhere," available at www.earth-policy.org

Bleaching of Coral Reefs

The “rain forest” of the ocean

Possible Interruption of the Earth’s Circulatory System

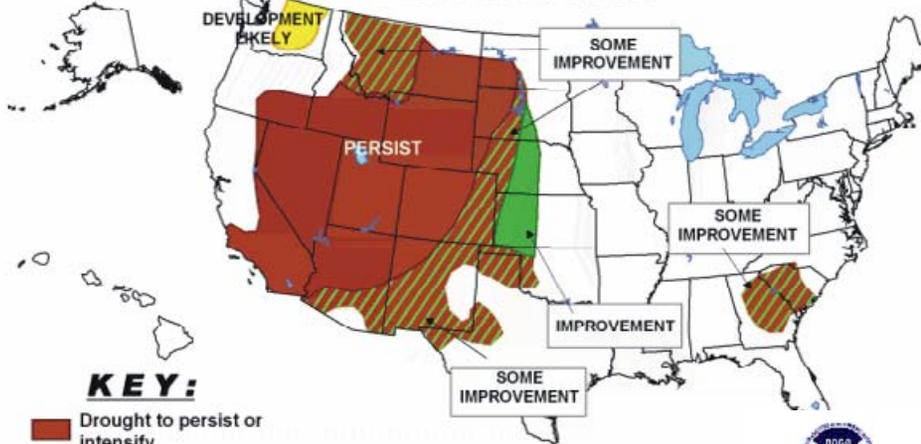




U.S. Seasonal Drought Outlook

Through September 2004

Released June 17, 2004



KEY:

- Drought to persist or intensify
- Drought ongoing, some improvement
- Drought likely to improve, impacts ease
- Drought development likely

Depicts general, large-scale trends based on subjectively guided by numerous indicators, including short and long dynamical forecasts. Short-term events -- such as individual storms -- cannot be accurately forecast more than a few days in advance, so outlook for applications -- such as crops -- that can be affected by such events. "Ongoing" drought areas are schematically approximate (D1 to D4). For weekly drought updates, see the latest text.



U.S. Seasonal Drought Outlook

Through October 2006

Released July 20, 2006



KEY:

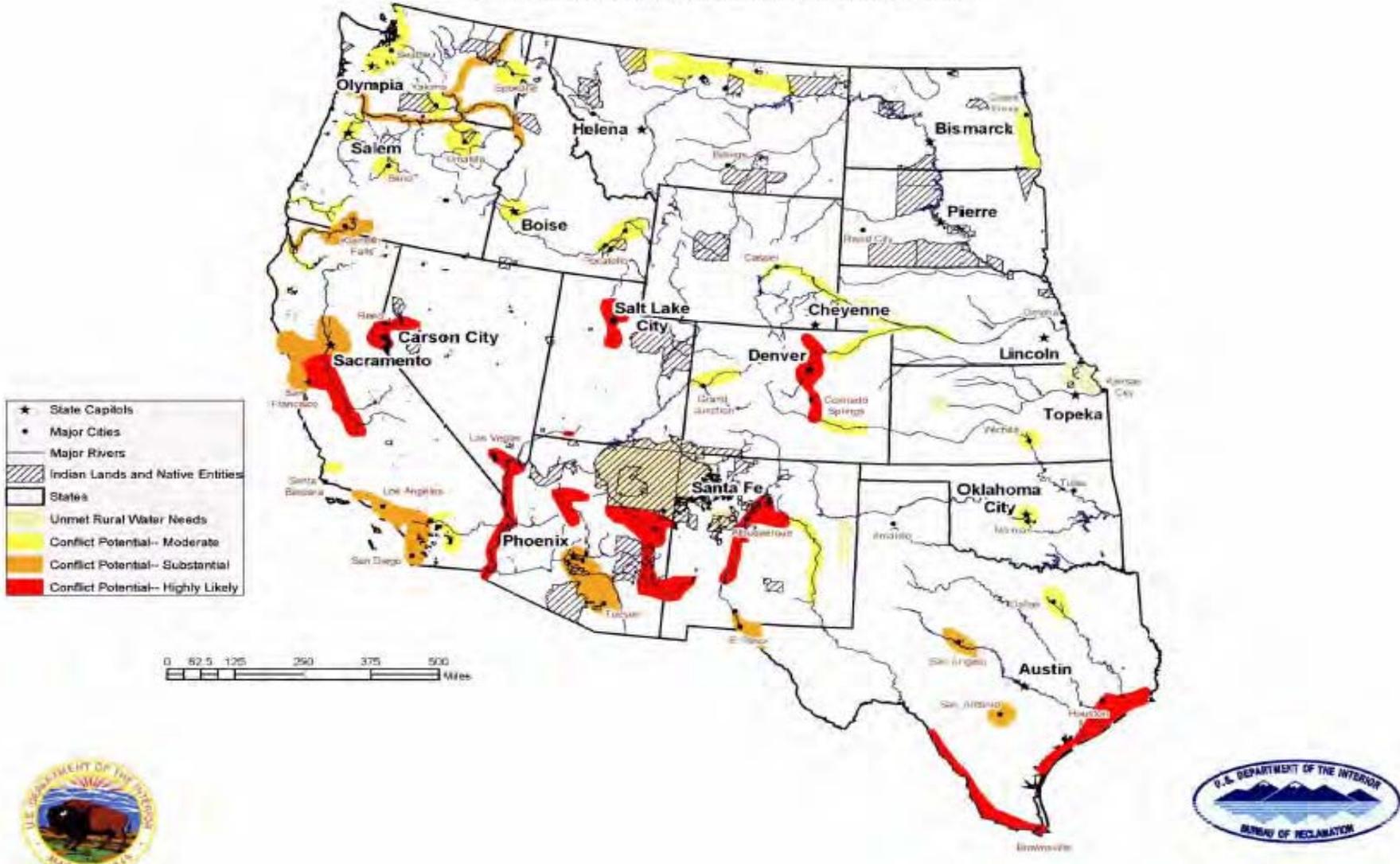
- Drought to persist or intensify
- Drought ongoing, some improvement
- Drought likely to improve, impacts ease
- Drought development likely

Depicts general, large-scale trends based on subjectively derived probabilities guided by numerous indicators, including short- and long-range statistical and dynamical forecasts. Short-term events -- such as individual storms -- cannot be accurately forecast more than a few days in advance, so use caution if using this outlook for applications -- such as crops -- that can be affected by such events. "Ongoing" drought areas are approximated from the Drought Monitor (D1 to D4). For weekly drought updates, see the latest Drought Monitor map and text. NOTE: the green improvement areas imply at least a 1 category improvement in the Drought Monitor intensity levels, but do not necessarily imply drought elimination.

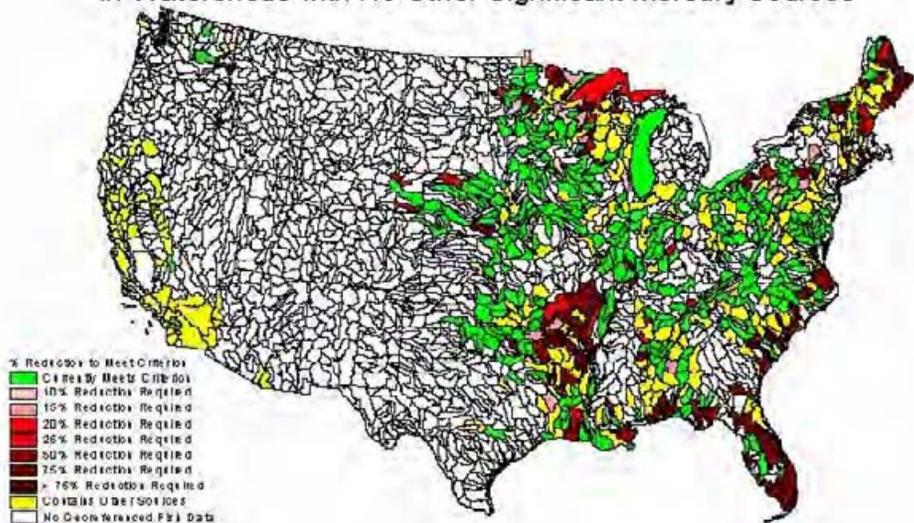


Potential Water Supply Crises by 2025

(Areas where existing supplies are not adequate to meet water demands for people, for farms, and for the environment)

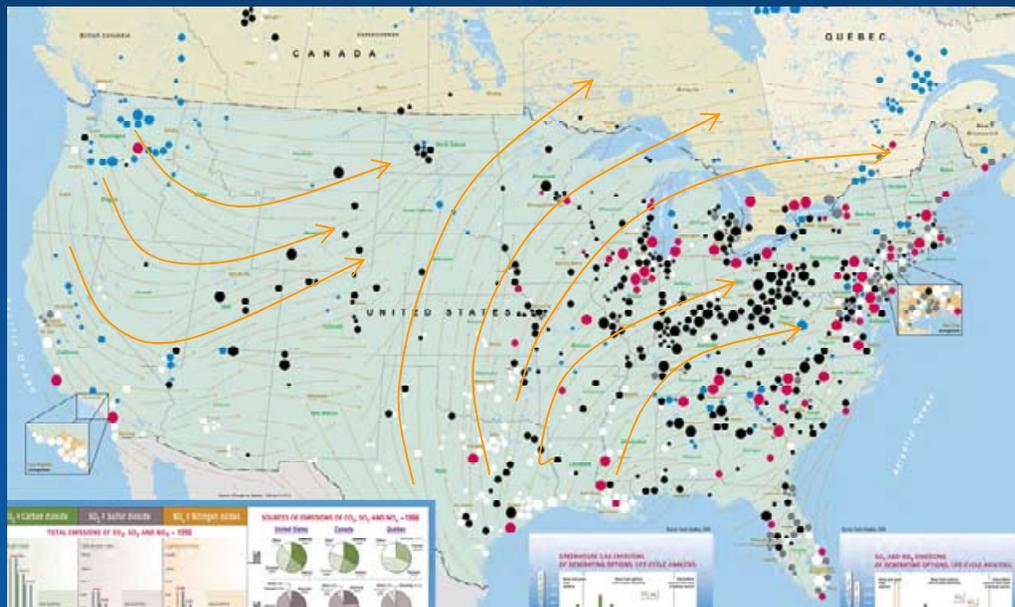


Estimated Percent Reductions in Air Deposition Load
Necessary to Meet New Methylmercury Criterion
In Watersheds with No Other Significant Mercury Sources



Mercury Contamination of Fish

Closely correlated with
Power Plant Emissions



The Peak Oil Story

Demand

Billions of People

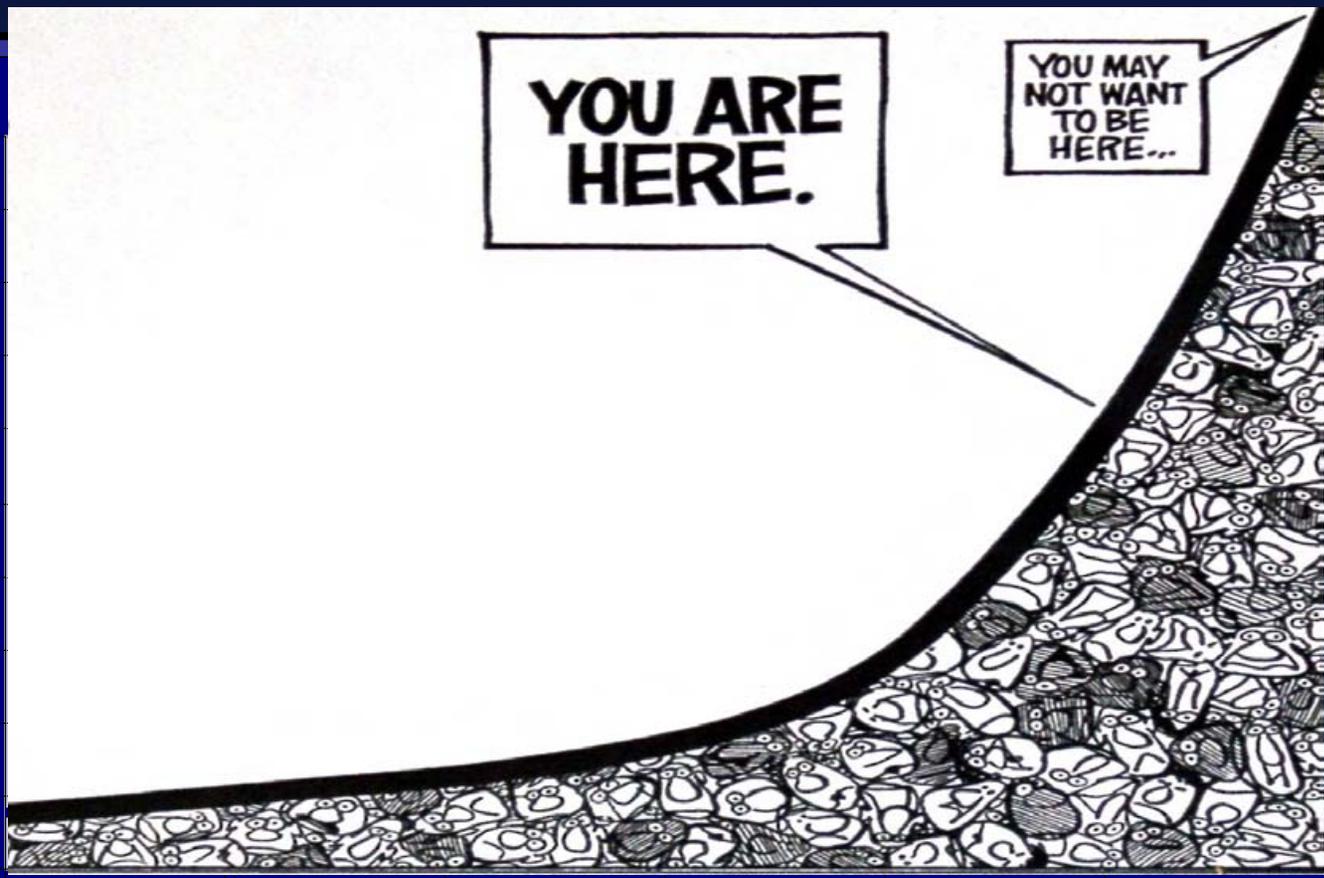
10
9
8
7
6
5
4
3
2
1
0

1750 1800 1850 1900 1950 2000 2050

Year

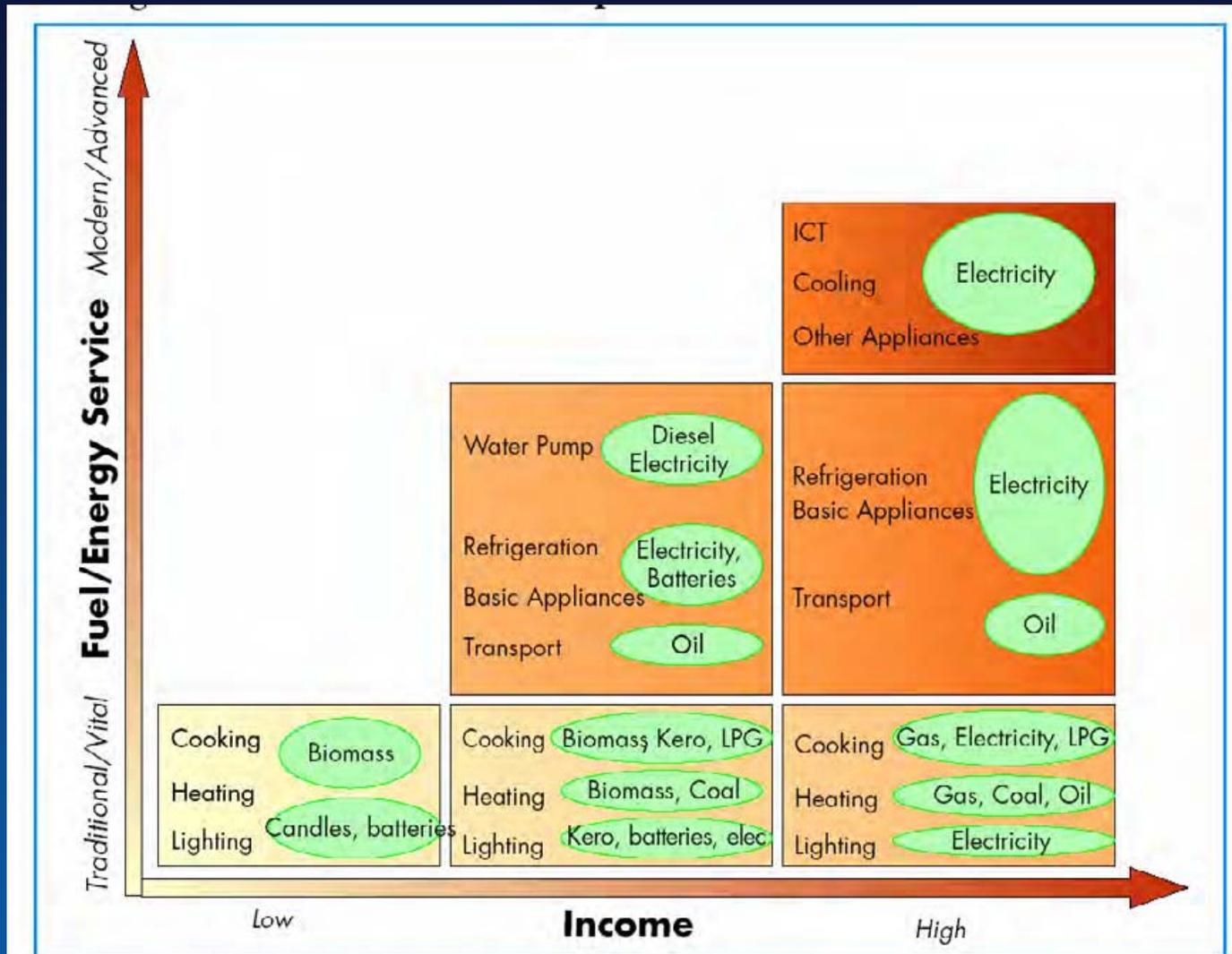
YOU ARE
HERE.

YOU MAY
NOT WANT
TO BE
HERE...



Population Connection

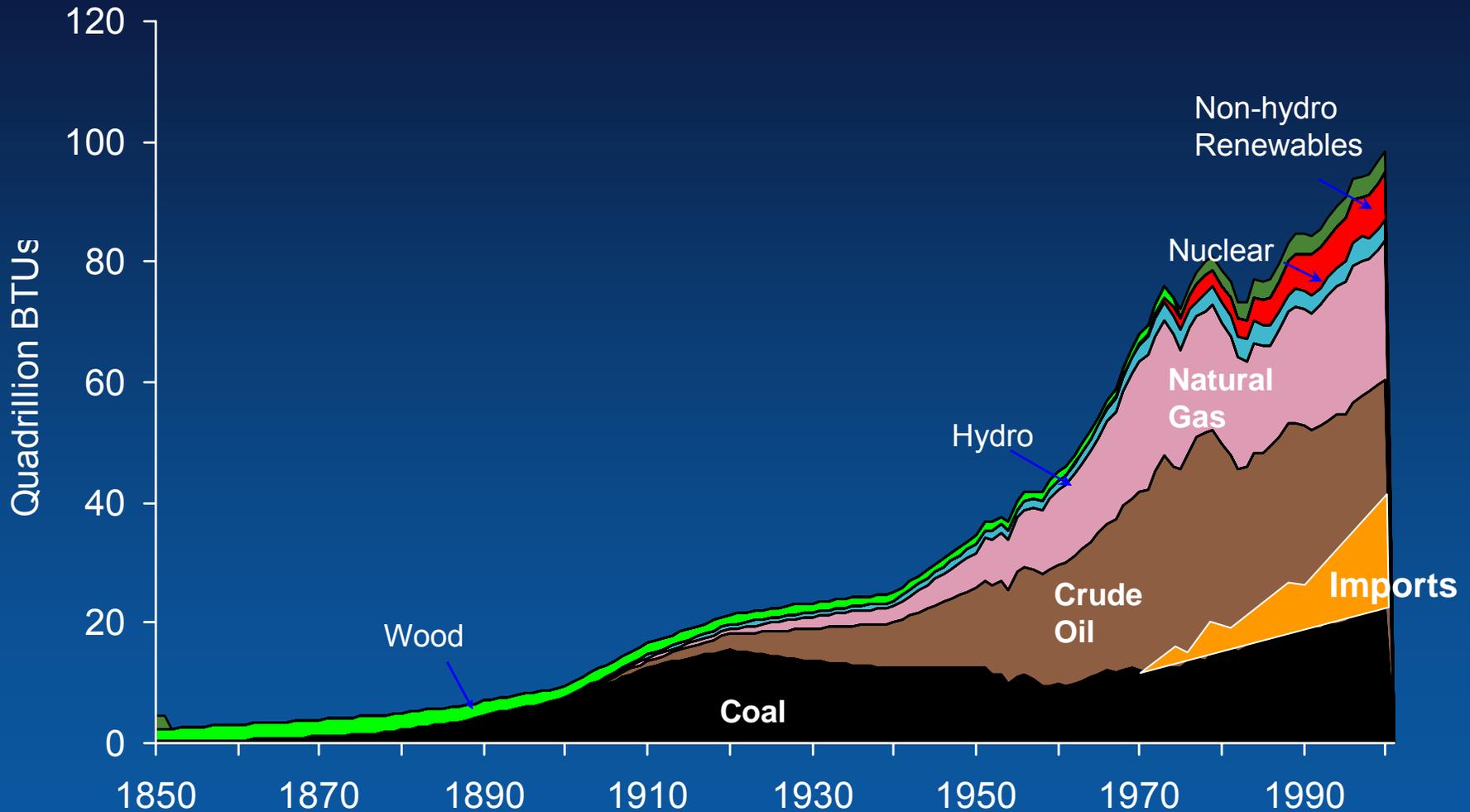
Modern energy services require increased incomes



Note: ICT is information and communication technology.

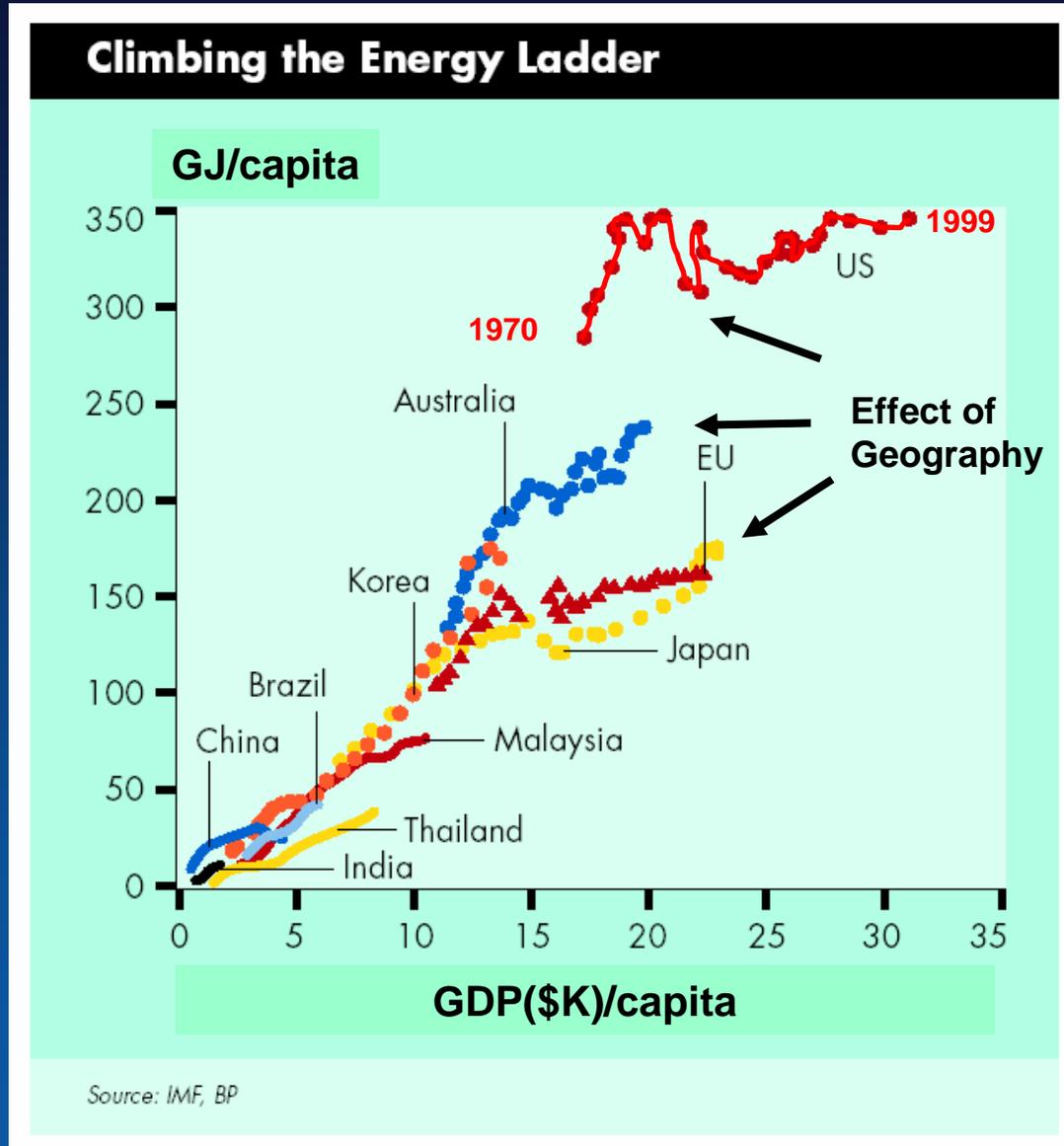
Source: IEA analysis.

U.S. Energy Consumption by source - 1850-2000



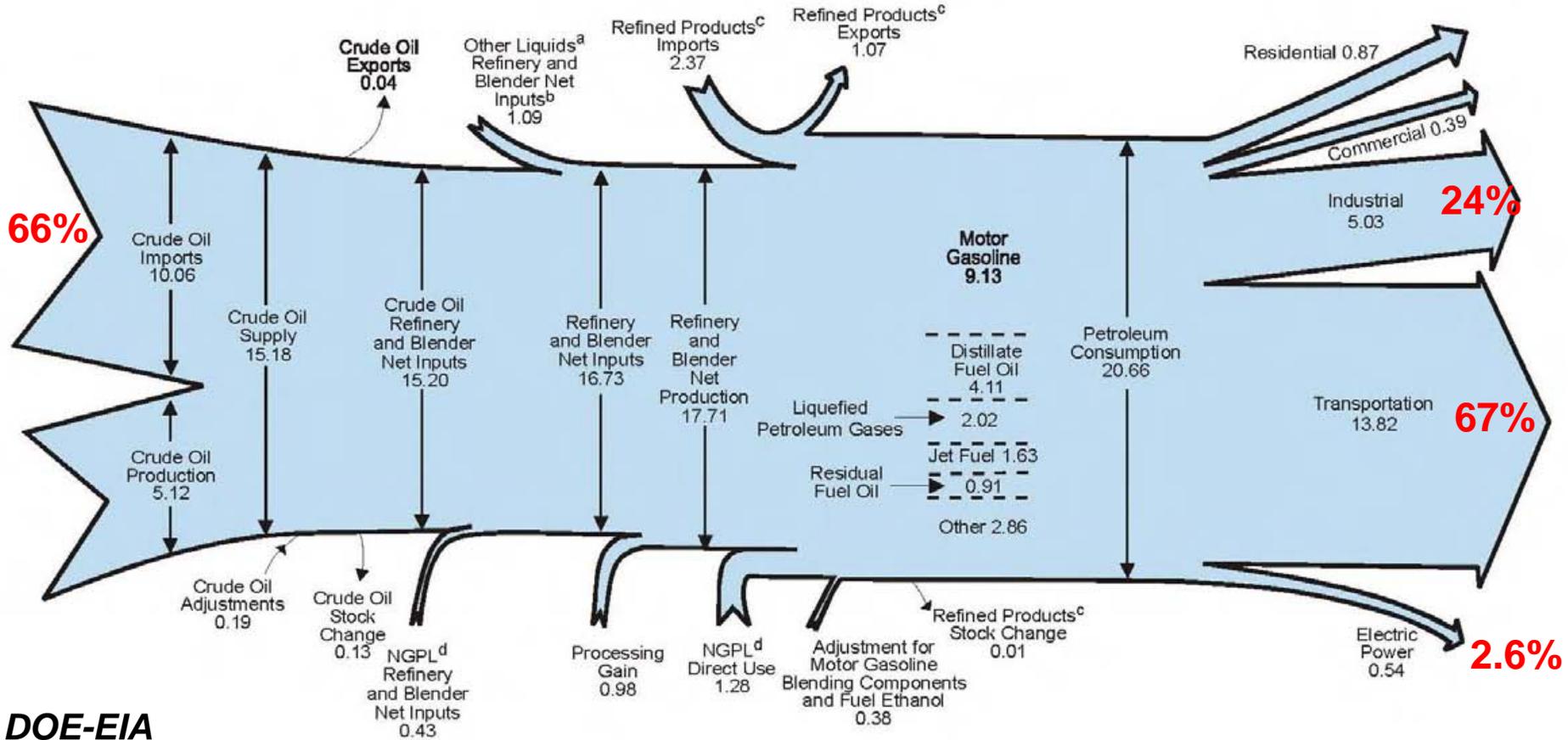
Source: 1850-1949, Energy Perspectives: A Presentation of Major Energy and Energy-Related Data, U.S. Department of the Interior, 1975; 1950-2000, Annual Energy Review 2000, Table 1.3

Economic development is tightly correlated with energy consumption

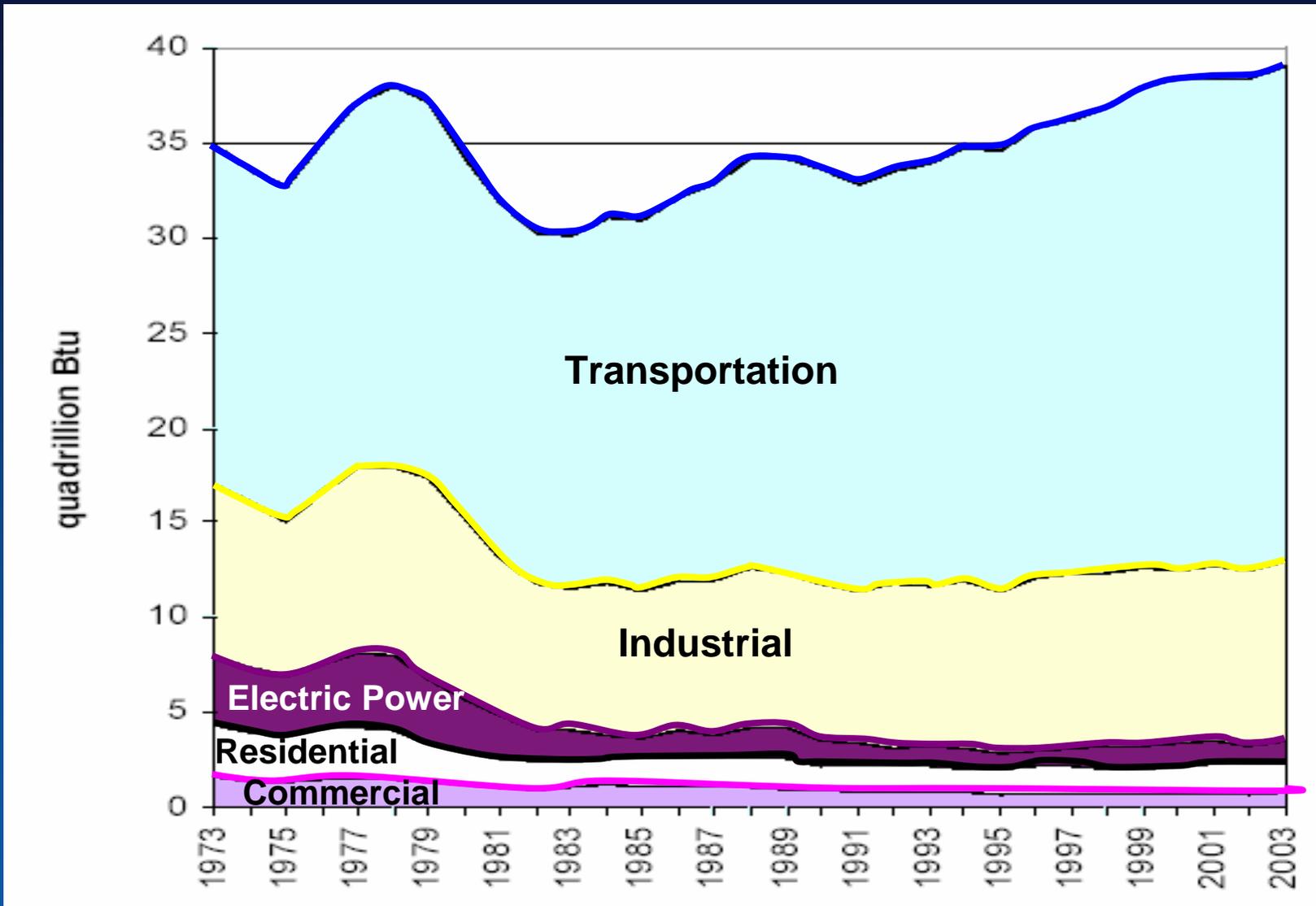


U.S. Petroleum Flow, 2005

Millions of Barrels per Day



U.S. Petroleum Consumption by Sector

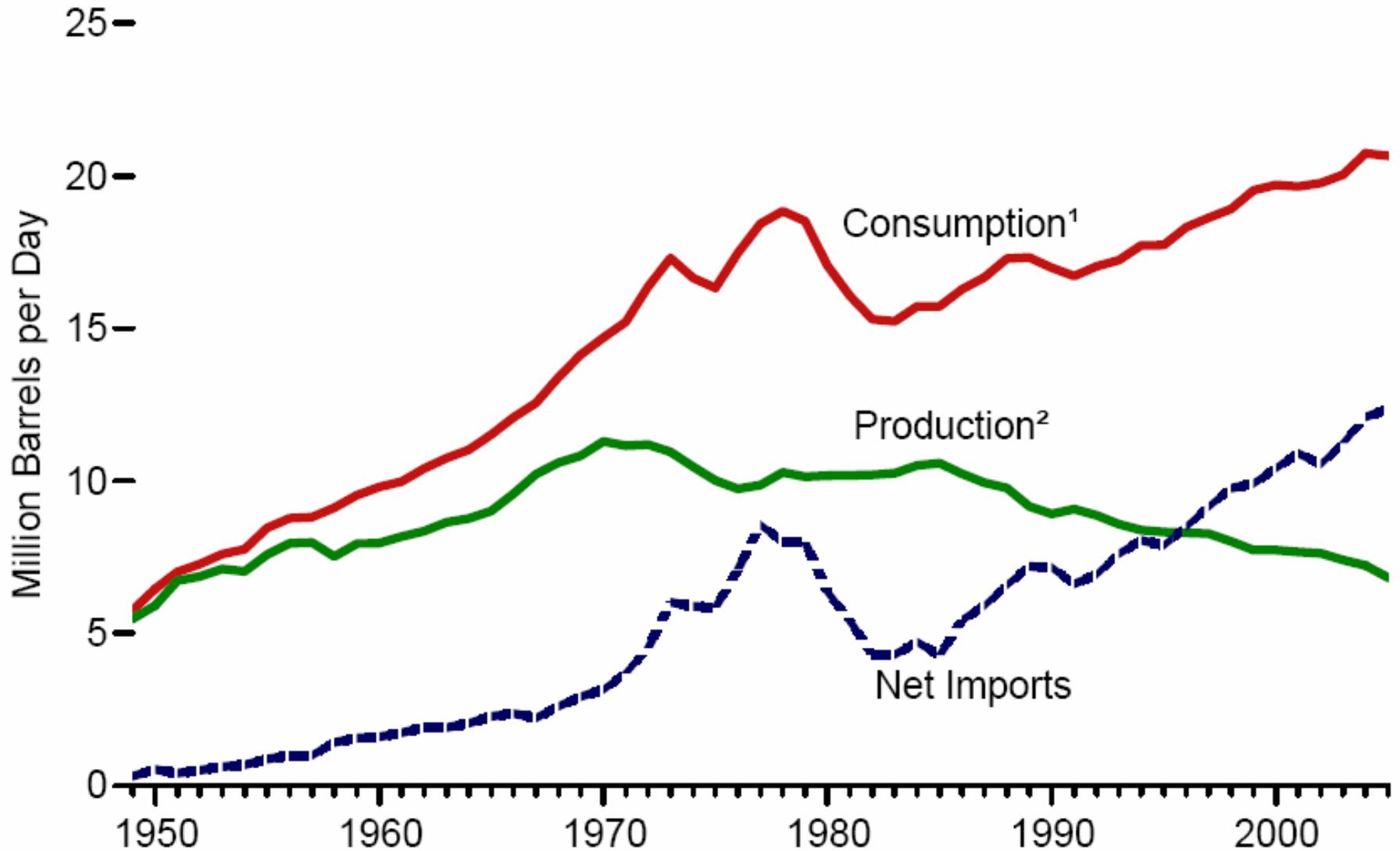


U.S. TRANSPORTATION FLEETS

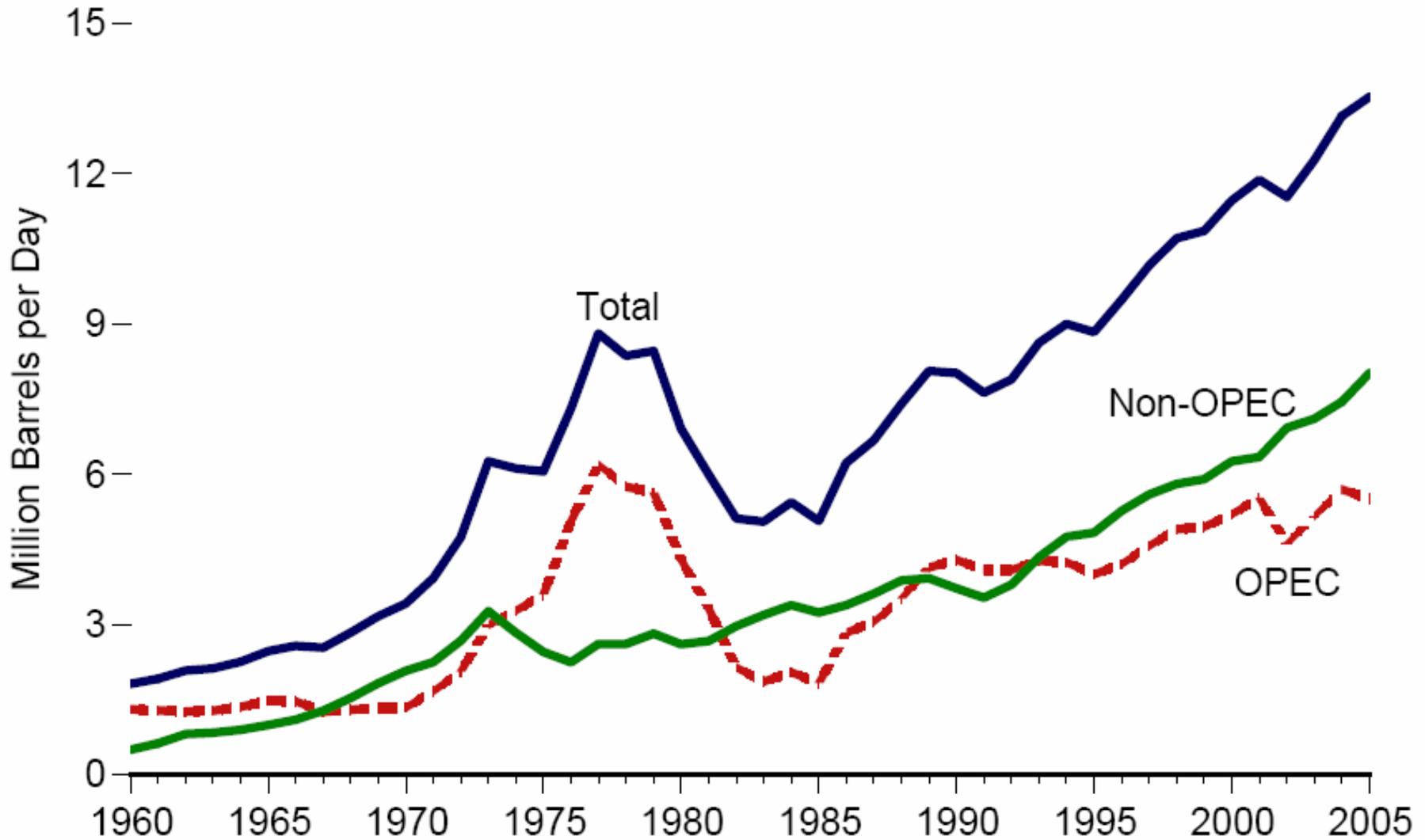
~ \$4 trillion to replace half the fleet

Fleet	Size	Median Lifetime (Years)	Cost to Replace Half the Fleet (2003 \$)
Automobiles	130 million	17	\$1.3 trillion
Light Trucks, SUVs, etc.	80 million	16	\$1 trillion
Heavy Trucks, Buses, etc.	7 million	28	\$1.5 trillion
Aircraft	8,500	22	\$.25 trillion

U.S. Oil Supply

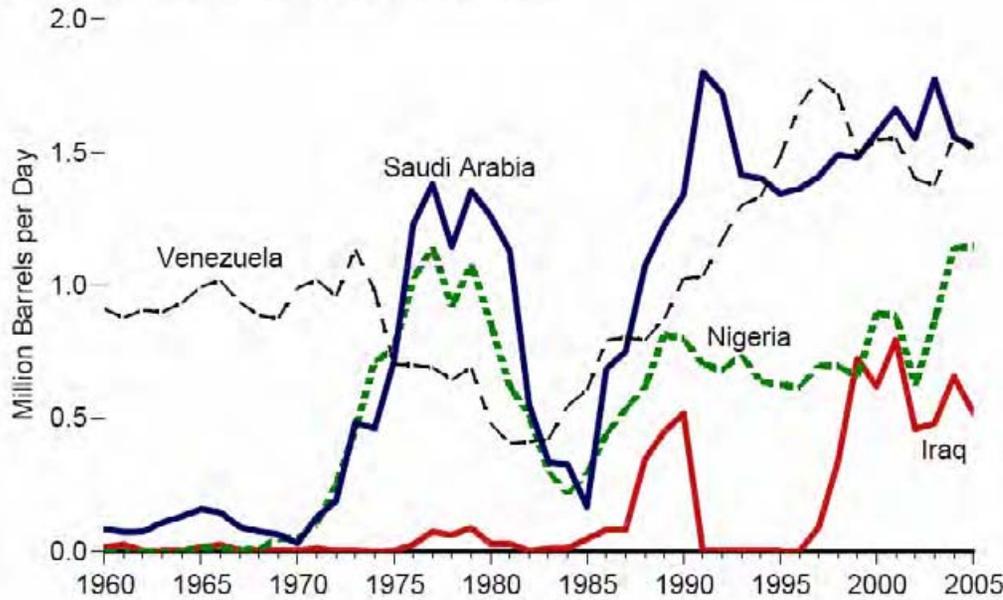


U.S. Oil Imports

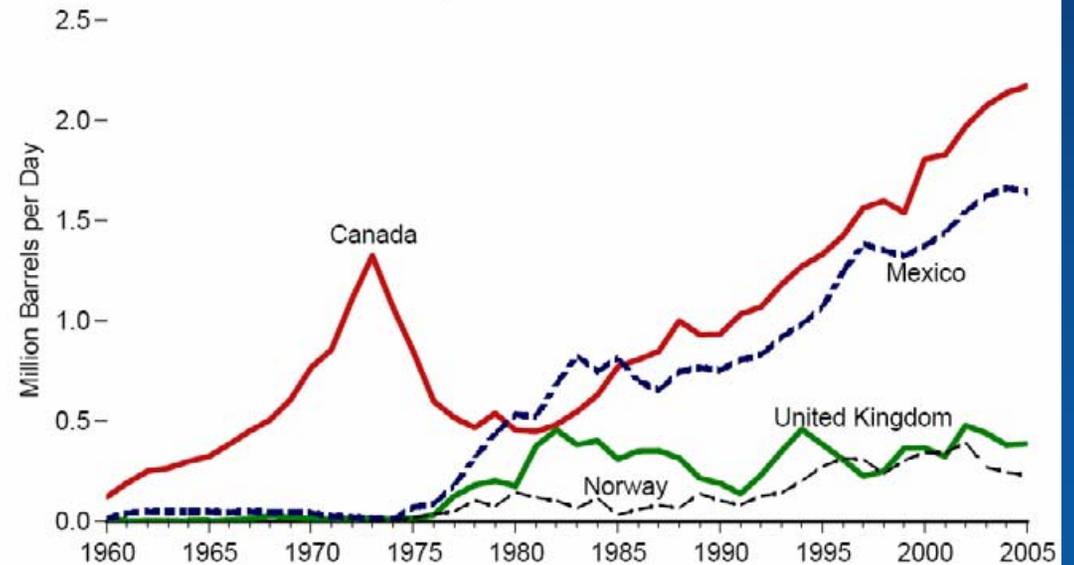


U.S. Oil Imports

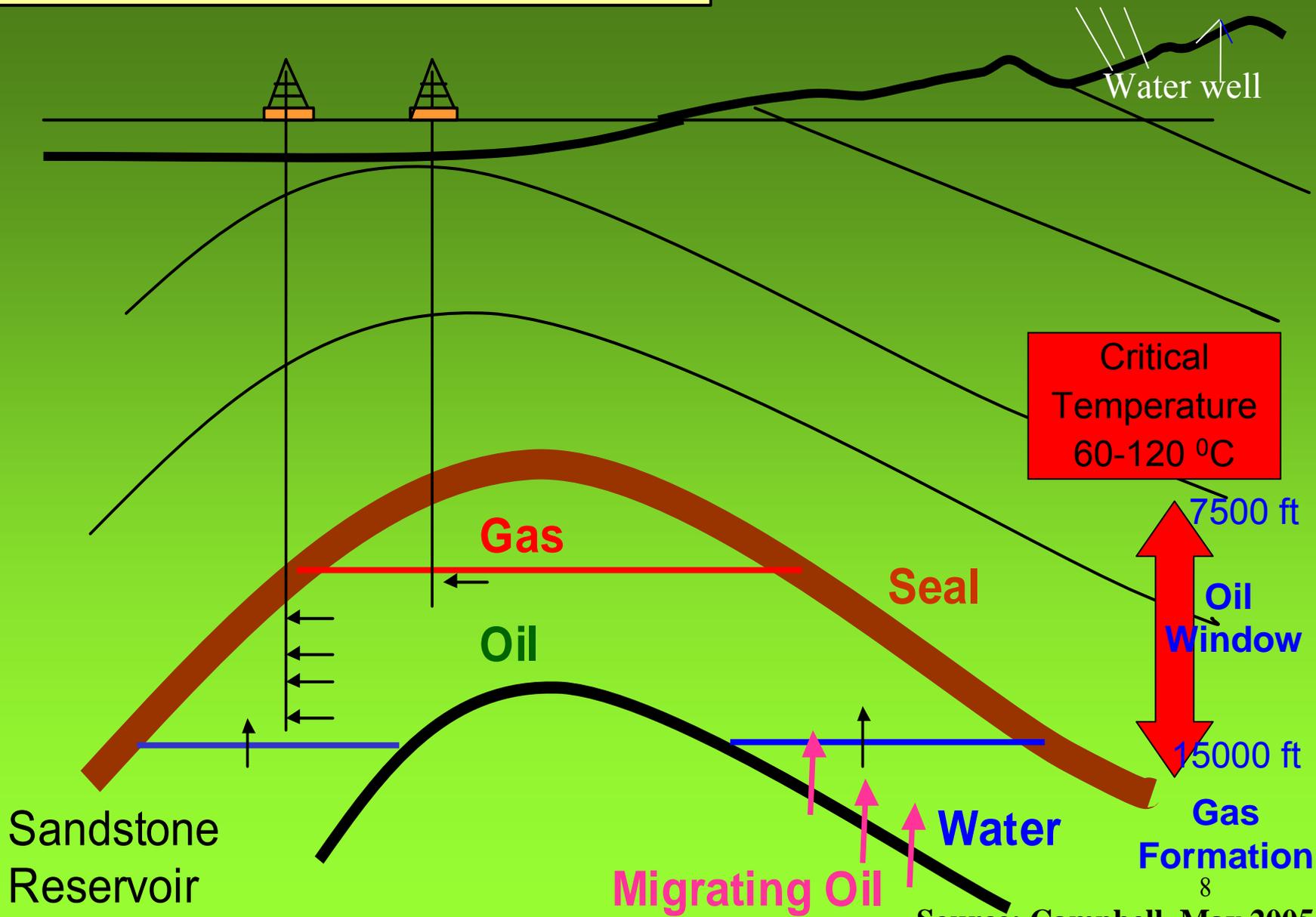
Selected OPEC Countries, 1960-2005



Selected Non-OPEC Countries, 1960-2005

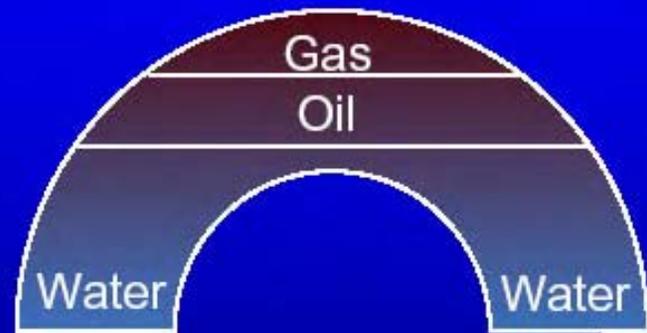
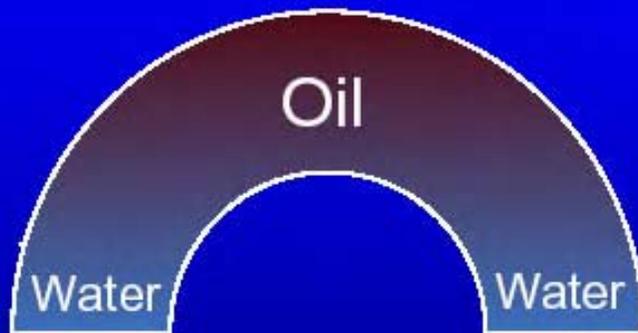


Geology of an Oilfield



Why Oil And Gas Fields Decline

New Field



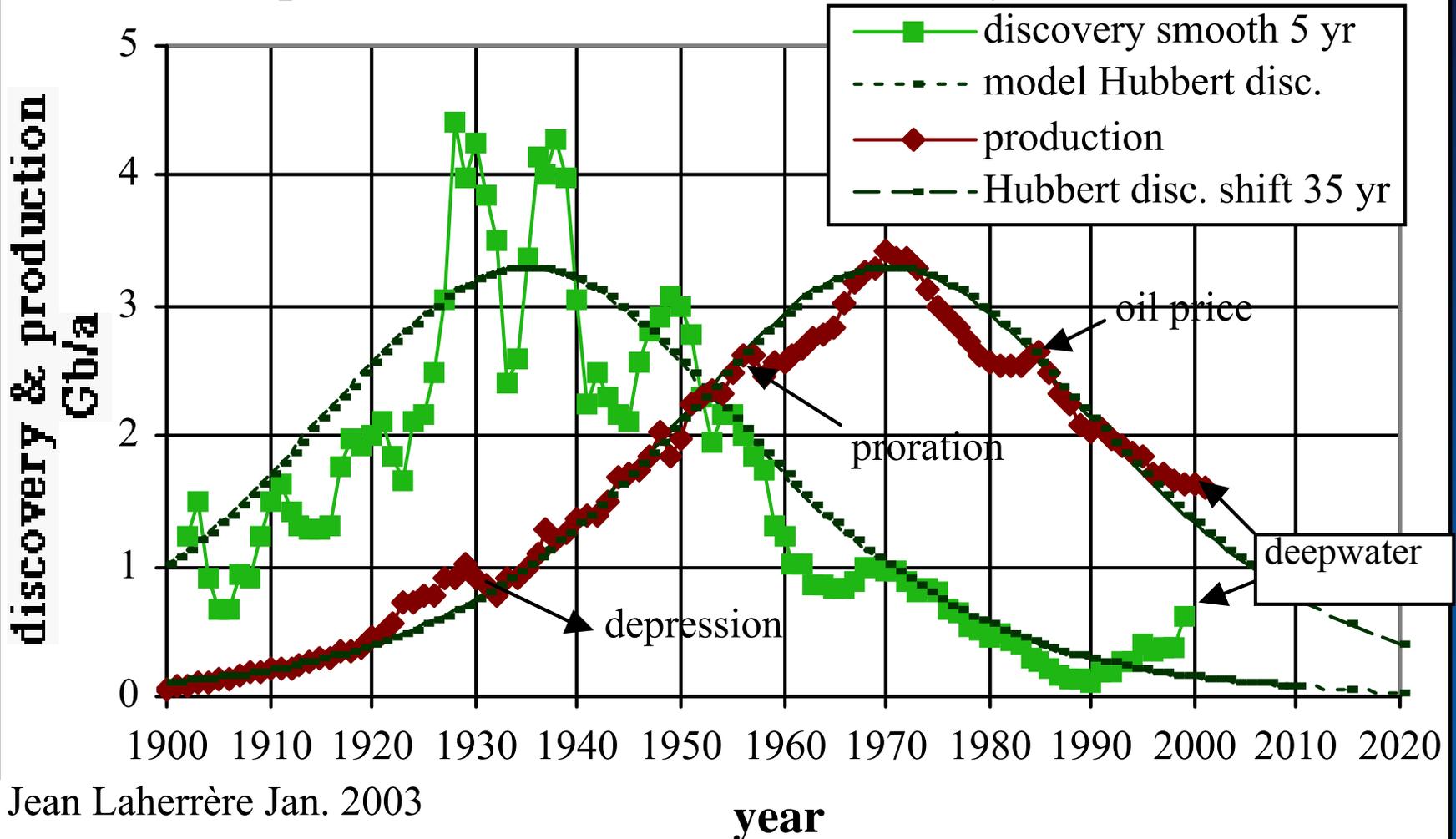
Production Profile



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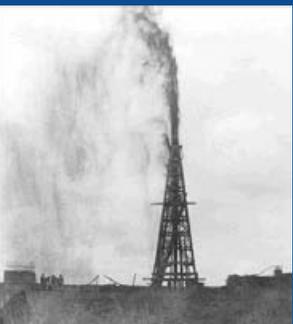
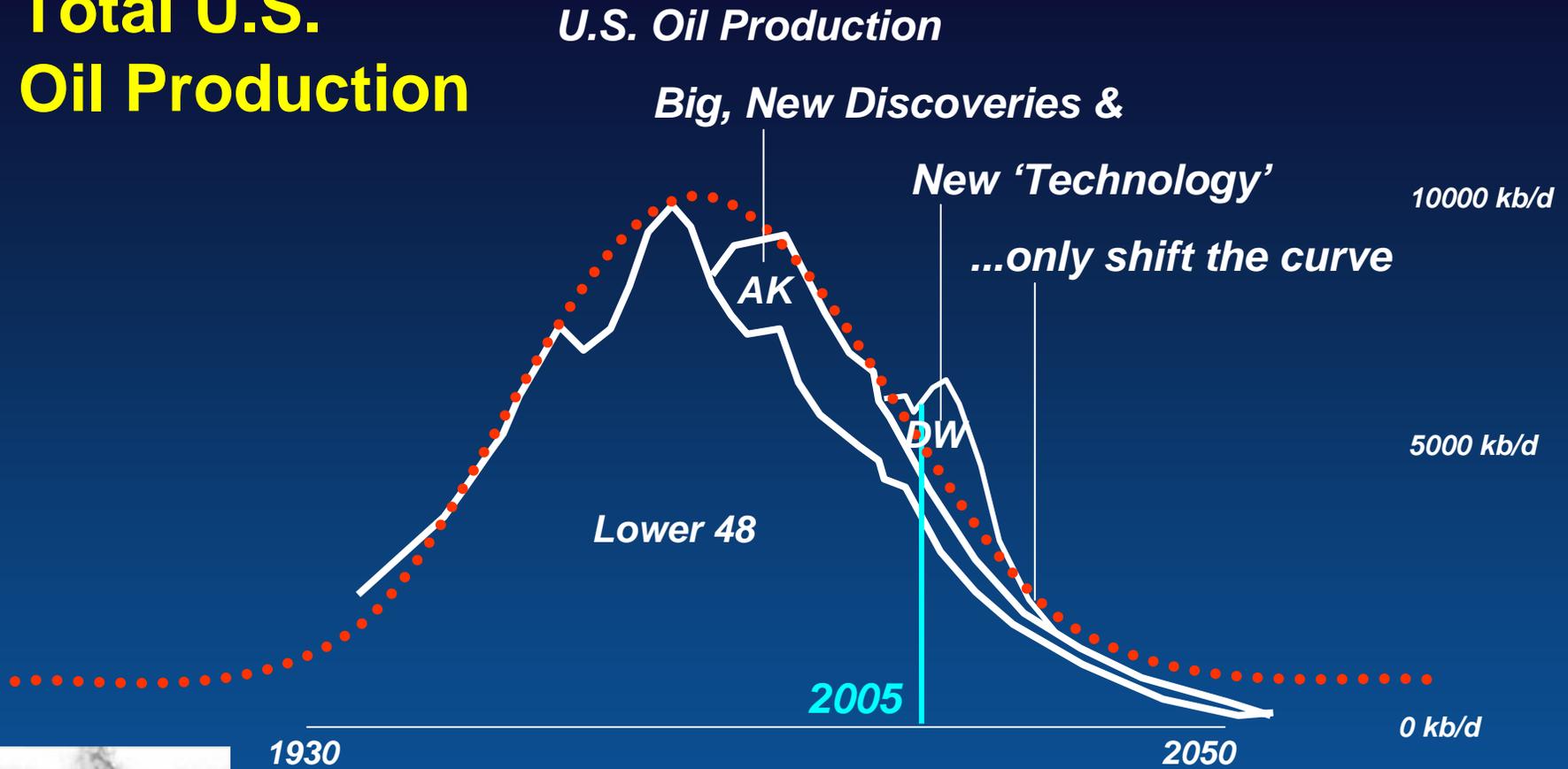
US Lower 48

US Lower 48: annual oil "mean" discovery & production with Hubbert discovery model



Jean Laherrère Jan. 2003

Total U.S. Oil Production



Lower 48



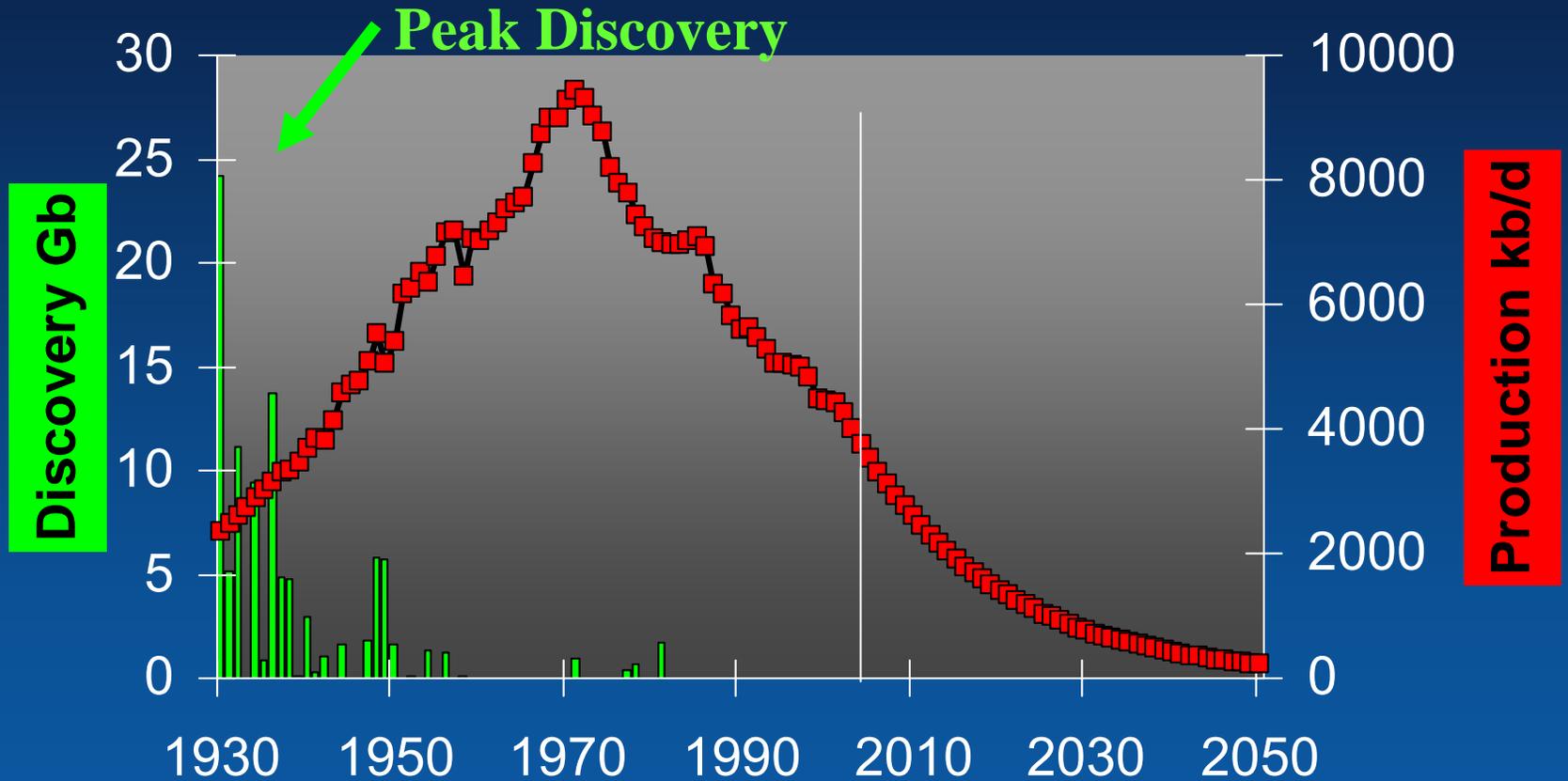
Alaska



Deepwater

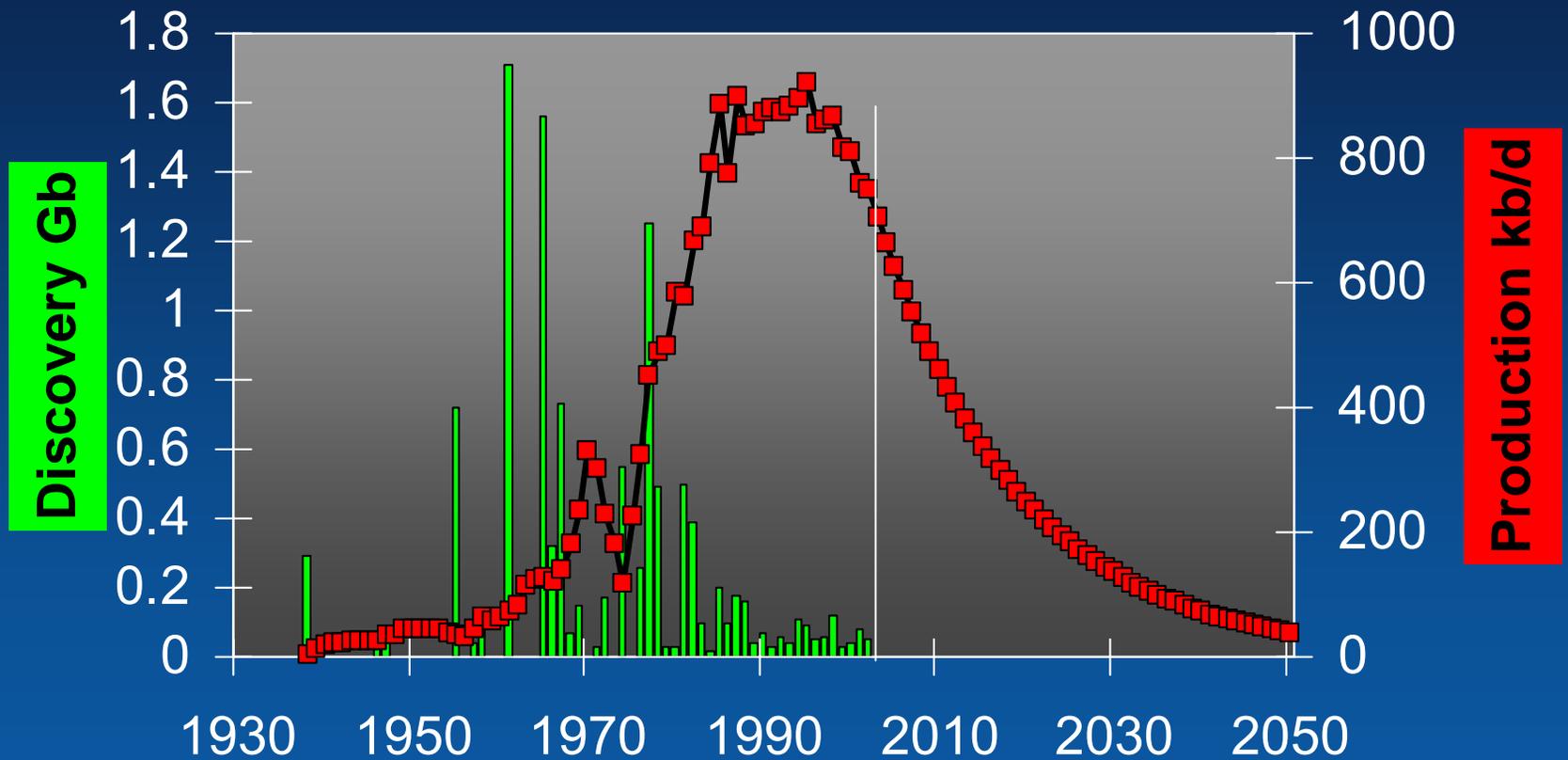
US-Lower48

Peak to Peak 40 years



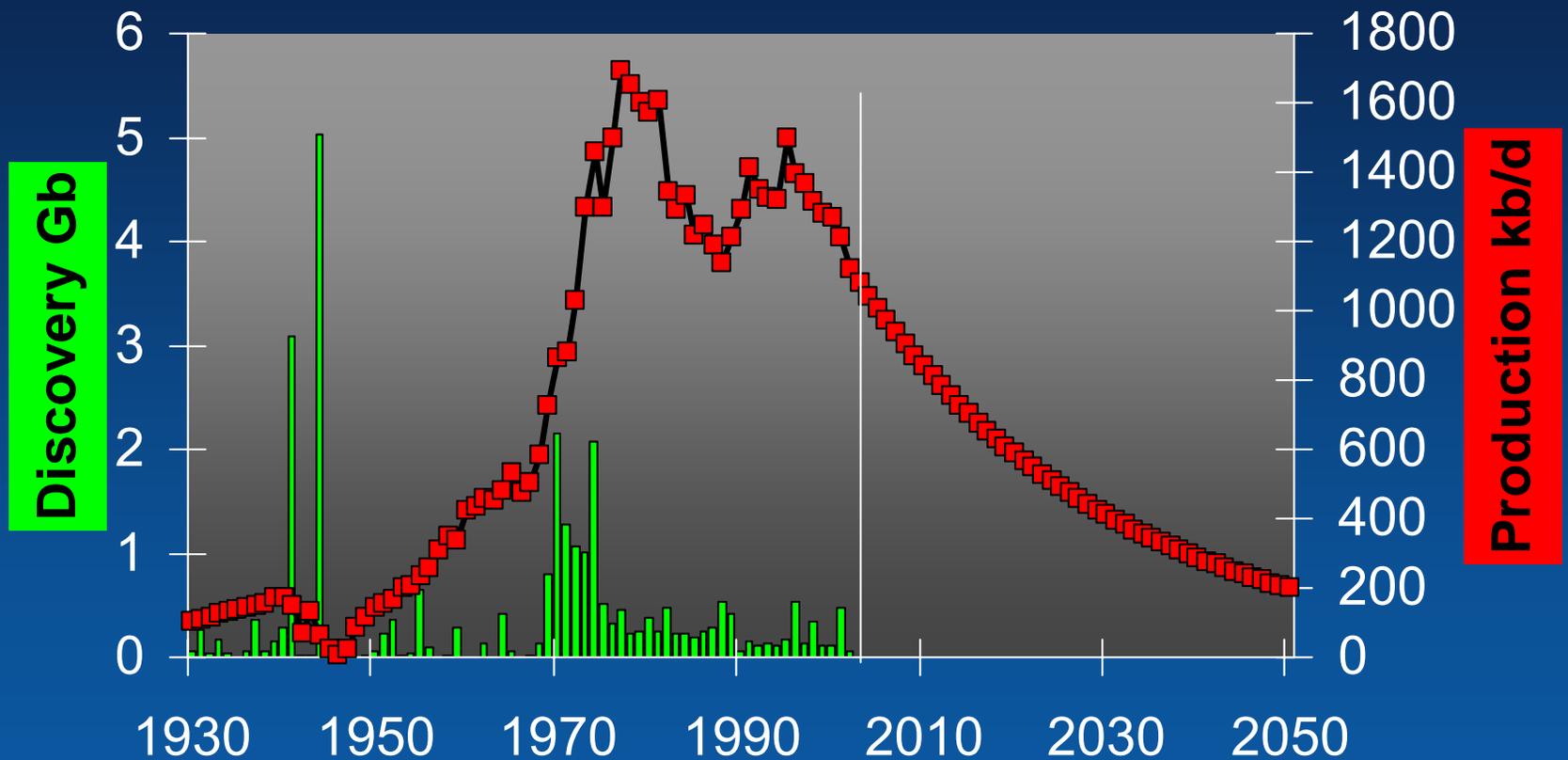
Egypt

Peak to Peak 30 years



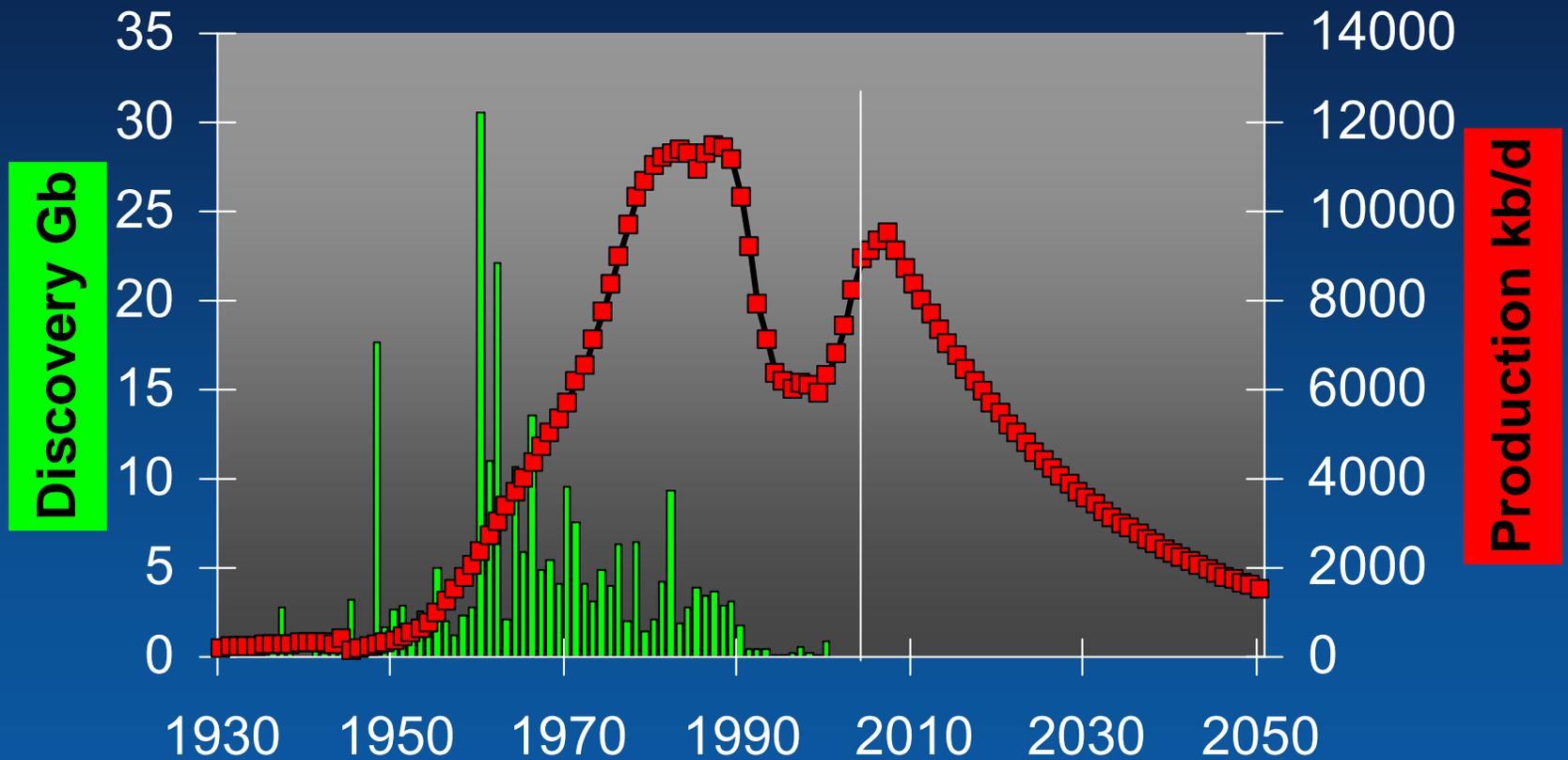
Indonesia

Peak to Peak 32 years



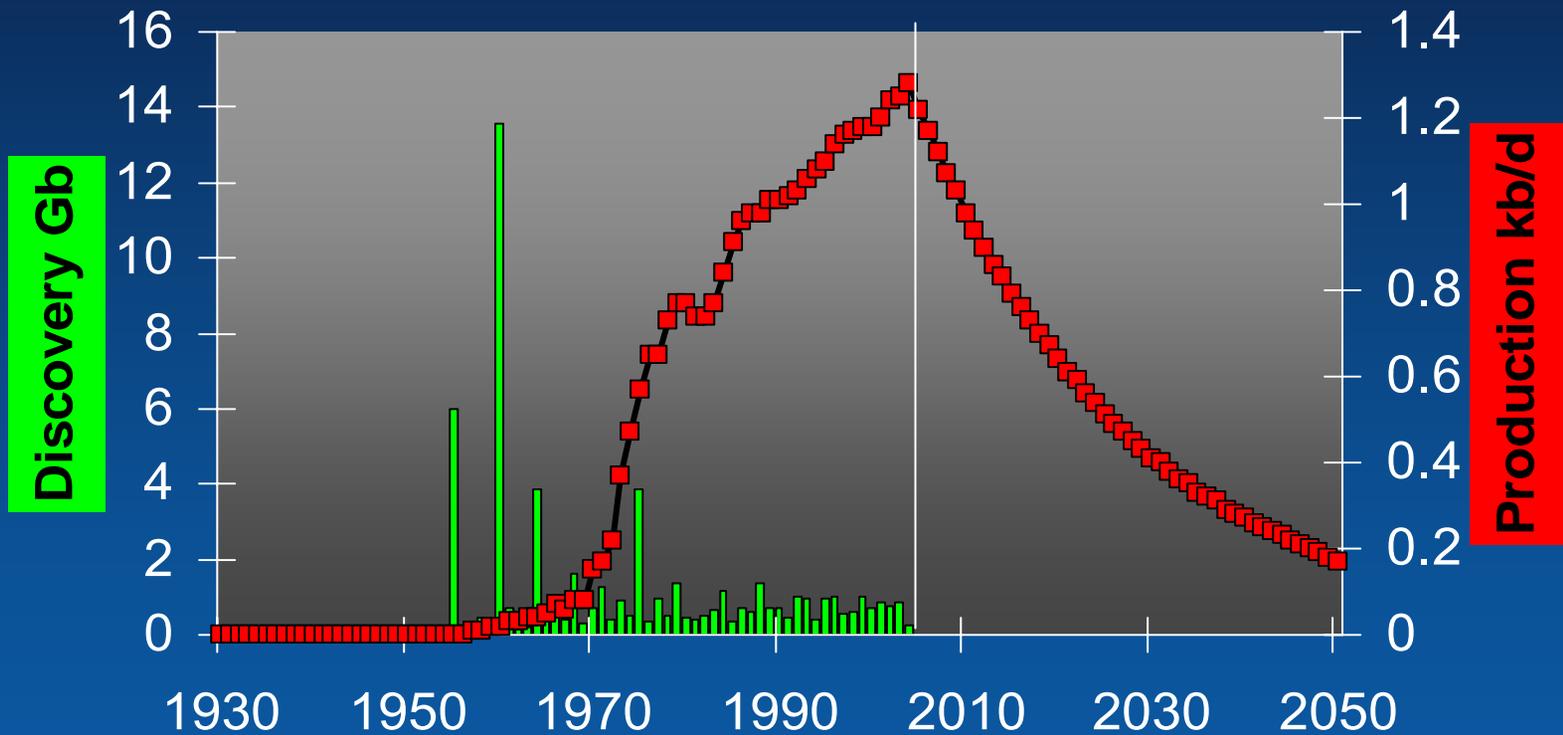
Russia

Peak to Peak 27 years



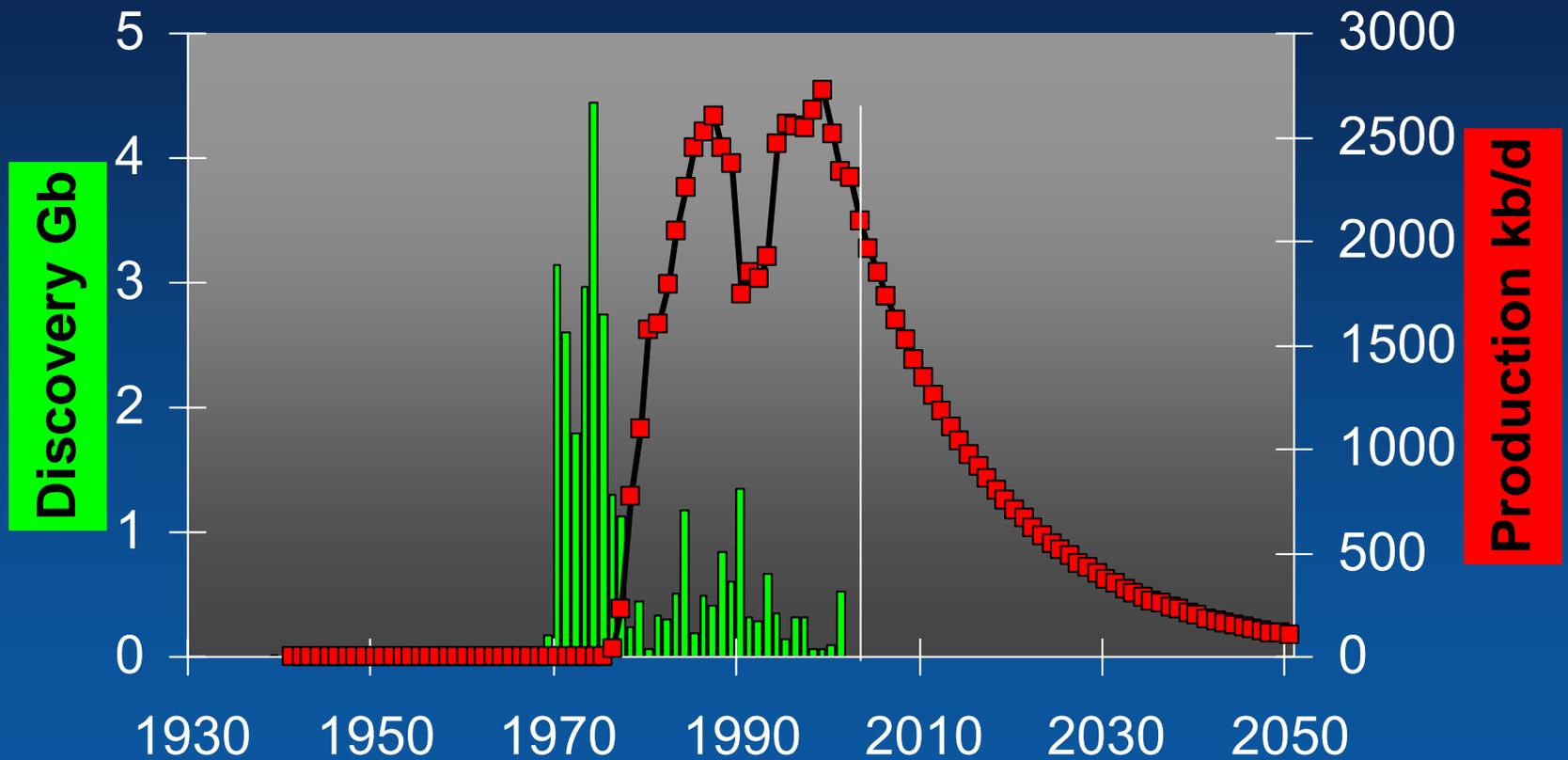
China

Peak to Peak 44 years



United Kingdom

Peak to Peak 25 years

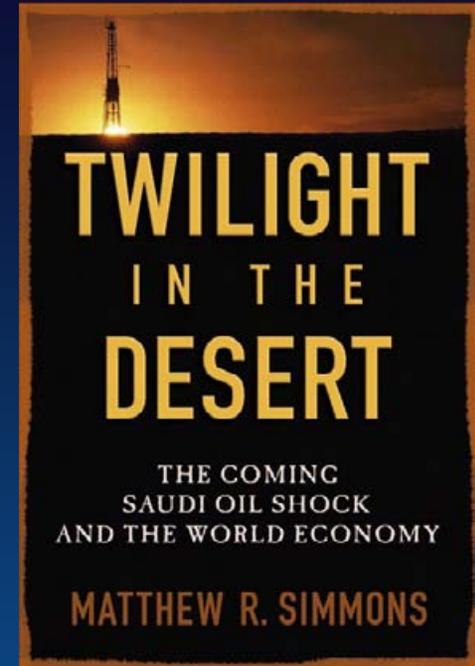


MATTHEW R. SIMMONS is Chairman and



Chief Executive Officer of Simmons & Company International, a Houston-based investment bank that specializes in the energy industry. Mr. Simmons serves on the boards of Brown-Forman Corporation and The Atlantic Council

of the United States. He is also a member of the National Petroleum Council and the Council on Foreign Relations. He has an MBA from Harvard University.



Once Saudi Oil Passes Peak, So Has The World

- There is no likely scenario that some new frontier can replace Middle East oil declines.
- Russia **might** have some frontiers left.
- Arctic's and Antarctic frontiers **might** have great oil.
- USA, Canada and Mexico OCS **might** have a new North Sea.
- Alaska North shore **might** find Prudhoe Bay's Queen.
- **But, all take time and merely offset post-Peak production declines.**



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How Slim Is The “Cushion” Of Spare Capacity?

■ Key choke points:

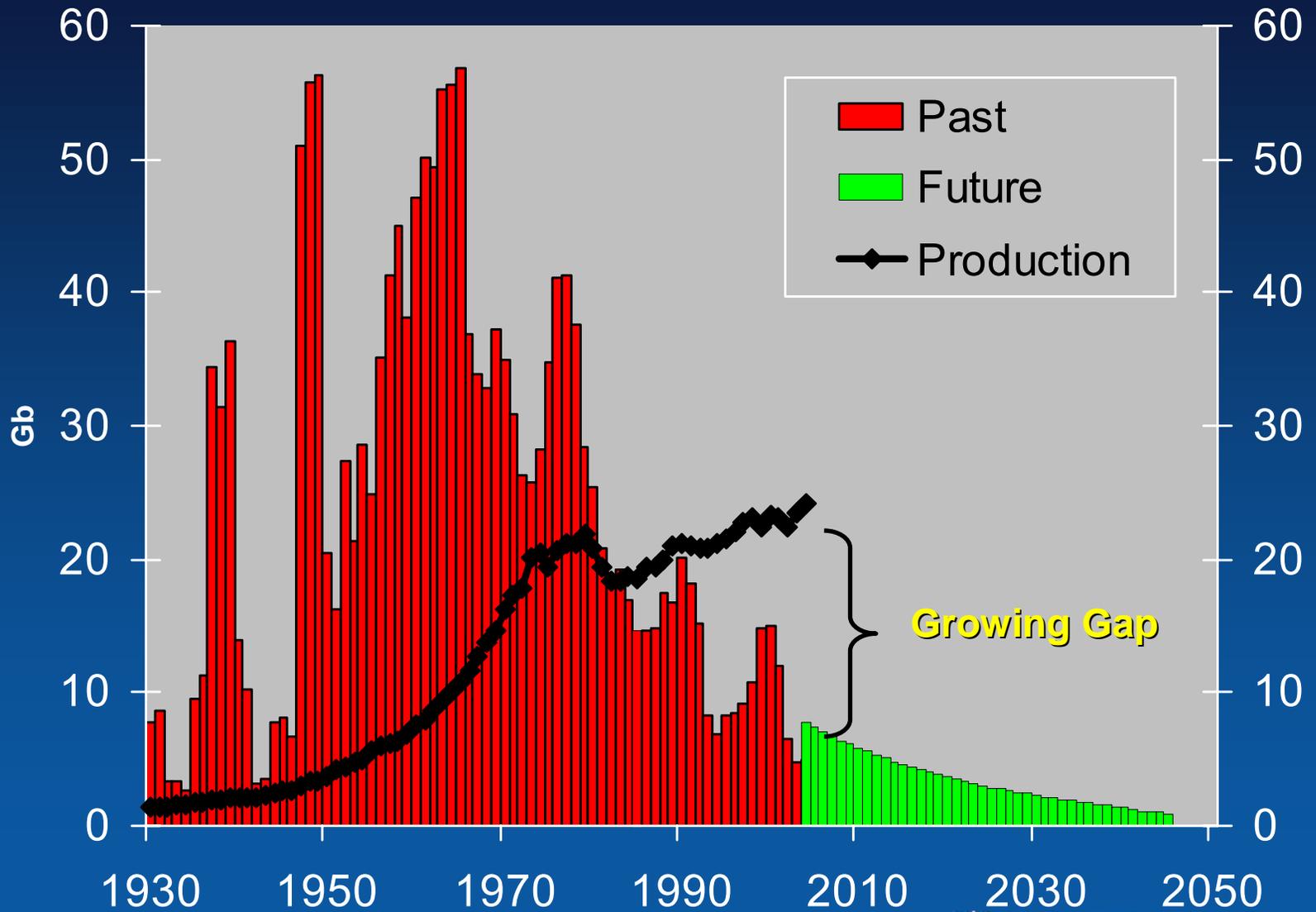
- Well head capacity
- Processing capacity
- Pipeline capacity
- Tanker capacity
- Refining capacity
- Drilling rig capacity
- New projects to boost supply inventory
- People to execute projects



- Every choke point is almost or beyond peak.
- Some choke points can be expanded, others cannot.
- All take a long time

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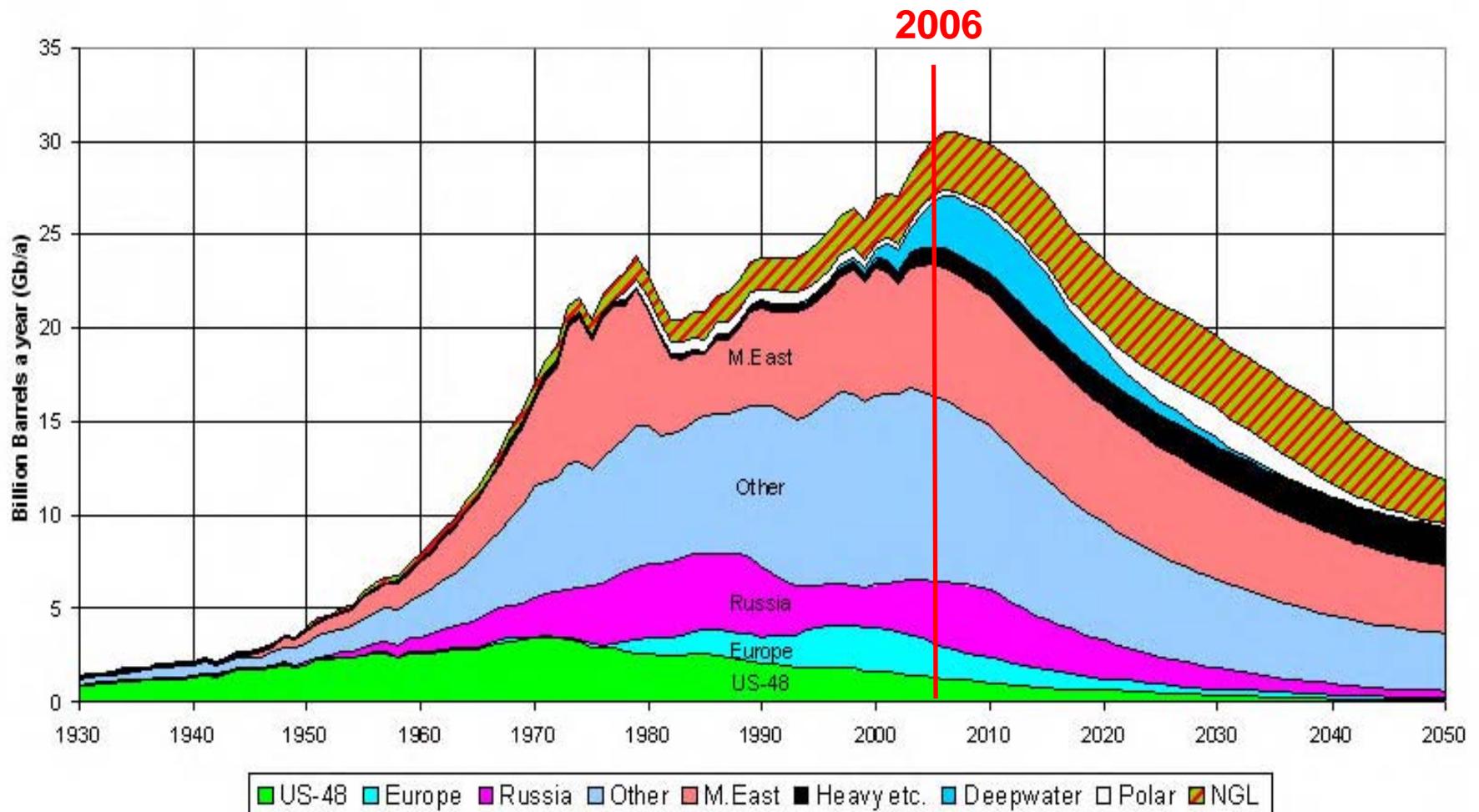
Worldwide Discovery Trend



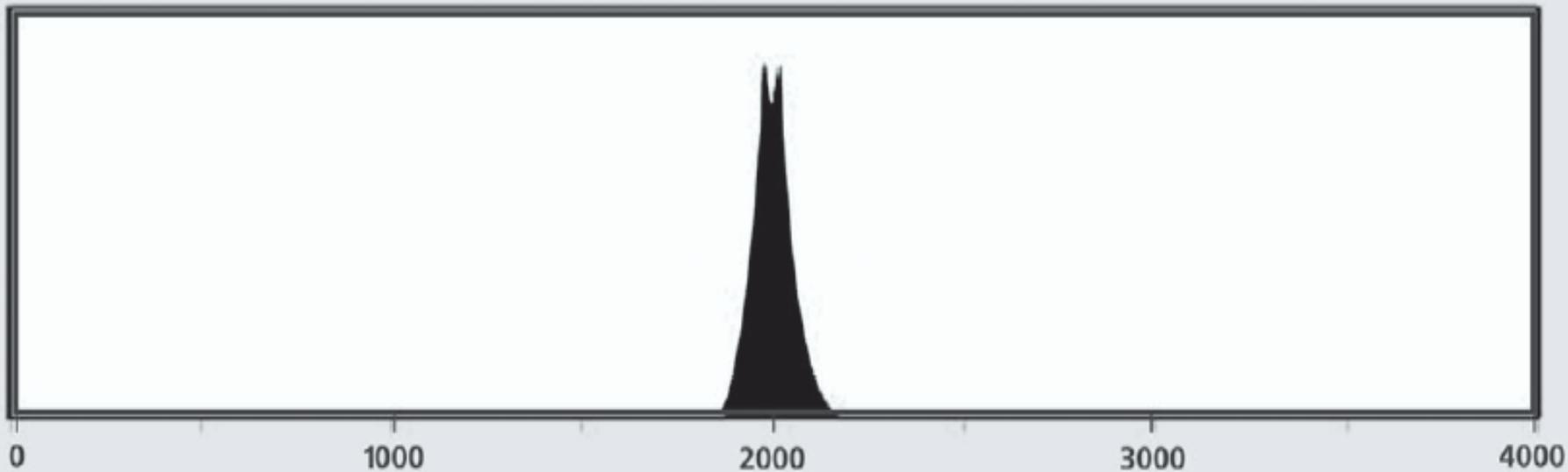
Source: Campbell, May 2005

ASPO - Colin Campbell 2004

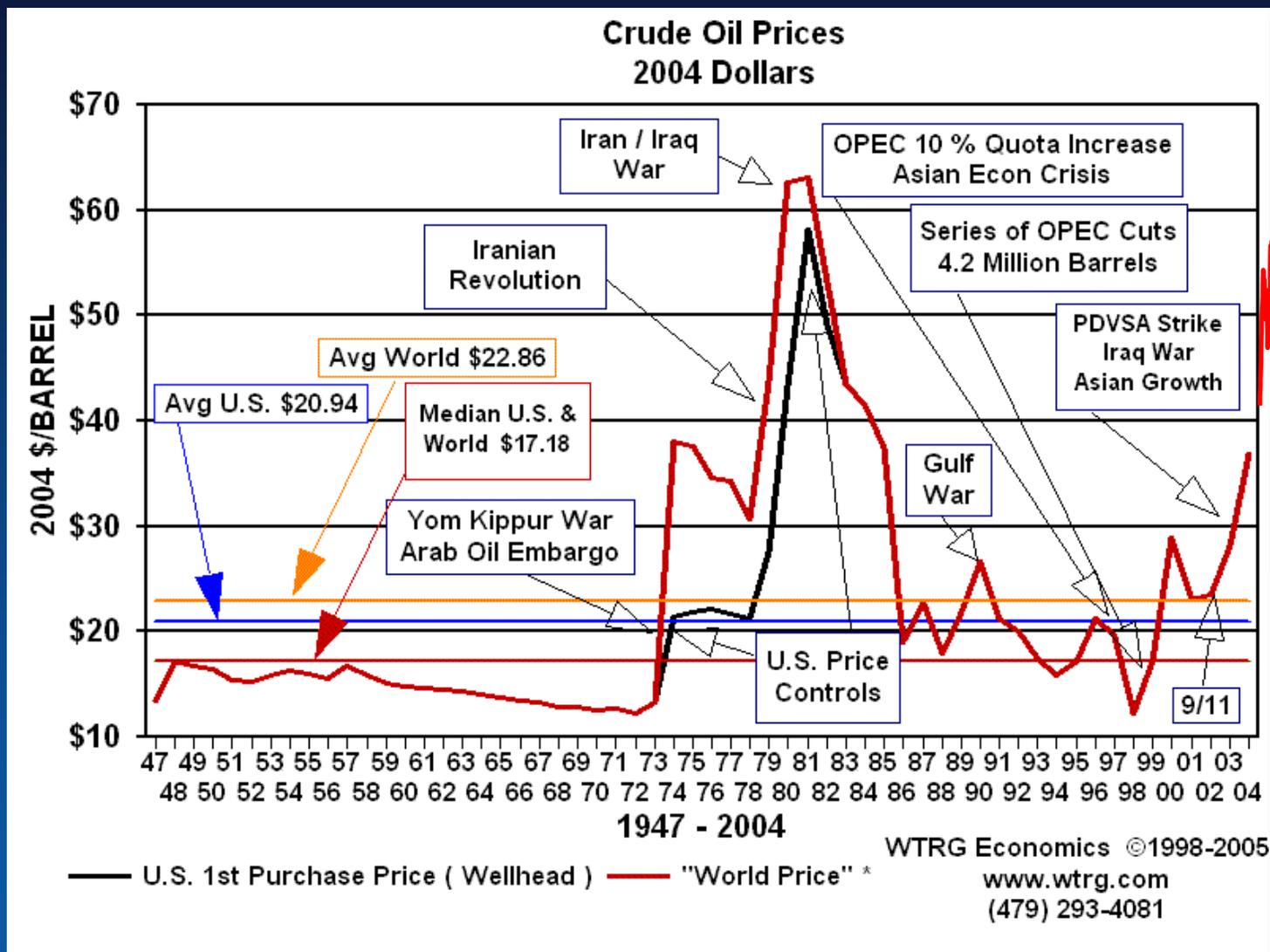
OIL AND GAS LIQUIDS 2004 Scenario



The Energy Curve of History?



Increasingly volatile, increasingly upward



~\$75/bbl

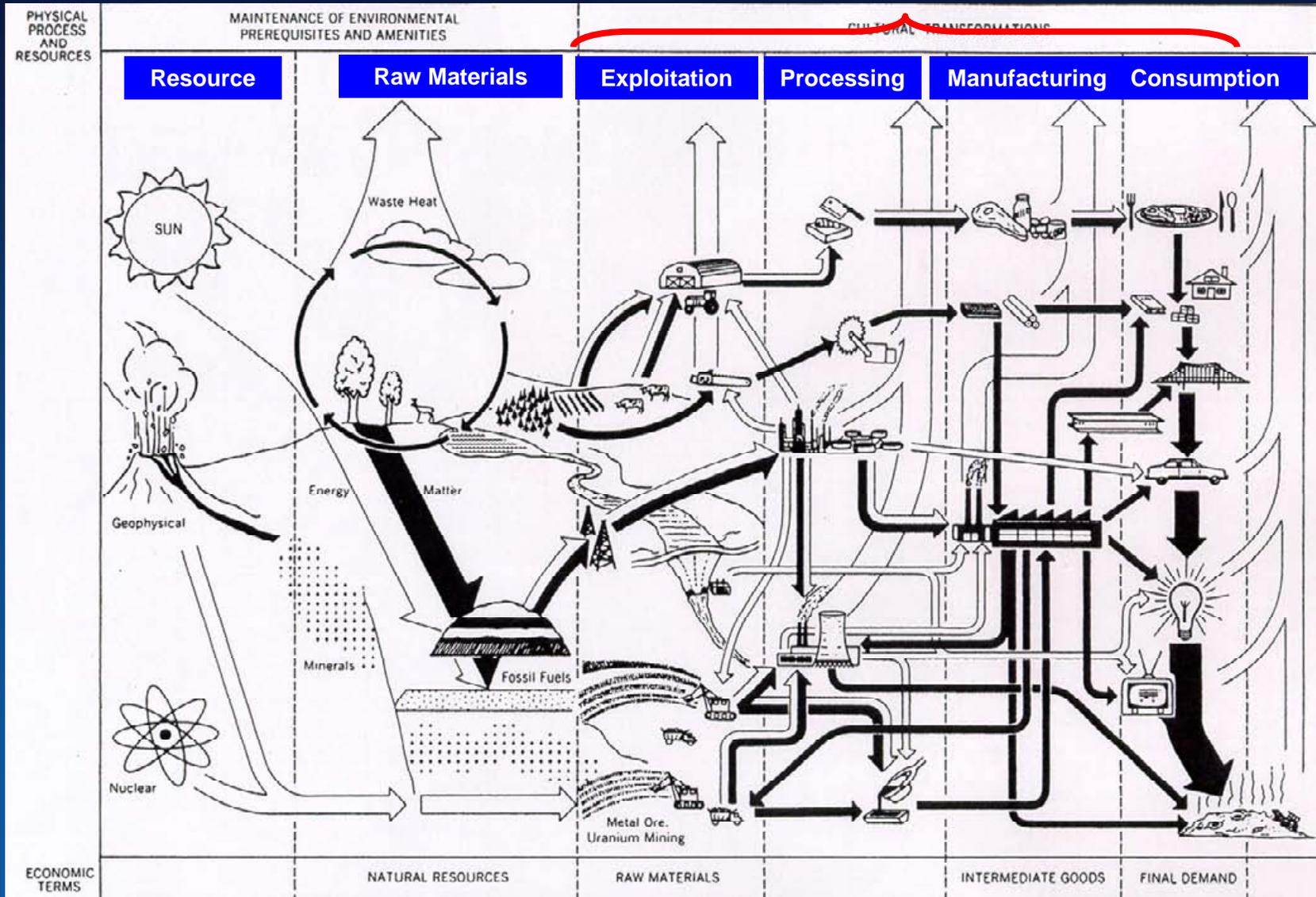
“Tell me the fairy tale about the economy.”



“Tell me the fairy tale about the economy.”

The global economy is very complex

And it's, almost entirely, dependent on cheap oil.



Peak Oil Is A Global Event

- Oil is not renewable and **will** peak.
- Discovering the date is the only open question.
- A rearview mirror is still only diagnostic tool that works.
- We might now be beyond the peak.
- Ignoring this issue is dangerous folly.
- **Wake-up time has arrived.**

Some Probable Post - Peak Oil Events

- World embarks on search for new energy sources.
- Conservation steps become urgent:
 - End of suburbia?
 - Globalization shifts to “stay at home”;
 - Era of energy-savings product innovation; and
 - Implementation proves slow and difficult.
- Global energy competition between countries:
“China vs. USA”: The main event

Future Scenarios

Last One Standing: The Way of War and Competition

- Worst case scenario
- Default scenario

Powerdown: The Path of Self-Limitation and Sharing

- Uppsala Protocol
- Requires unprecedented international cooperation
- Examples of Cuba vis-à-vis North Korea

Waiting for the Magic Elixir: False Hopes, Wishful Thinking and Denial

- Plan Snooze – leads back to Plan War

Building Lifeboats: The Path of Community Solidarity and Preservation

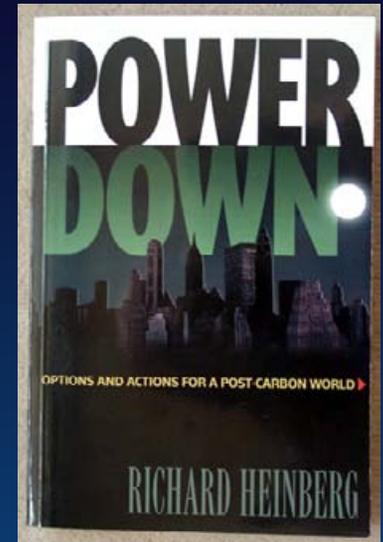
- Amish communities

Blessed are those who depend least on modern technology, for they have not forgotten how to take care of themselves.

Blessed are those whose culture is communitarian and not individualist, for they will share and prosper.

Blessed are they who have no exploitable natural resources, for no one will bother them.

Blessed are those who know how to grow food, for they will eat and feed others.



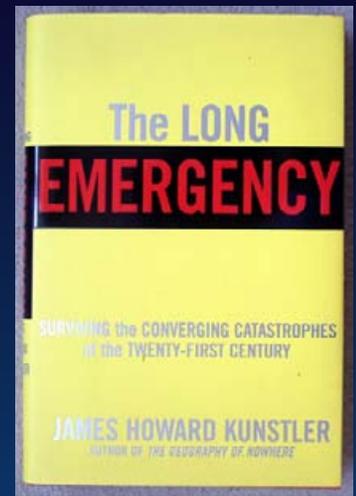
The Dark Side

“The Long Emergency will present conditions Americans have never experienced...”

“Complex systems based on far-flung resource supply chains and long-range transport will be especially vulnerable. Producing food will become a problem of supreme urgency.”

“We are going to have to rebuild from the bottom up those complex webs of local economic interdependence that the national chain store movement has destroyed. It is a tremendous and daunting task. The transition out of corporatist hyper-retailing will be very painful.”

“Since central government is likely to be increasingly ineffectual and irrelevant in an energy-starved world, I believe the dominant culture of the American South would tend to promote people taking the law into their own hands.”



Some Silver Linings

(In an awkward sort of way)

- **CO₂ emissions will drop dramatically, slowing Global Warming (as global economies collapse. However, in the short term, emissions could increase if the World moves to coal.)**
- **The rate of species extinctions will drop and ocean fish populations will get a chance to recover (as diesel fuel costs rise to astronomical levels, crippling fishing fleets and ground transportation).**
- **After the transition (which could be very ugly) global resource wars will decline or disappear.**
- **A renewed understanding of the interconnectedness-of-all-things will return, including a renewed interest in the ancient ways of working with Nature.**
- **The future will not look like the past. Working with Nature, plus 200 years of accumulated scientific knowledge, will help humankind navigate the challenging road ahead.**

**"Our imagination is the only limit to what we can
hope to have in the future."**

~Charles F. Kettering~

Energy Security & Sovereignty Through Local Self-Sufficiency

Economic Dependence

National Grid
Oil Imports
Air Quality
Water Quality
Shrinking Planet
Agro-Industry

“He who has the gold,
makes the rules.”

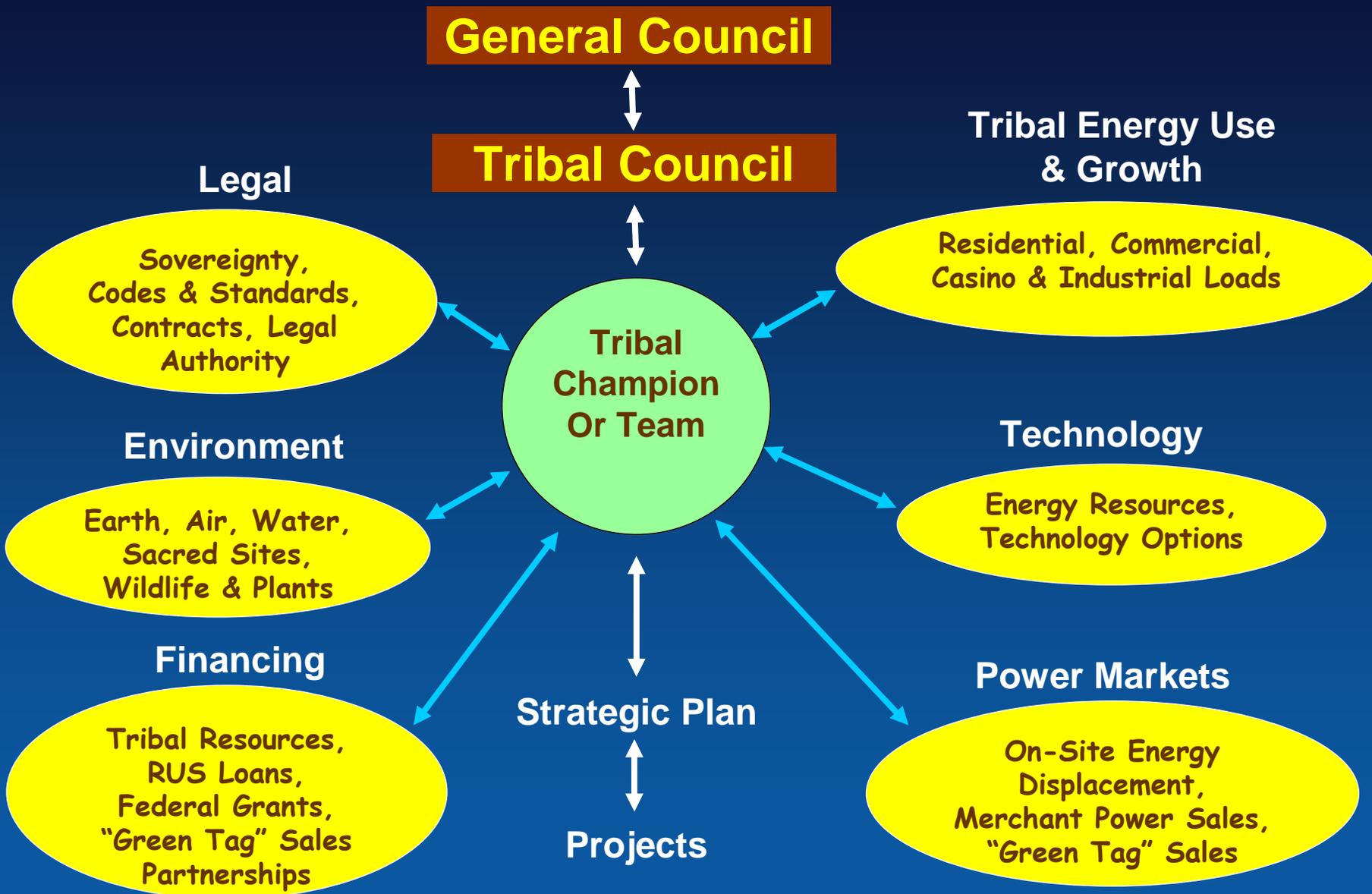


Community Independence

Self sufficiency
Local Community
Food (Earth)
Air
Energy (Fire)
Water

“Community of Cooperation”

The Tribal Energy Development Challenge



Village Strategic Energy Planning

Village Objectives

- Energy Reliability & Security
- Off-Grid Electrification
- Minimize Environmental Impacts
- Supply Diversification
- Use of Local Resources
- Economic Development
 - Jobs
- Build technical expertise
 - Respect for Mother Earth
 - Others??



Progressive Partnerships

For Rural Economic Development and Local Self Sufficiency

Economic Inter-dependence

Information Sharing
Business Development
Economic Equity
Financial Equity
Quality of Life for All
Survival of the Planet



Community Independence

Capacity Building
On-site Production
Local Cultural Integration
Good Quality of Life
Local Pride
Human Satisfaction

**If Planet
Earth...**



**were the size
of an Apple,**



**Then her life-giving atmosphere,
surface, and mineral resources,
would be thinner than an Apple's peel!**