



2008 ASPO-USA Peak Oil Conference

Proceedings



- [Program](#)
- [Speakers](#)
- [DVD](#)
- [Online Video](#)

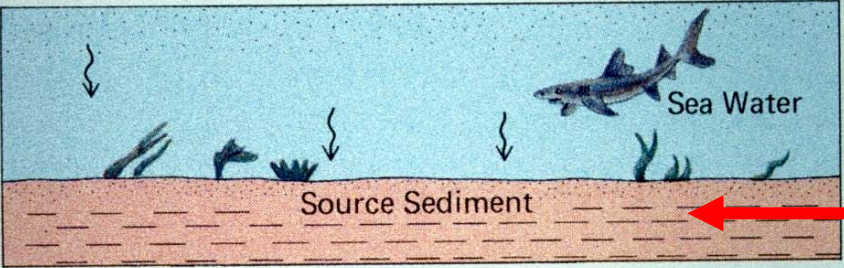
Petroleum 101

**Ken Verosub
Geology Dept.
UC Davis**

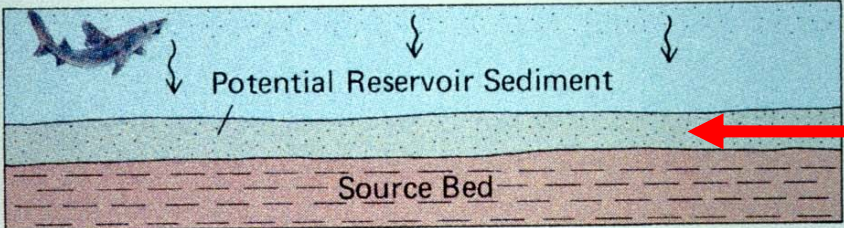


The Good Old Days

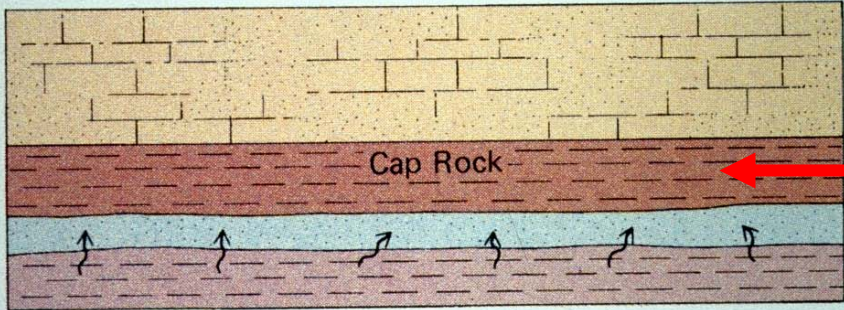
Making Oil



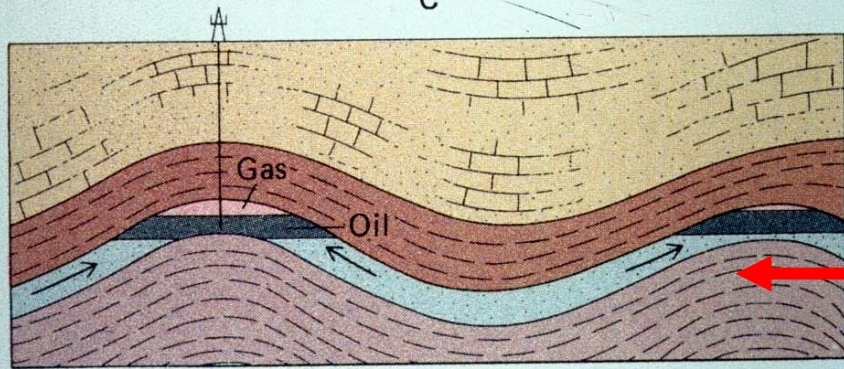
Source rock



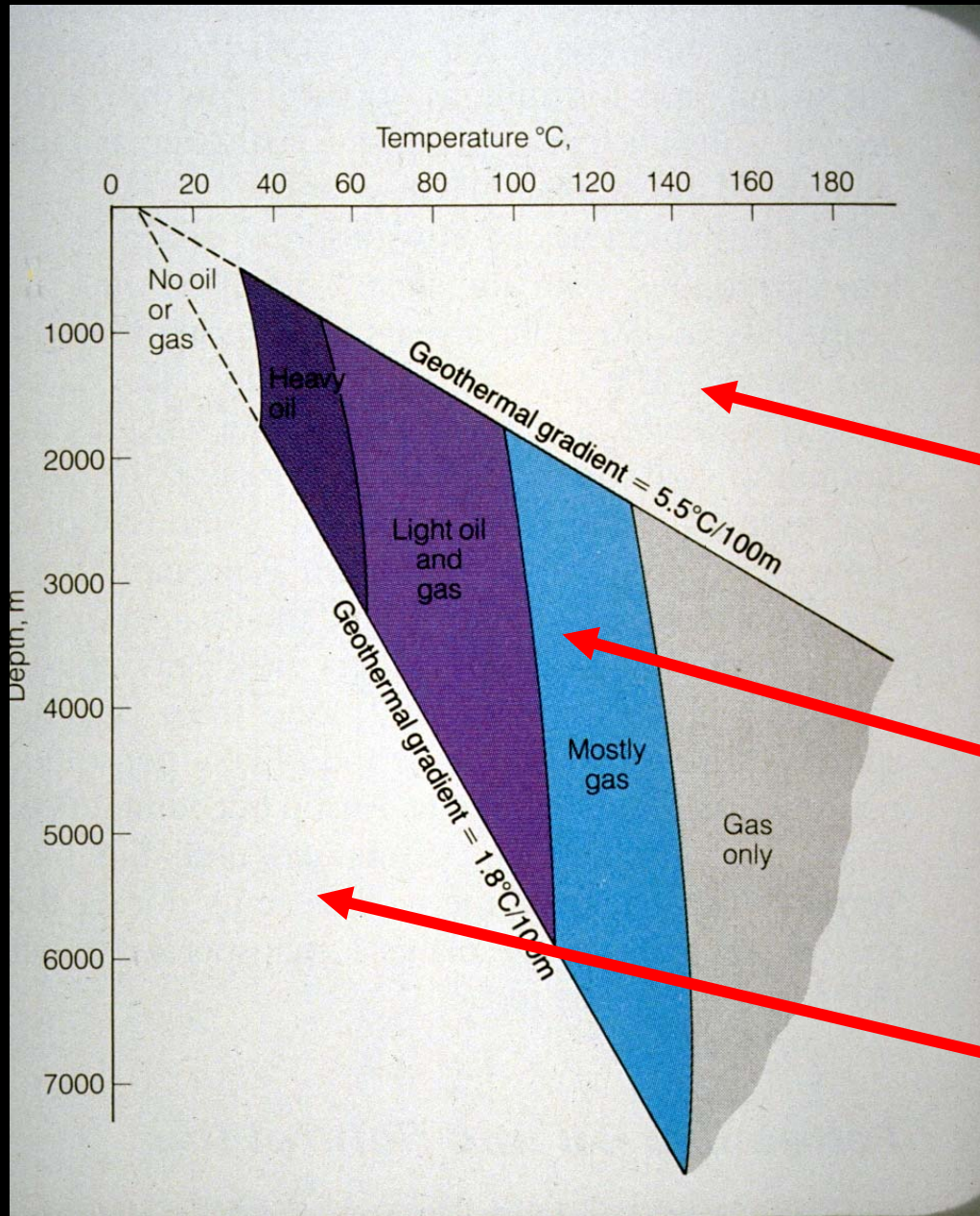
Reservoir rock



Cap rock



Trap



The oil window.

Not too hot.

Just right.

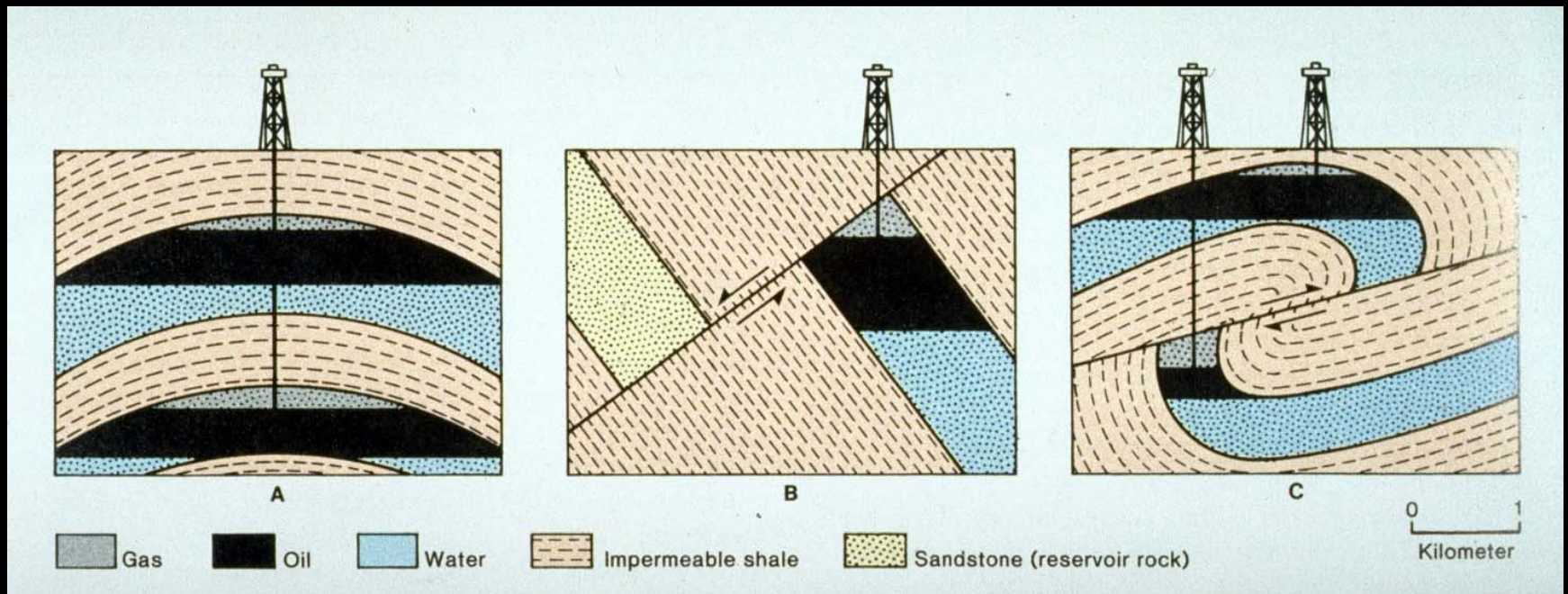
Not too cold.



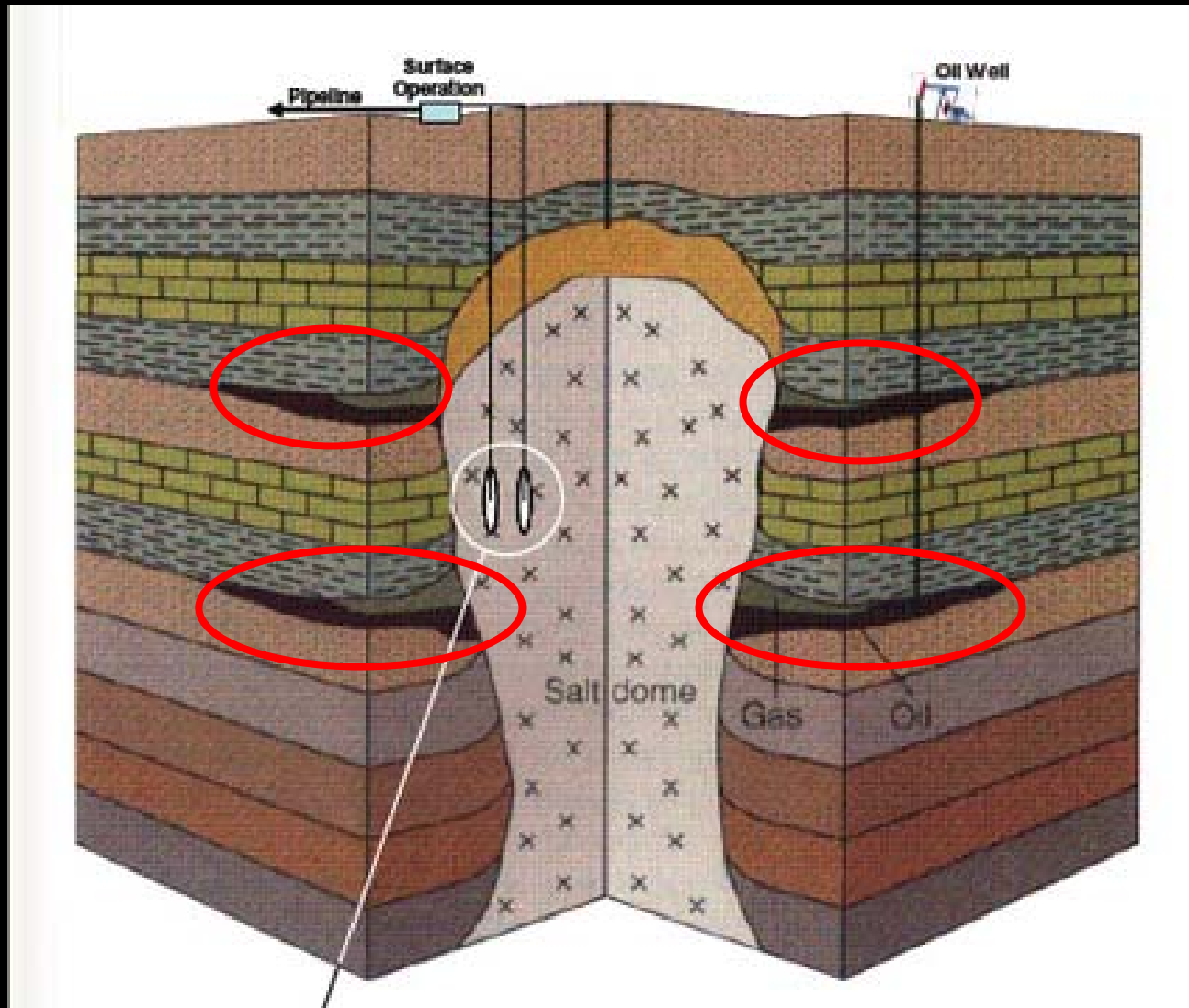
1,200,000-year-old
volcanic ash layer

Ventura anticline.

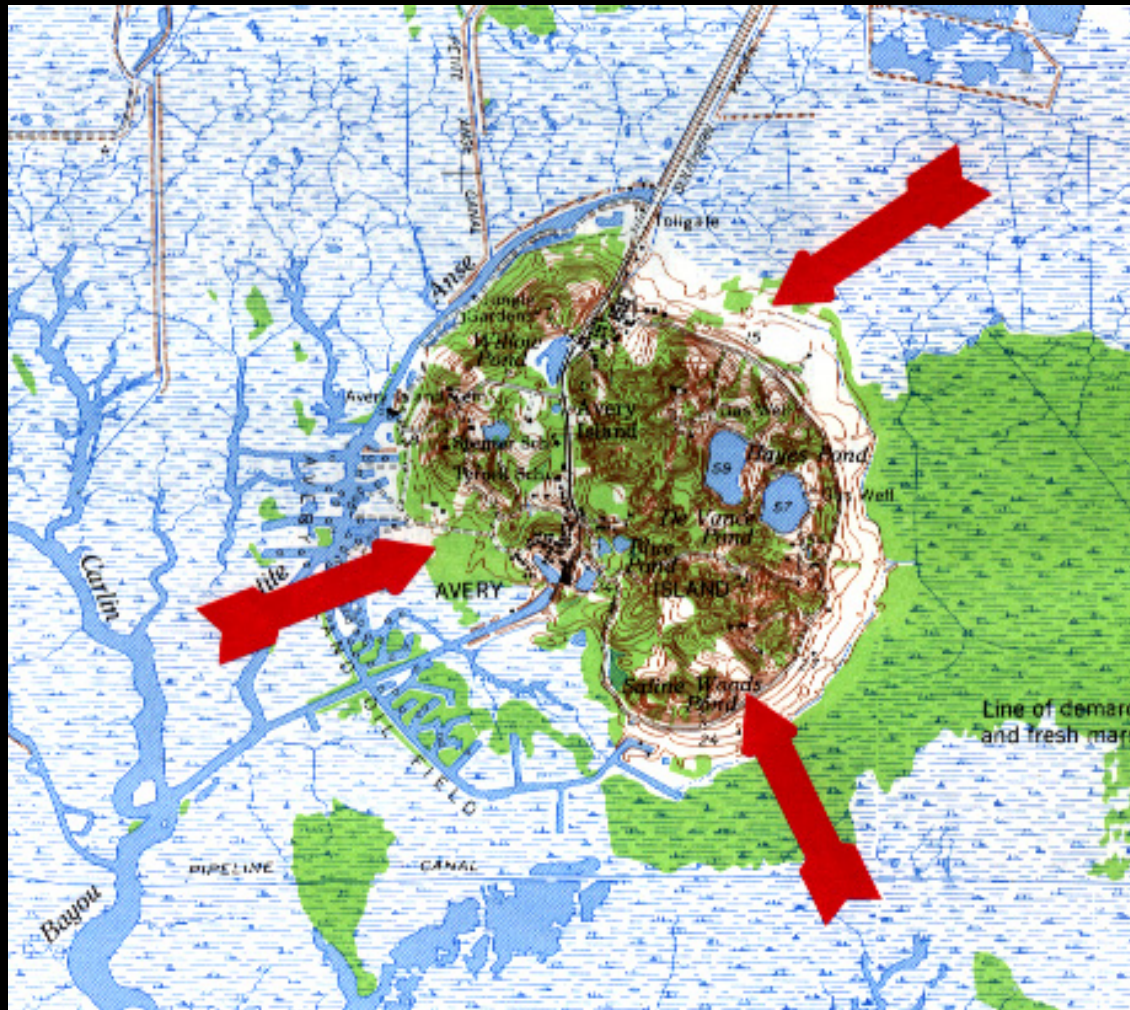
Oil is trapped in traps.



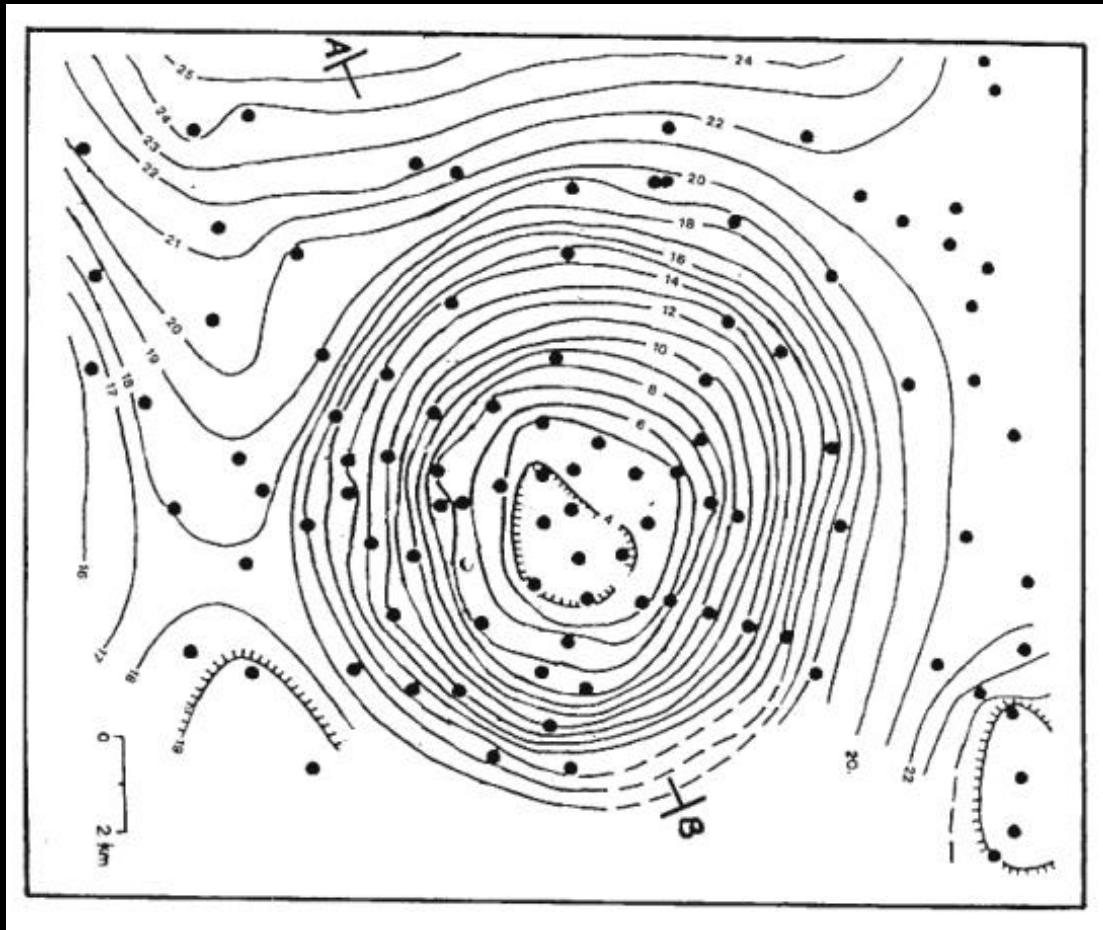
Stratigraphic and structural



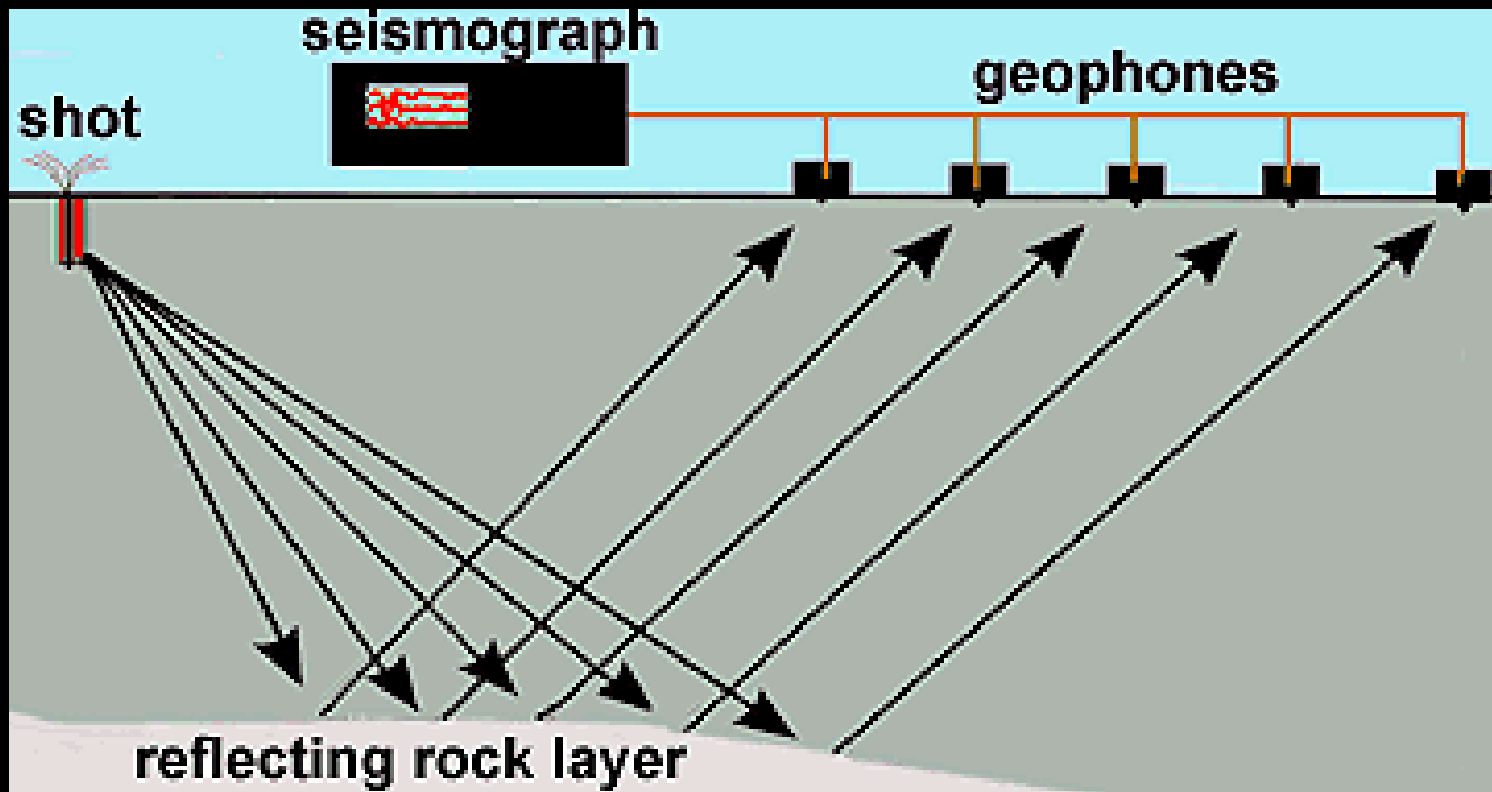
Anatomy of a Salt Dome



Avery Island, Louisiana



Gravity over a Salt Dome



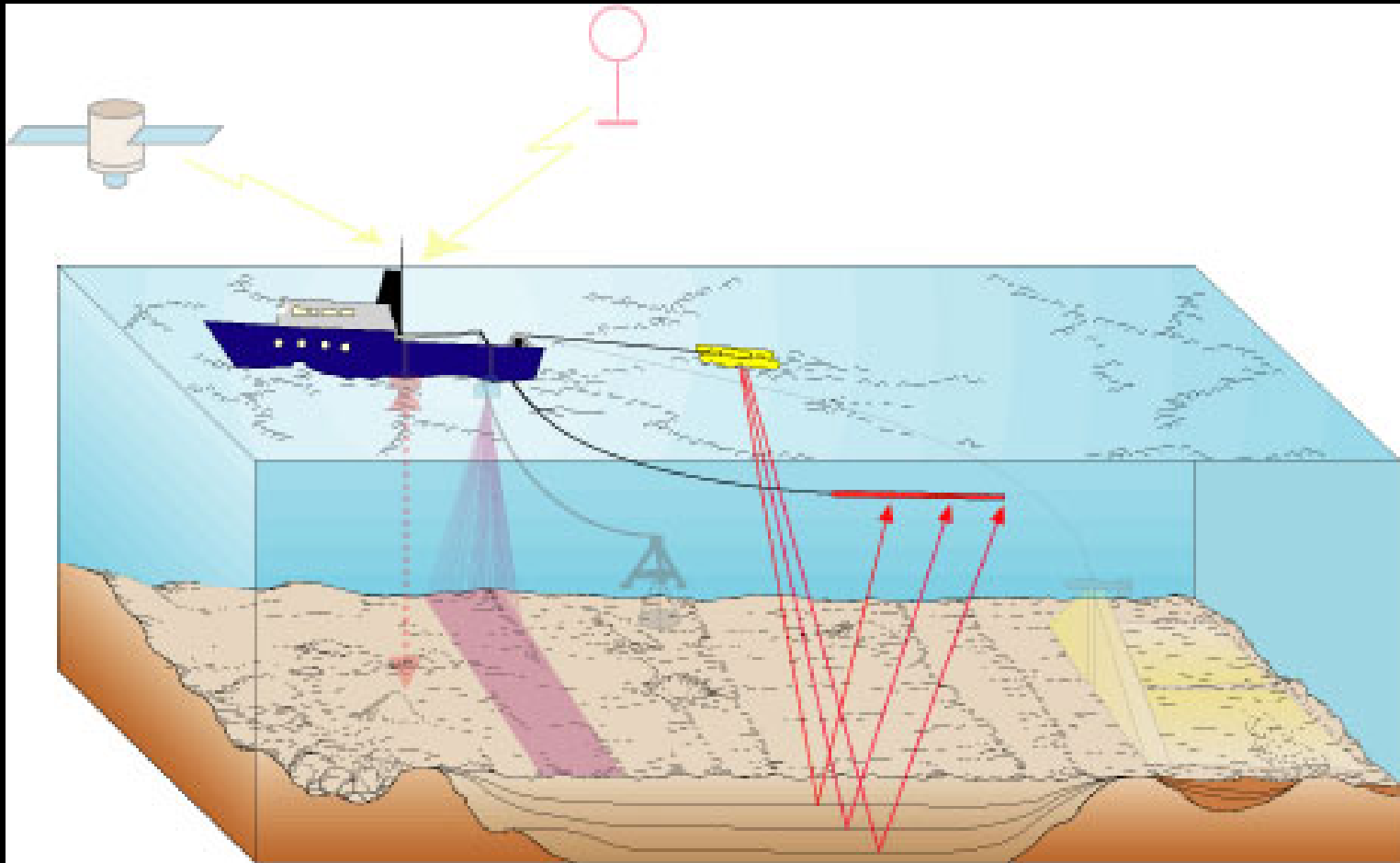
Reflection Seismology



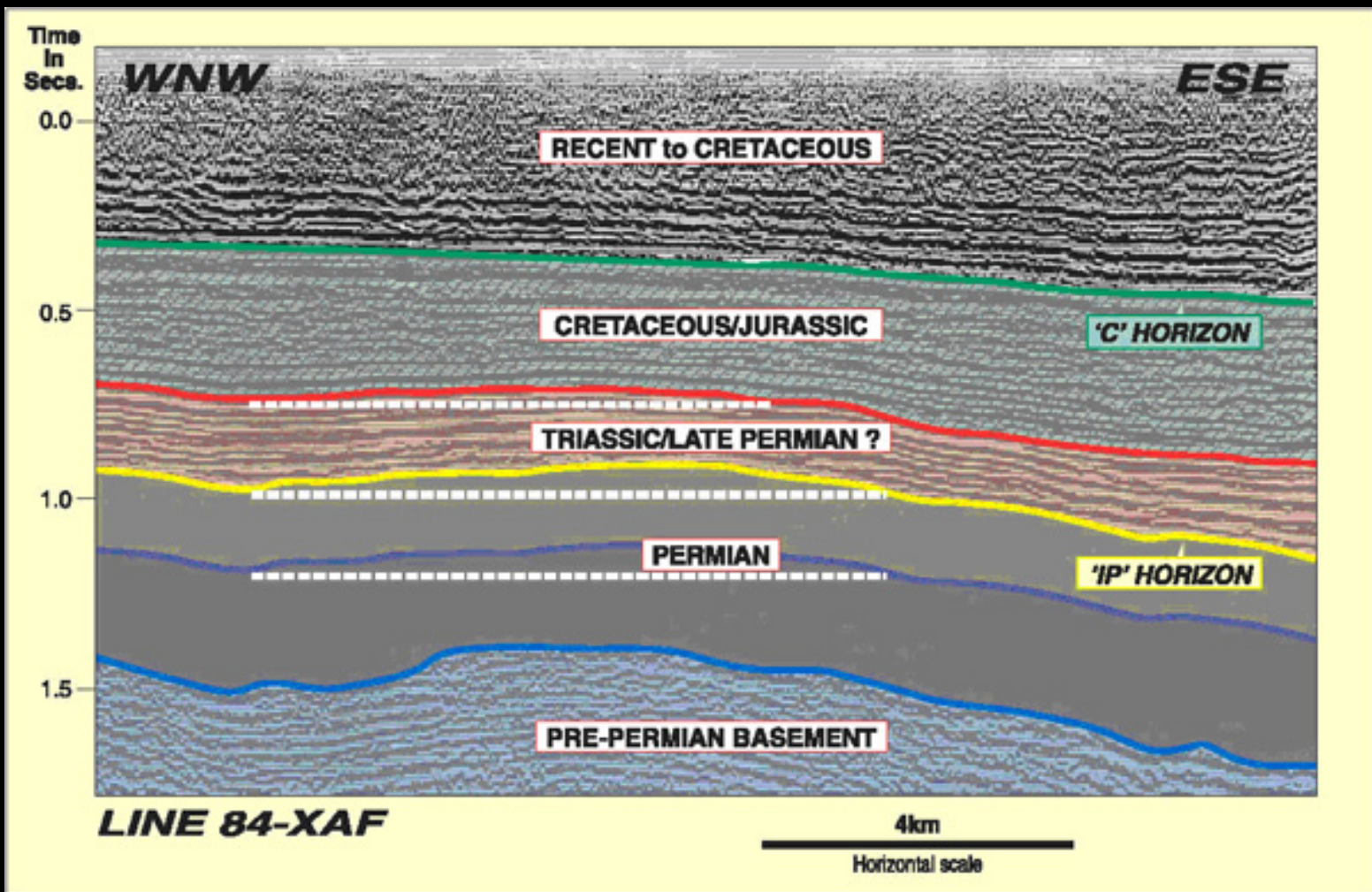
**Thumper
Truck**

**Geophone
Array**

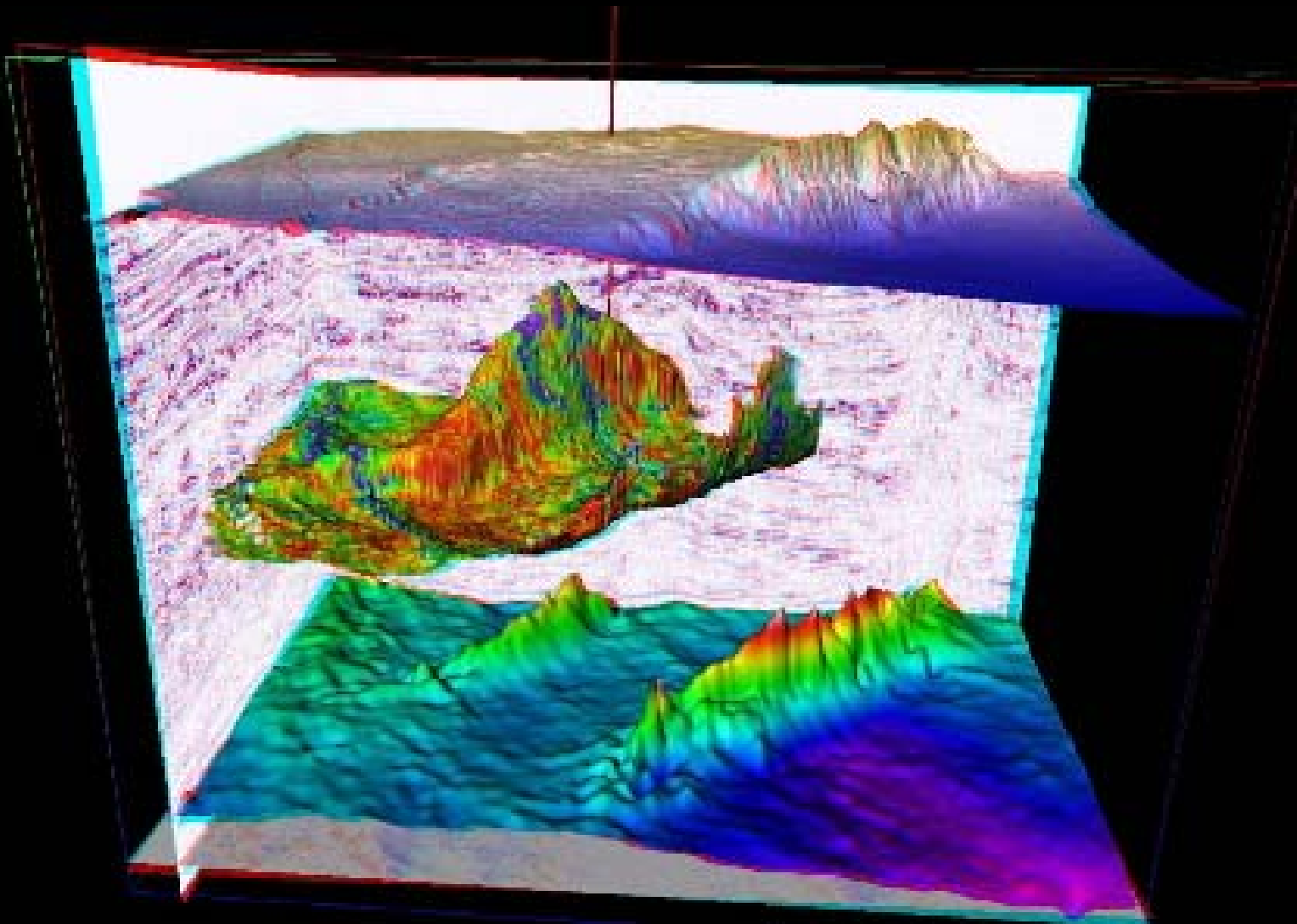




Seismic Reflection at Sea



2-D Seismic Profile



3-D Seismic Profile

TAKE HOME MESSAGE

Oil forms under special conditions.

It takes time to form.

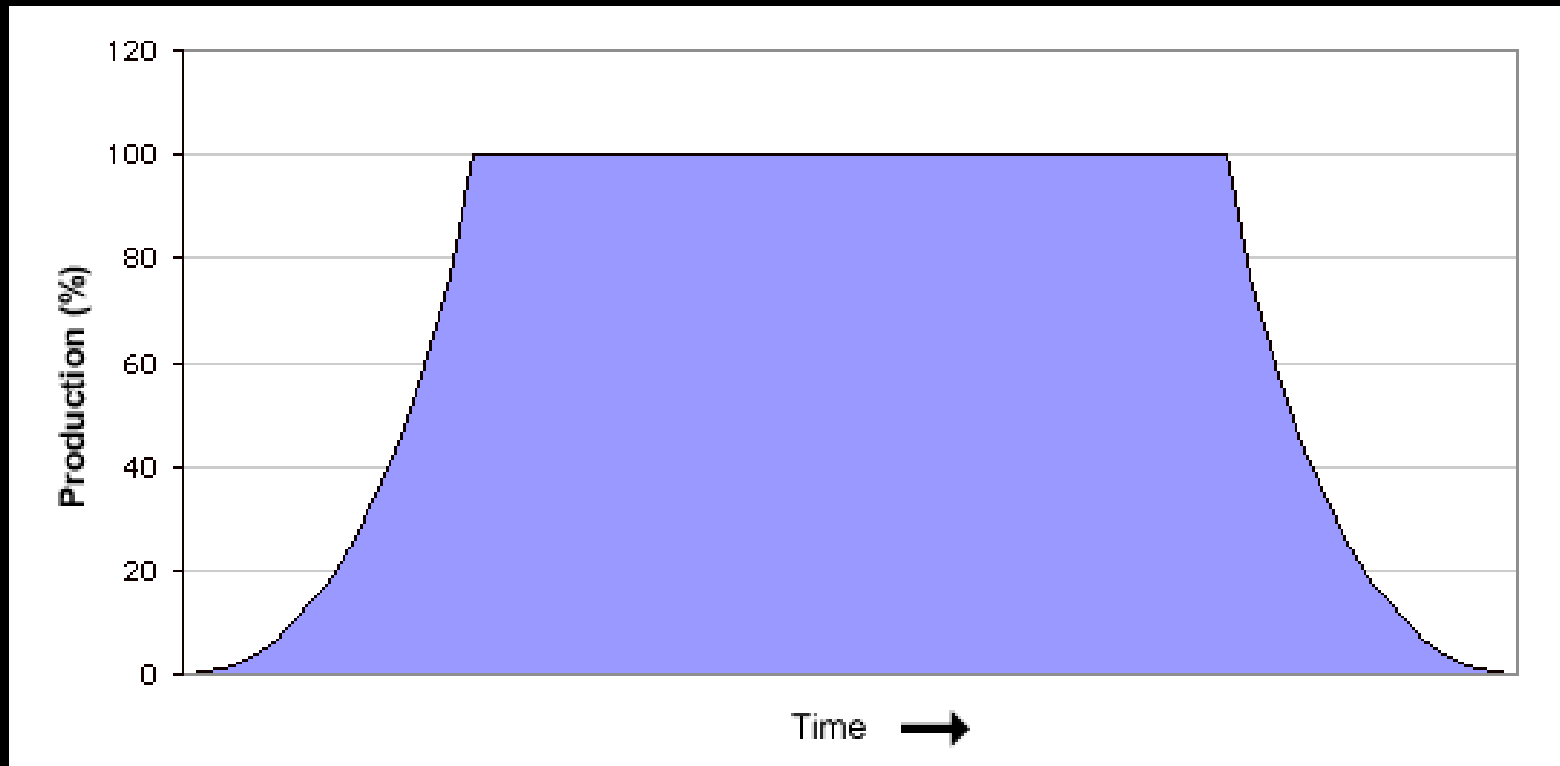
There's only so much of it.

It isn't easy to find.

All the "easy oil" has been found.



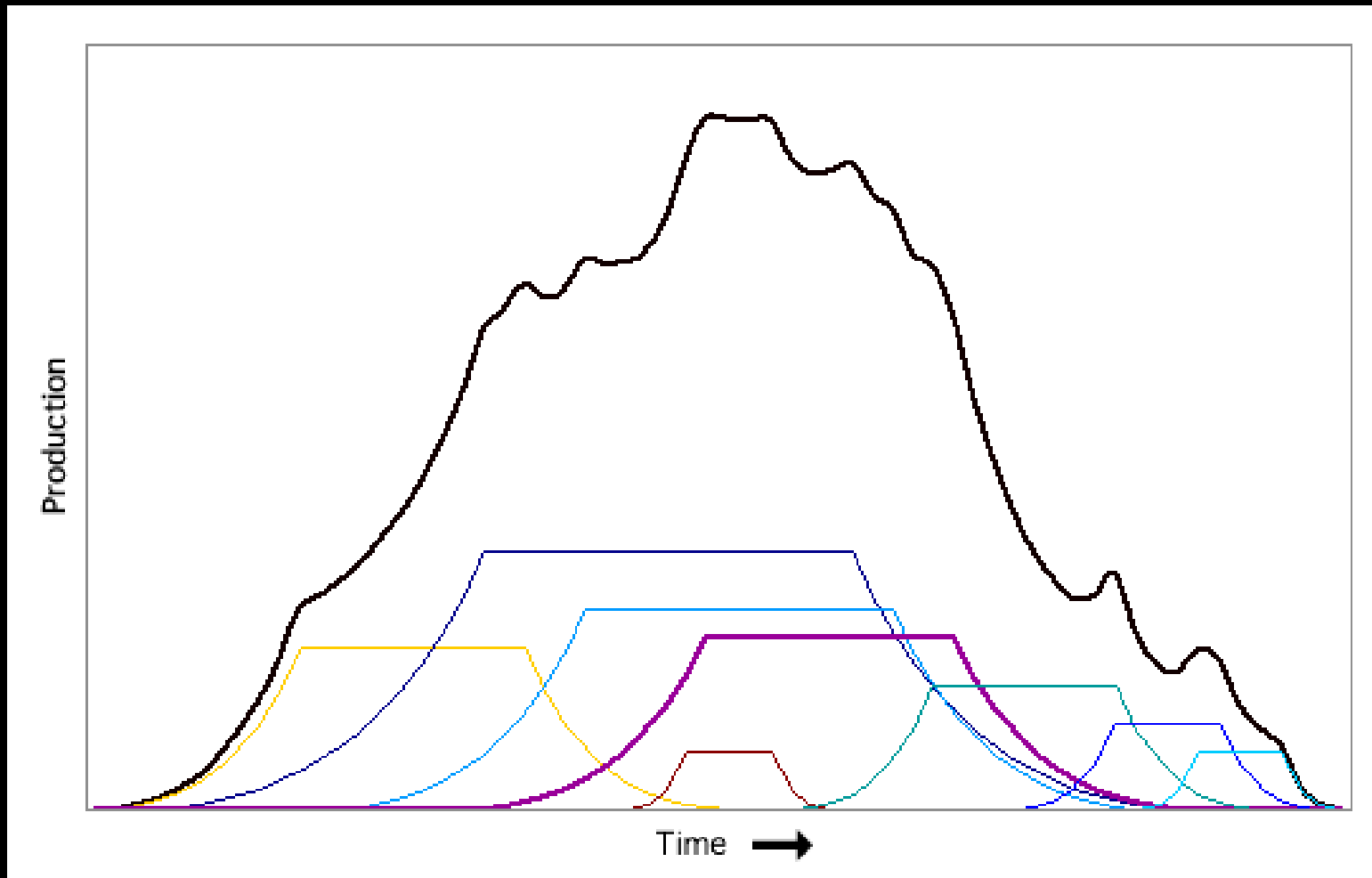
Drilling for Oil



History of an individual well.



Signal Hill Oil Field, Los Angeles



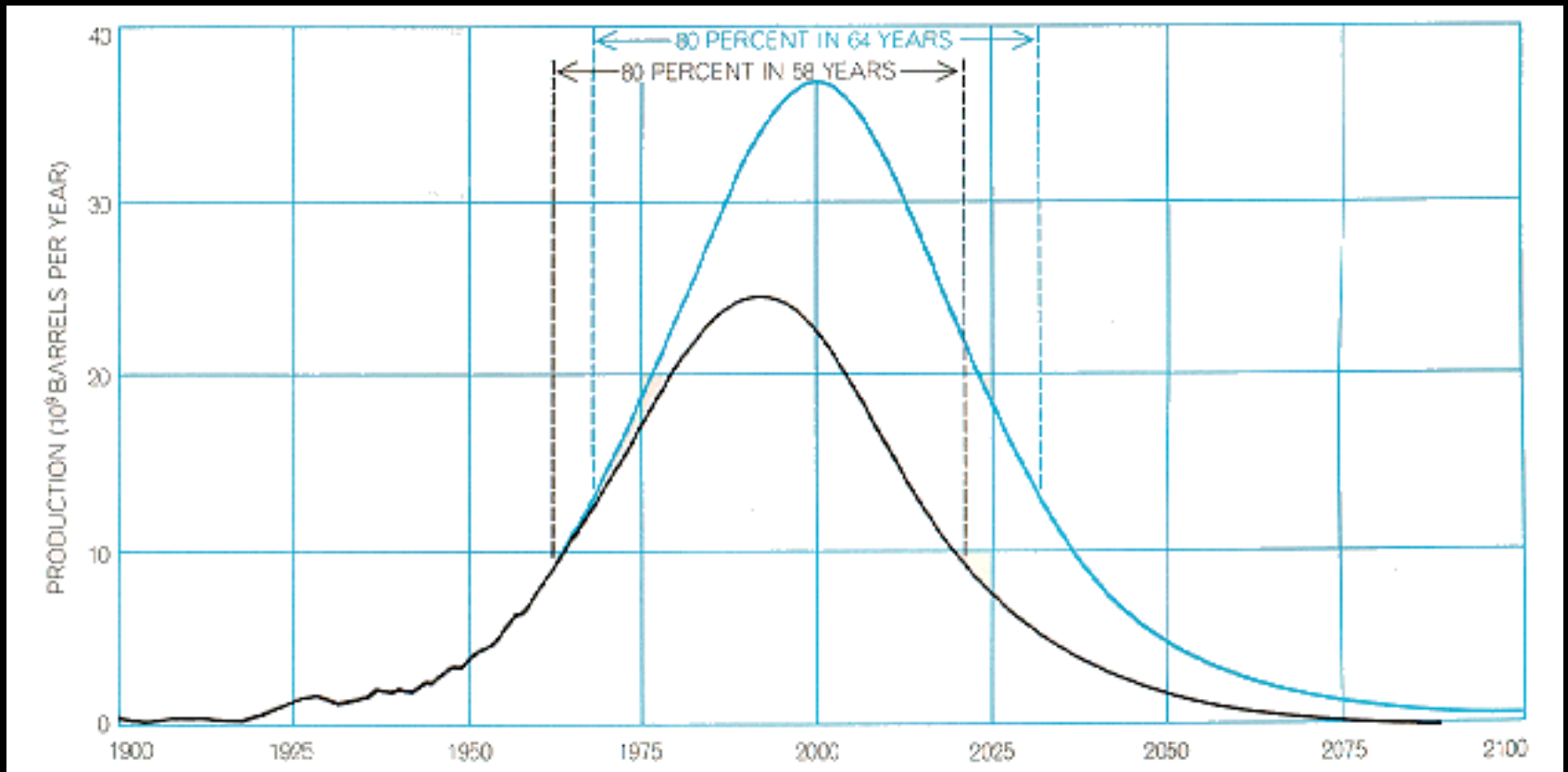
History of an oil field.



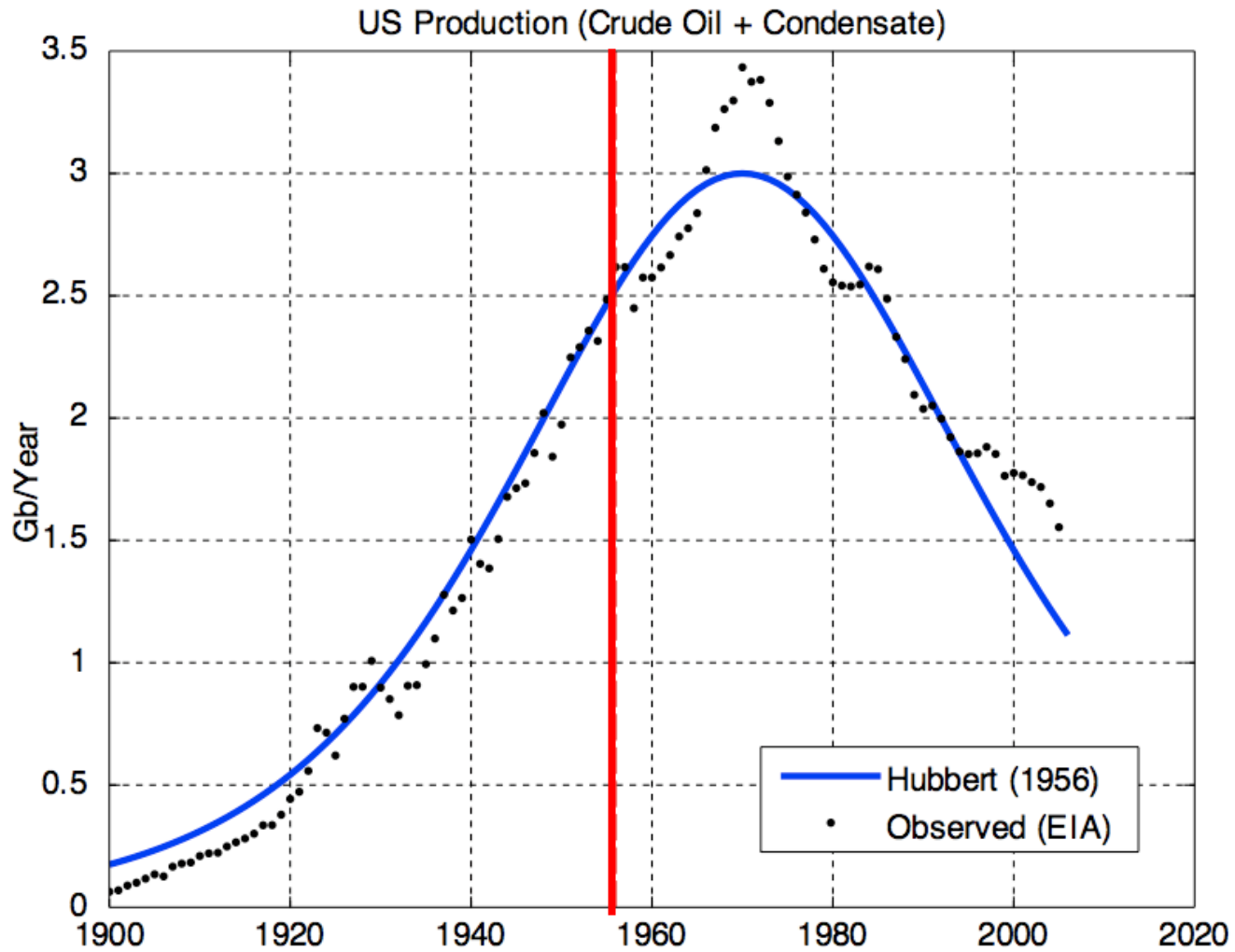
**The man who
put it all
together.**

**M. King Hubbert
1903 -- 1989**

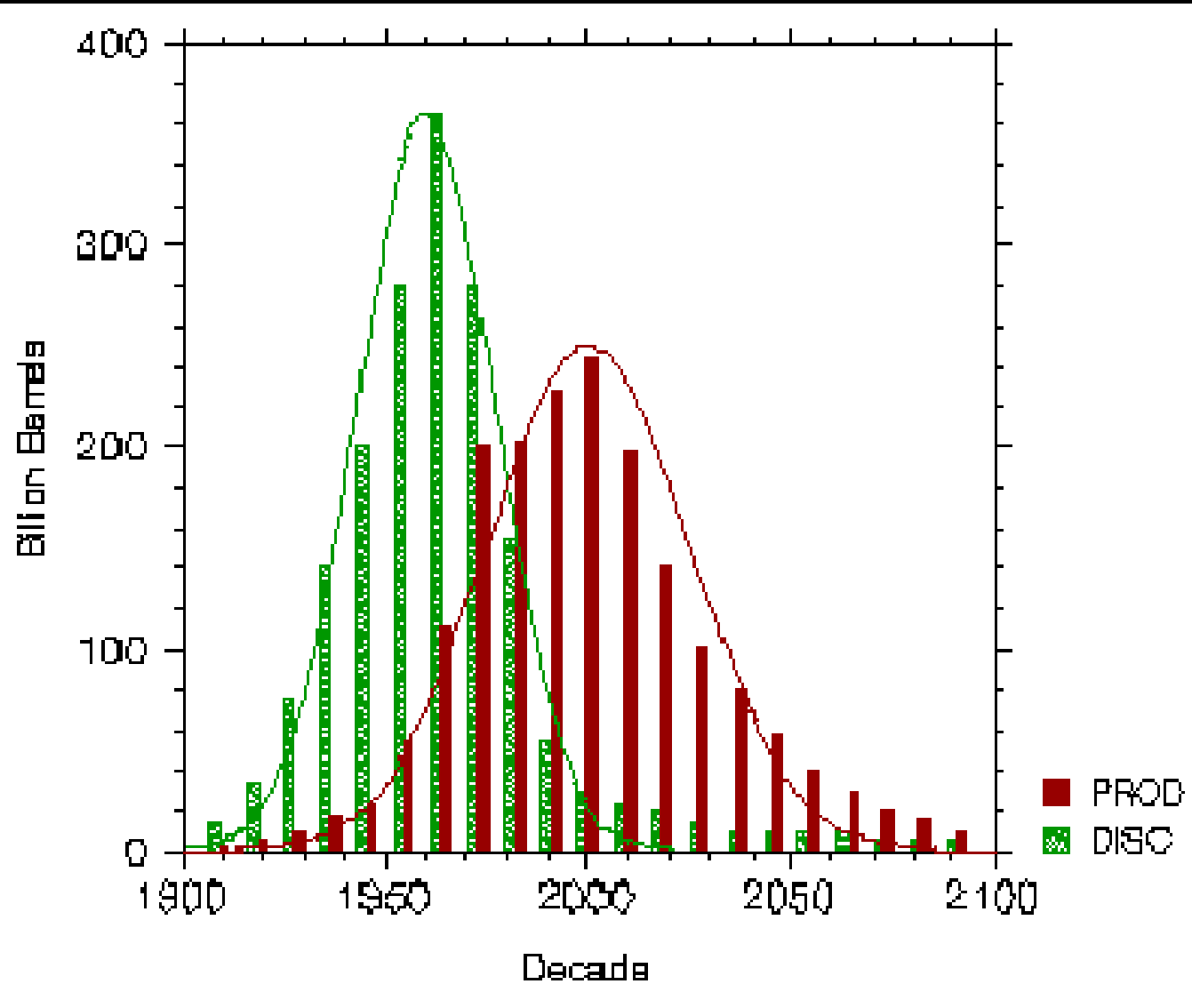
Father of the Hubbert Curve



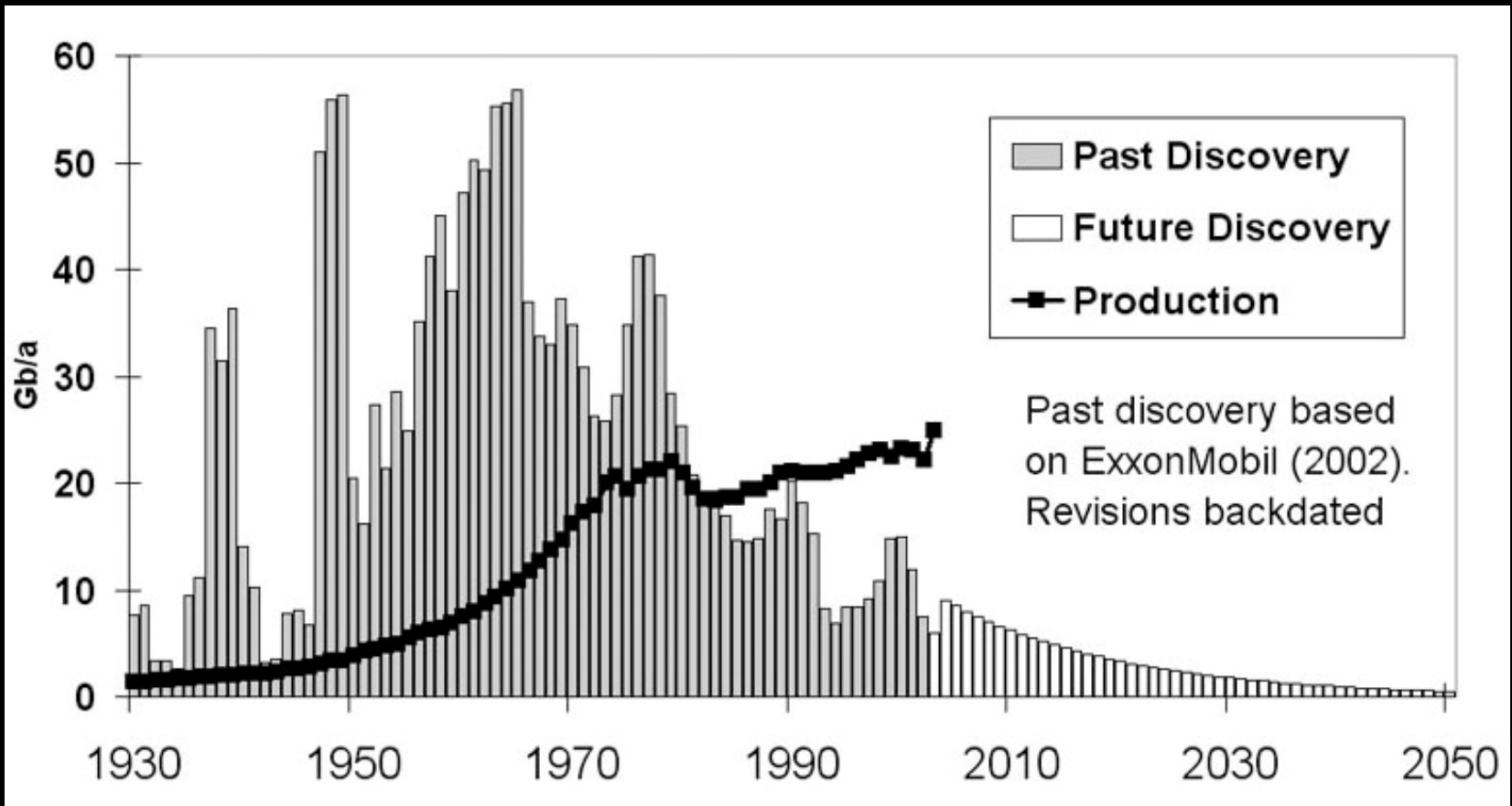
Hubbert Curve of oil production



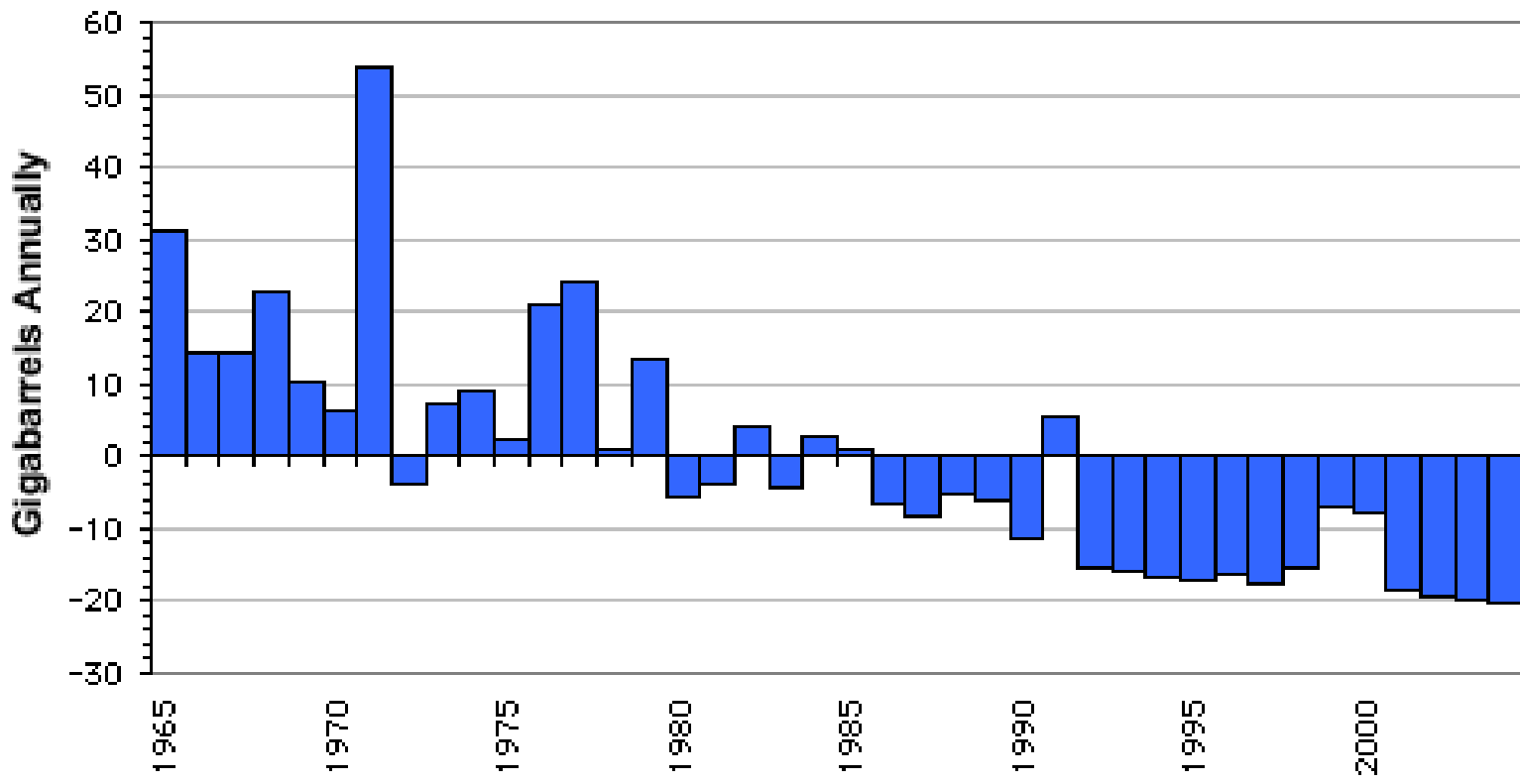
Hubbert's Prediction for US Oil Production



Discovery and production



Houston, we have a problem.



Running a deficit



Newt Gingrich: Petroleum Geologist

DRILL HERE
DRILL NOW
PAY LESS

Show
Your Support



1. Pick Your Size
2. Buy the Shirt & Hat
3. Sign the Petition

ENERGY SOLUTIONS

Drill Here. Drill Now. Pay Less.

Join your fellow Americans who are making their voice heard!

"As gas prices continue to increase, Congress continues to blame others while ignoring practical steps to stop the pain Americans are feeling at the pump. To lower gasoline prices and reduce our dependence on foreign oil, we need real solutions to our energy challenges.

We, therefore, are petitioning the U.S. Congress to act immediately to lower gasoline prices (and diesel and other fuel prices) by authorizing the exploration of proven energy reserves to reduce our dependence on foreign energy sources from unstable countries." -Newt Gingrich



\$ 19.95
+ S & H

(That's less than 5 gallons of Gas!)

- Drill Here Drill Now Shirts
- T-Shirts are made of 100% cotton
- All T-Shirts are preshrunk
- Please allow 3-7 business days for shipping



SMALL

MEDIUM

LARGE

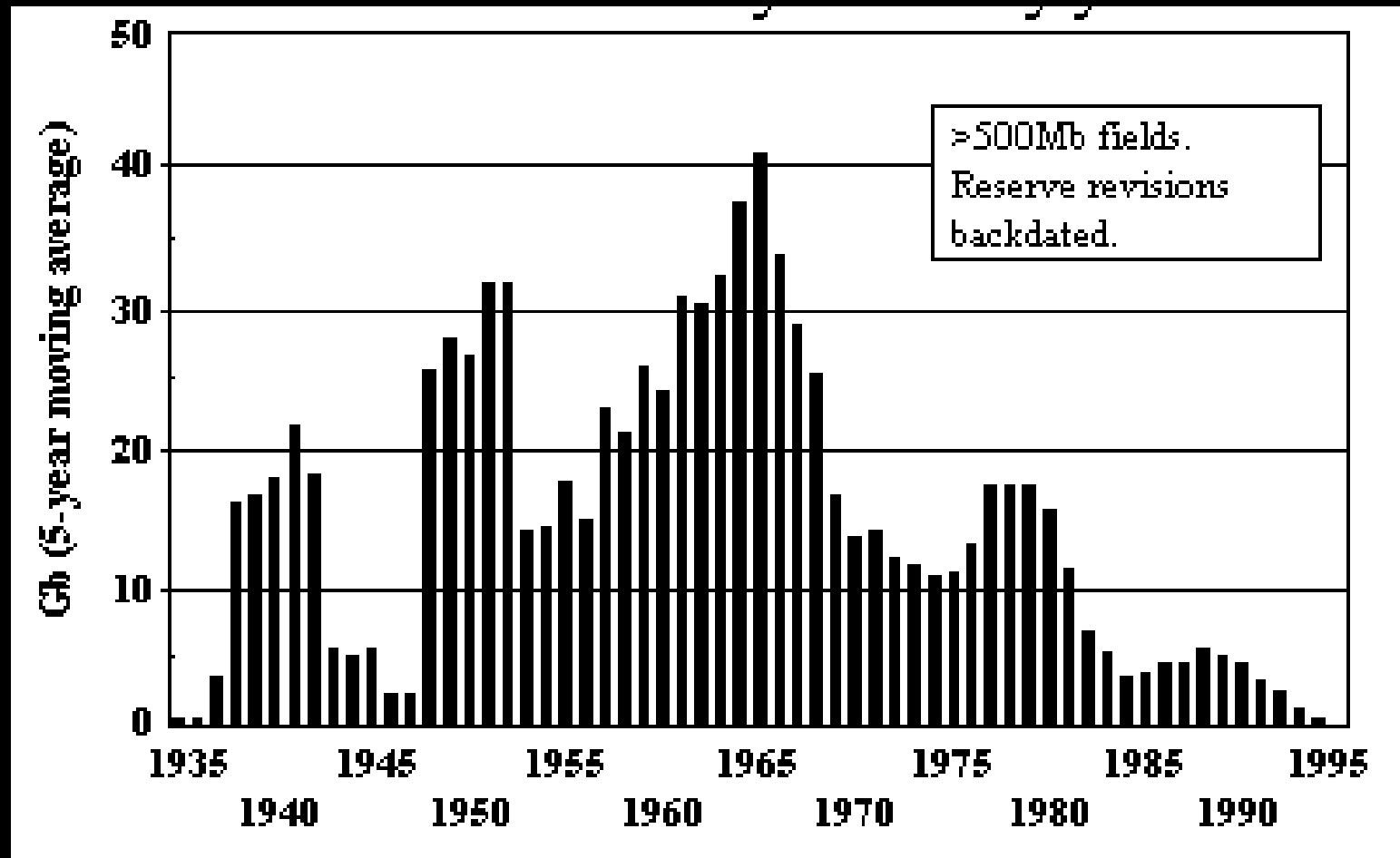
X-LARGE

XX-LARGE

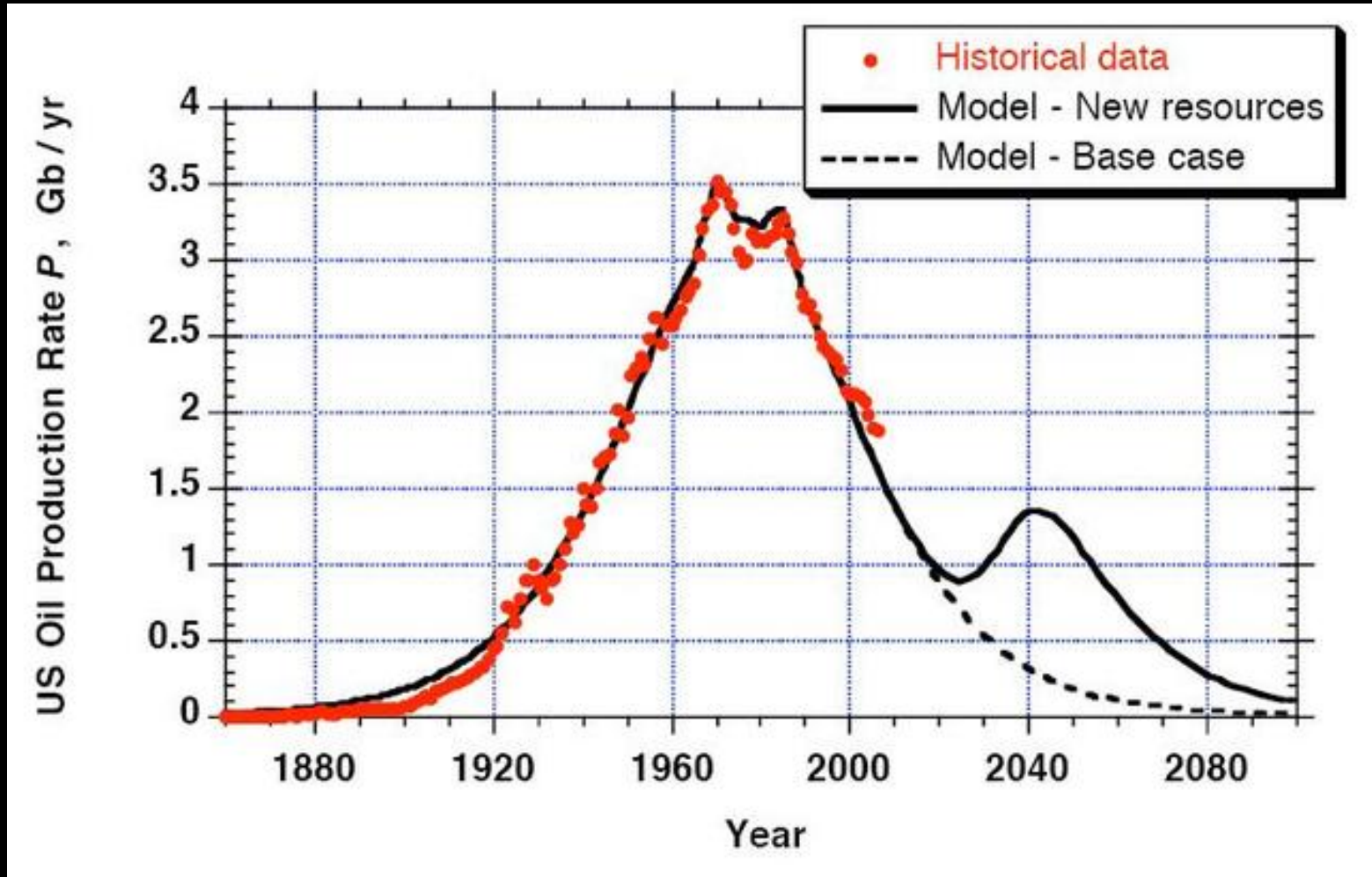
And even if he is right....



Finding oil won't be easy or cheap.



Finding big fields is unlikely.



Bringing them on-stream will take time.

Total U.S. Oil Reserves

20.9 billion barrels

-that's all there is, there ain't no more.

Total U.S. Daily Consumption

20.7 million barrels per day (in 2005)

of which we import

11.7 million barrels per day

How much time do WE have left??

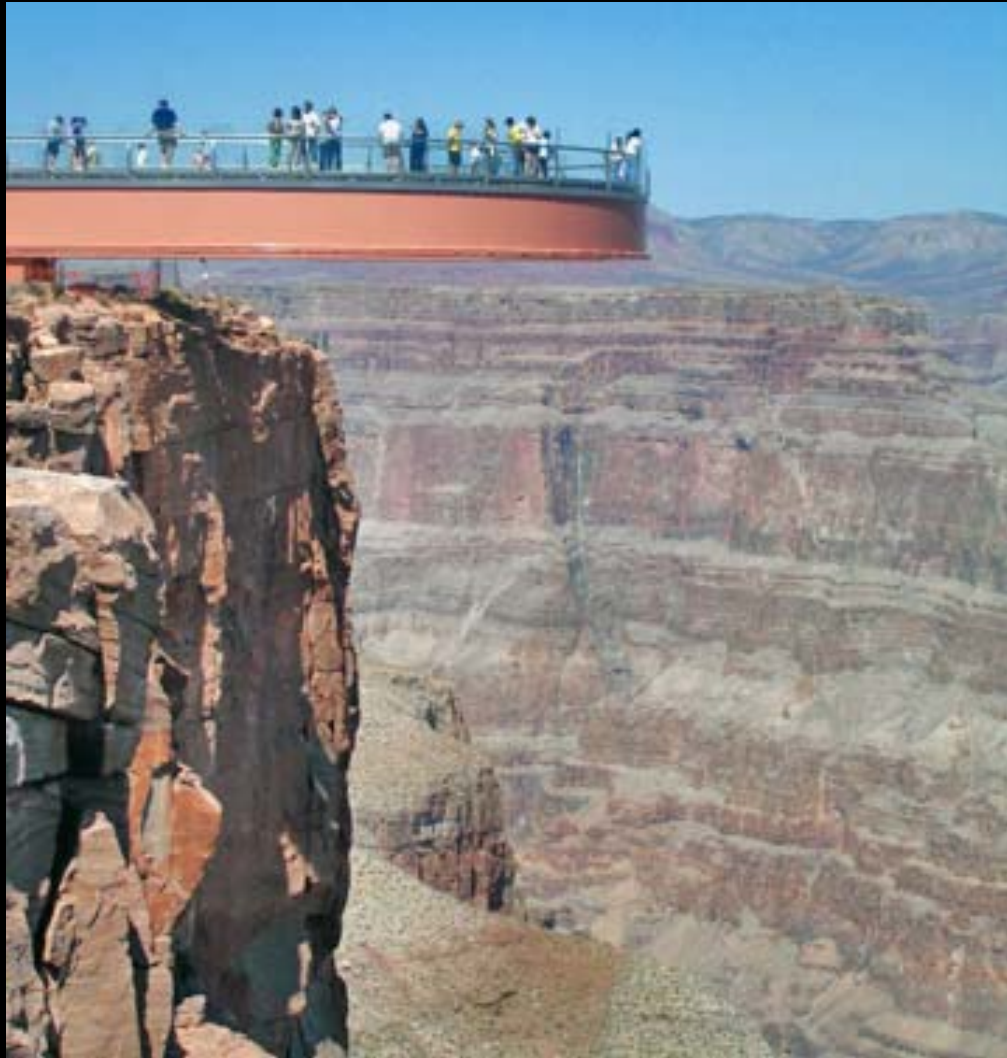
**U.S. Domestic Daily Consumption
9.0 million barrels per day.**

**U.S. Domestic Annual Consumption
3.0 billion barrels per year.**

**20.9 billion barrels total
3.0 billion barrels per year = 7 years**

2015 ± 2

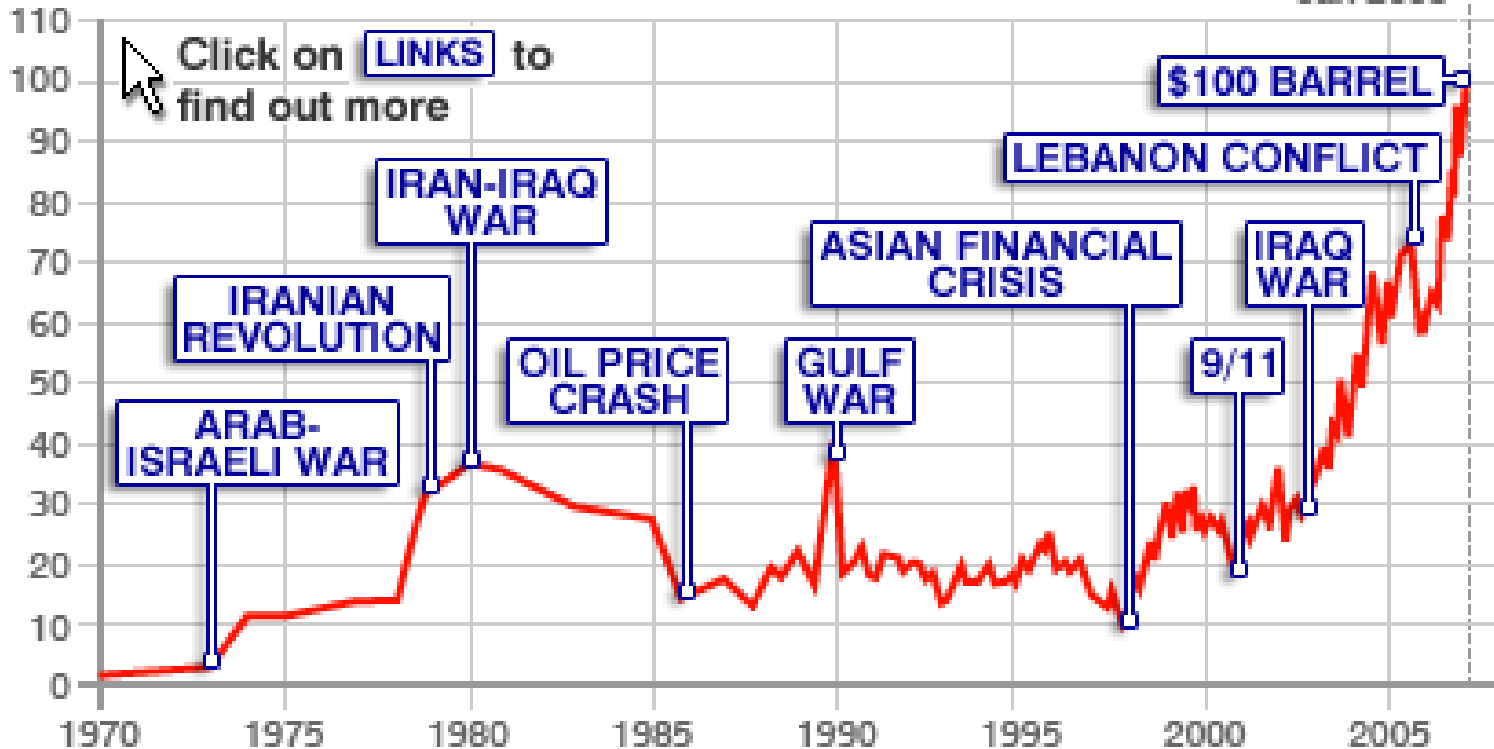
It's crunch time.



Is this the future of US oil?

CRUDE OIL PRICES 1970-2008

US\$ per barrel



Figures are not inflation adjusted

SOURCE: BP/Bloomberg

What will really happen

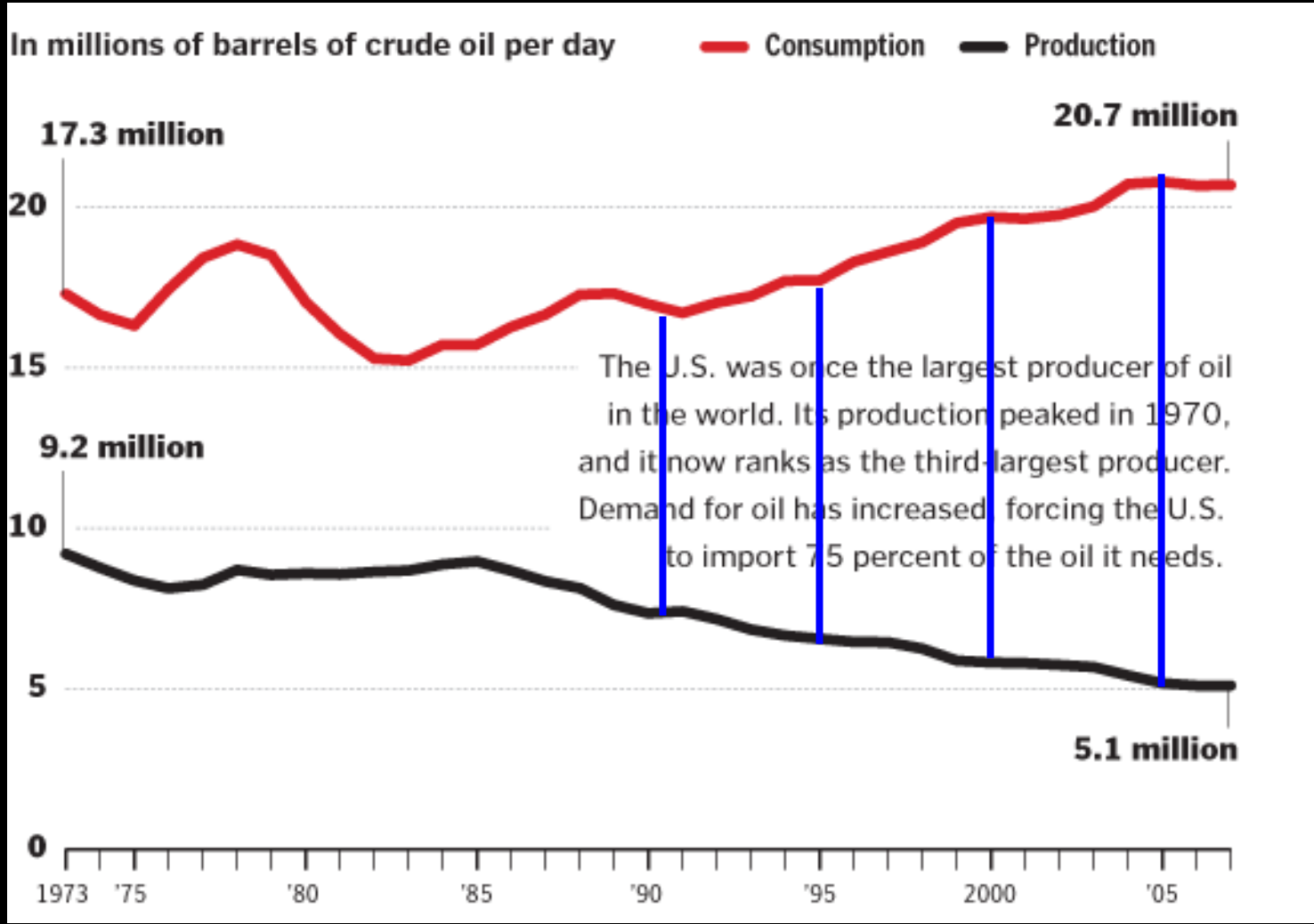
Sticker Shock

It costs less to fill up in the U.S. than in most other countries. The cost to fill a 17-gallon tank in select countries, in U.S. dollars:

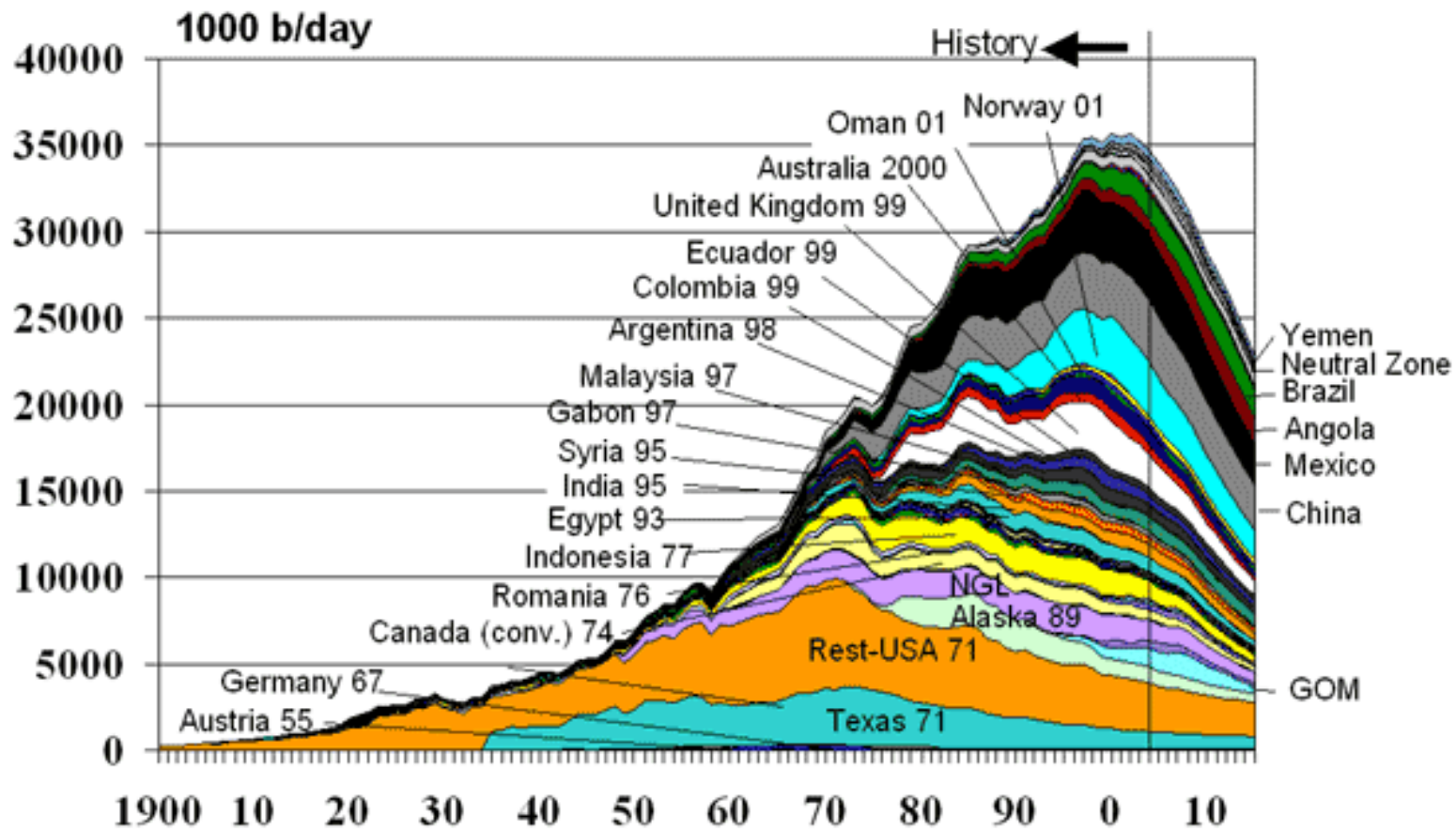


UNITED KINGDOM	\$152 ³²
UNITED STATES	\$68 ¹⁰
SAUDI ARABIA	\$7 ⁹⁹
VENEZUELA	\$2 ⁰⁴

At some point people change their behavior and new technologies become attractive.

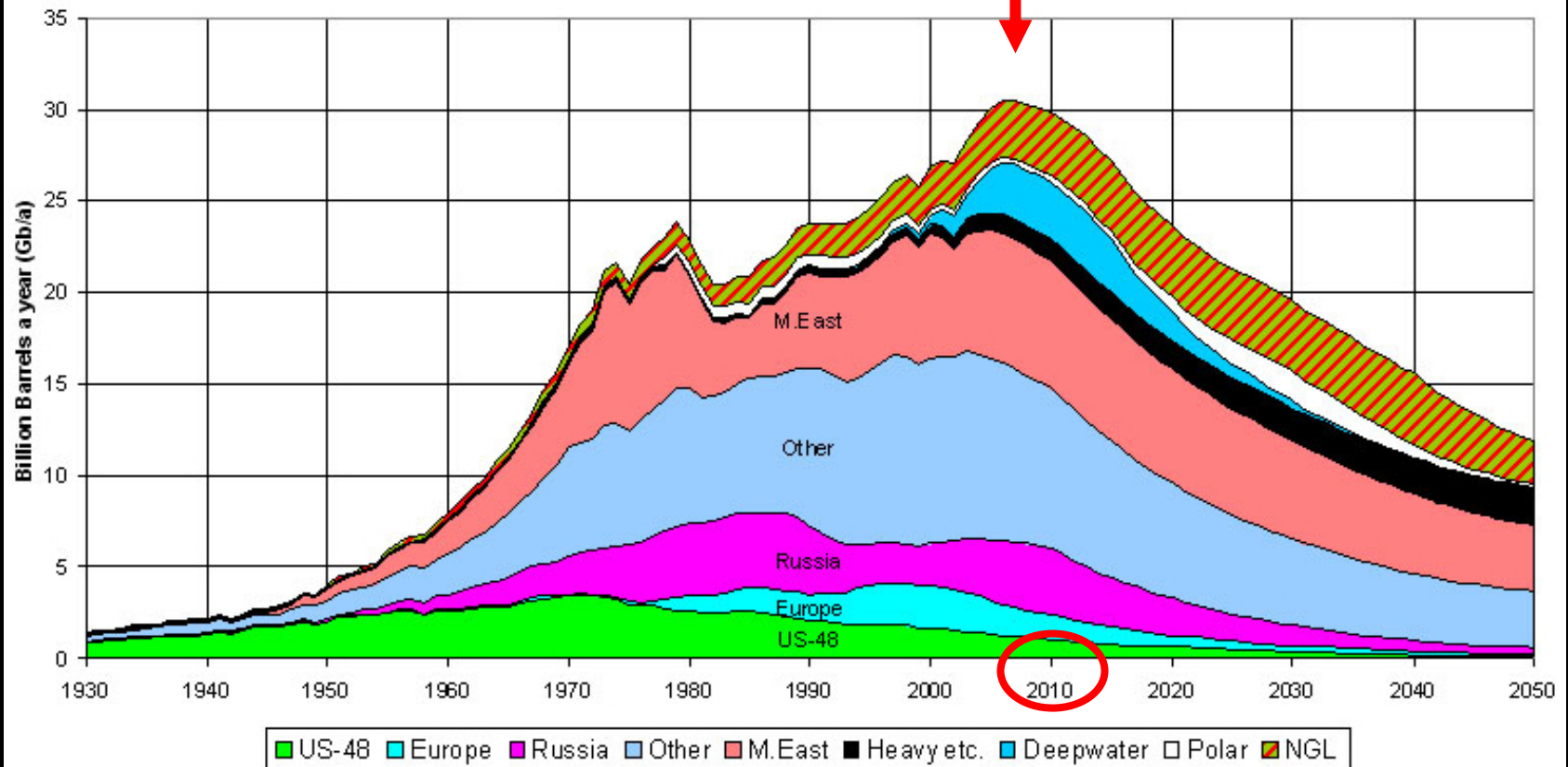


In the meantime, we just import more oil.



But we are not alone.

OIL AND GAS LIQUIDS 2004 Scenario



Global Hydrocarbon Production

32 billion barrels per year

35 billion barrels per year

365 days per year

or

~100 million barrels per day

Maximum global oil production

2015 ± 2

It's crunch time.

World Oil Production (History + Projections) (Barrels/day)

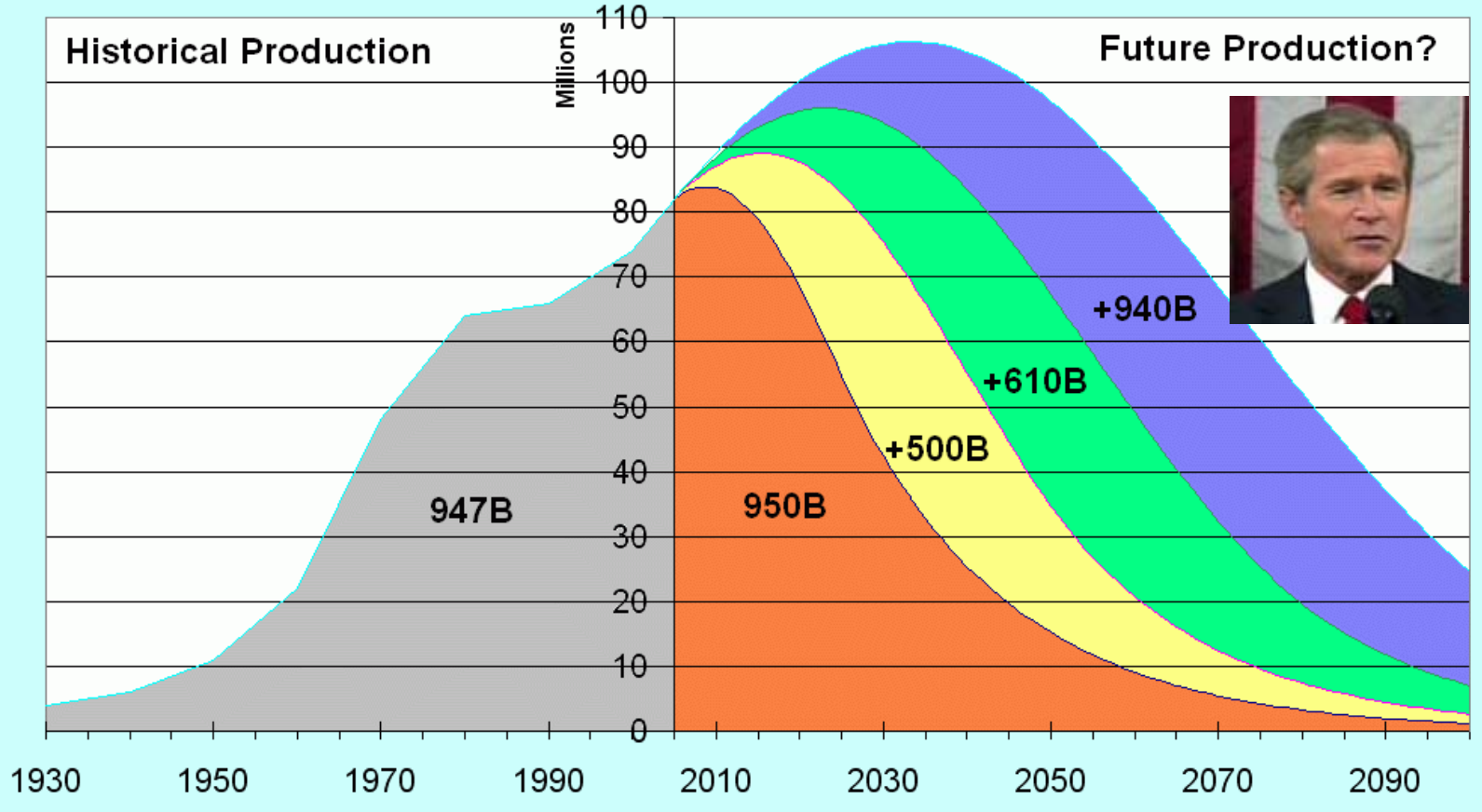
Peaks 2010-2035

World consumed ~960 Billion barrels: 1930-2004

~0.95, 1.45, 2.06, 2.95 trillion barrels remaining

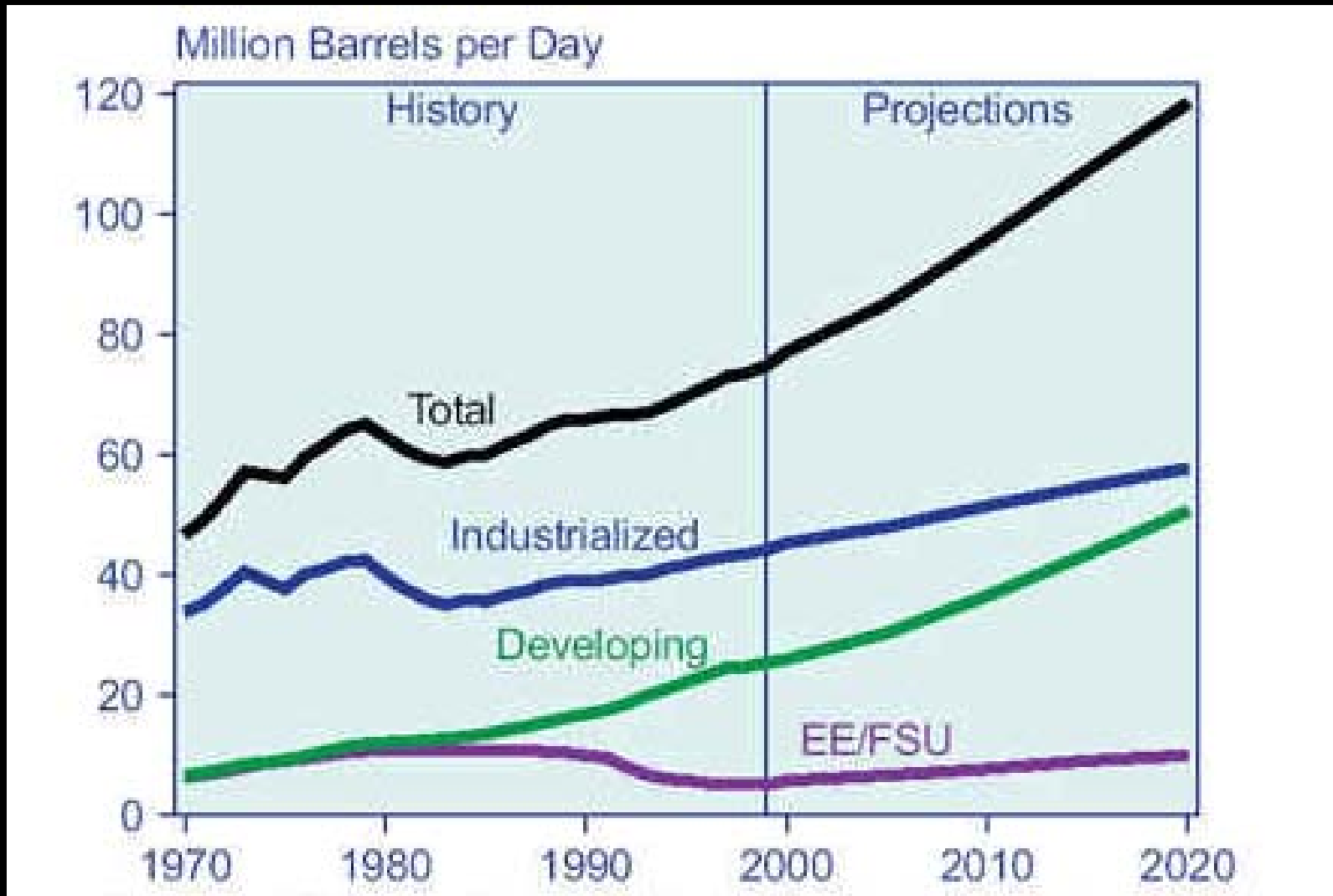
Transition: 2% growth curve to 5% decay curve

- Campbell: 0.953Tb left, 2010 peak at 83mb/d
- Harper: 1.45tb left, 2015 peak at 89mb/d
- USGS 50% - 2.06tb left, 2024 peak at 97mb/d
- USGS 5%: 2.949tb left, 2033 peak at 106mb/d

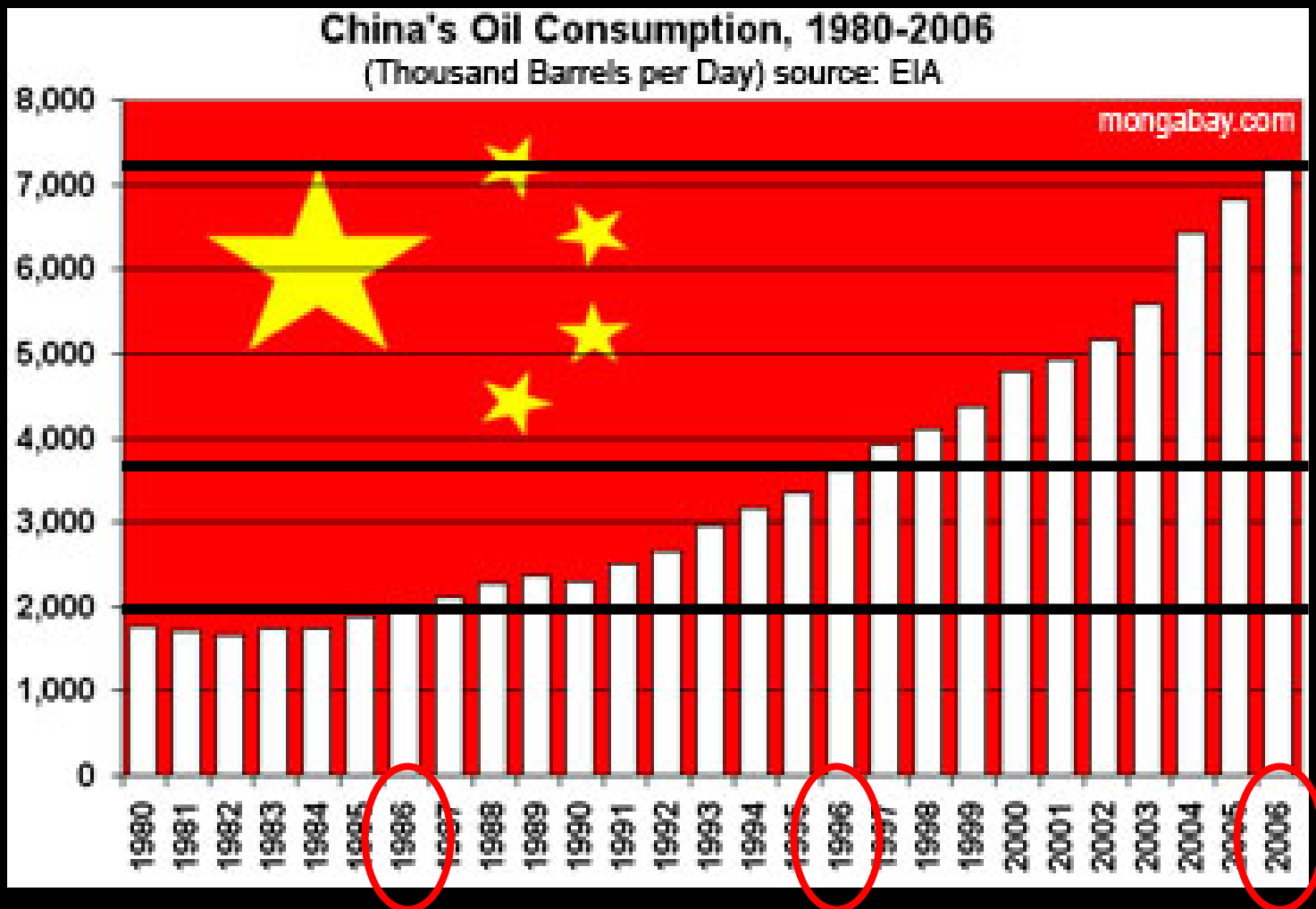


Alternate realities

And there's one more problem.



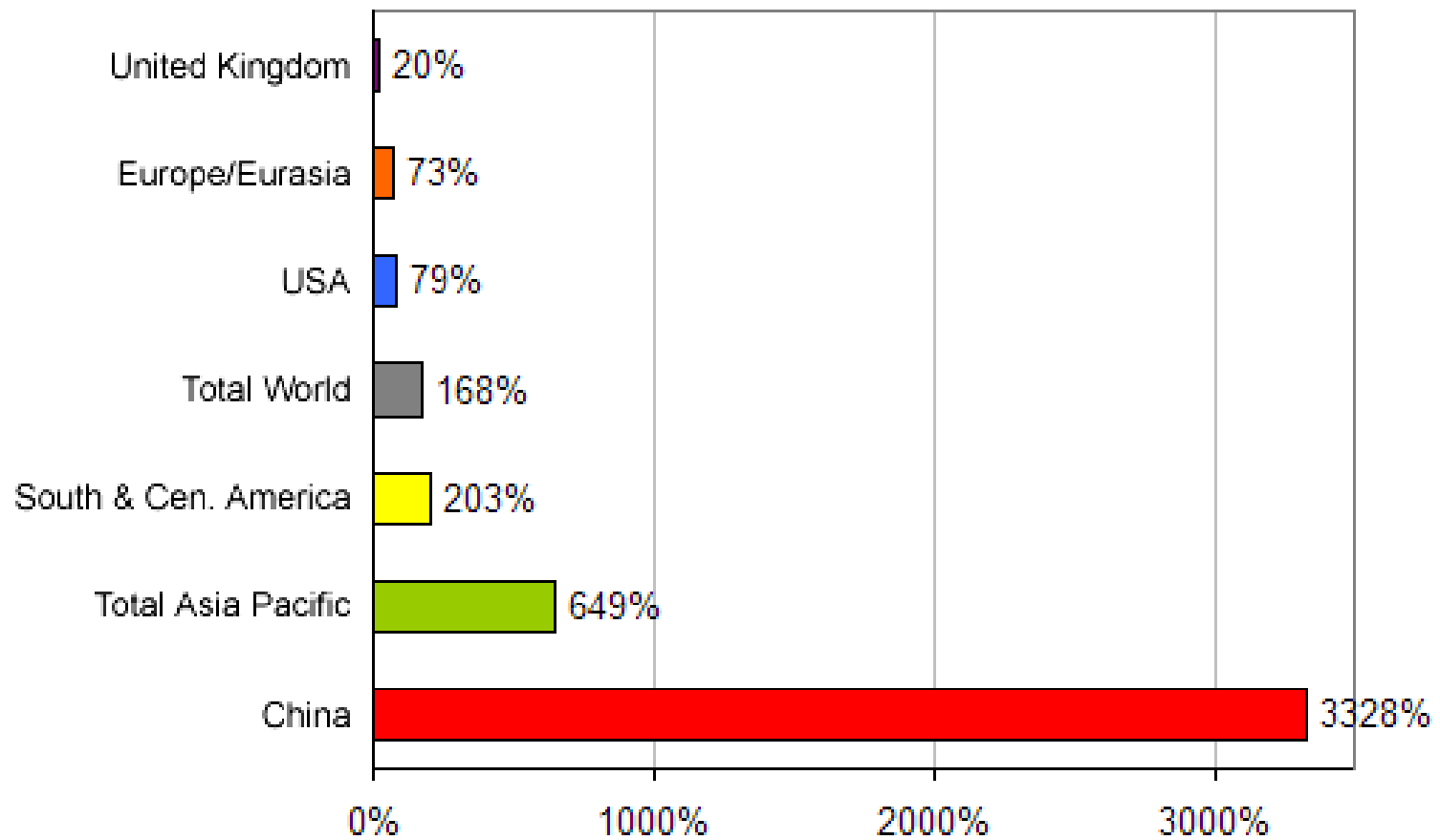
Projected world oil consumption



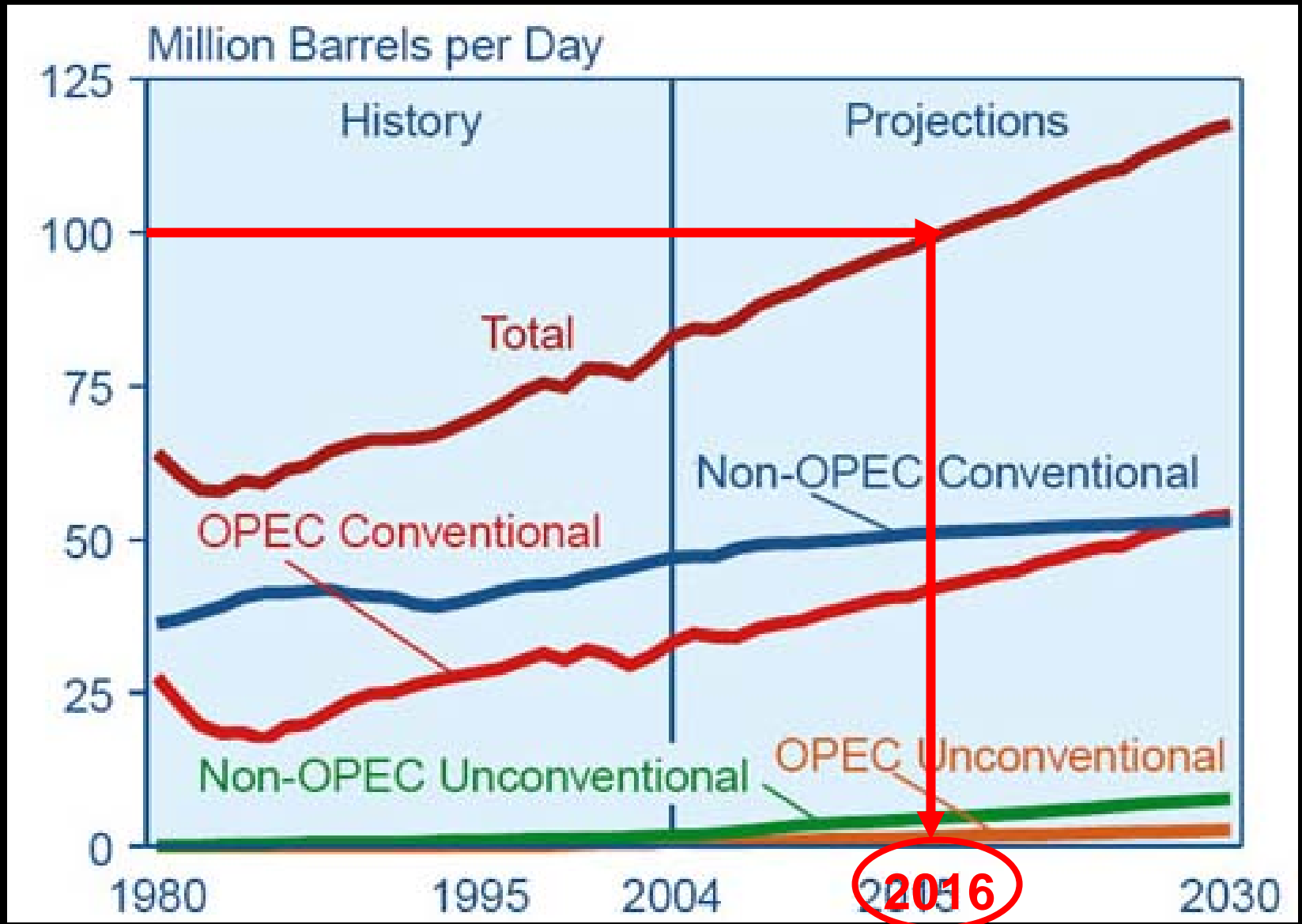
Growth of Chinese oil consumption.



Because everyone wants to drive an SUV!!



Change in oil consumption (1965-2006)



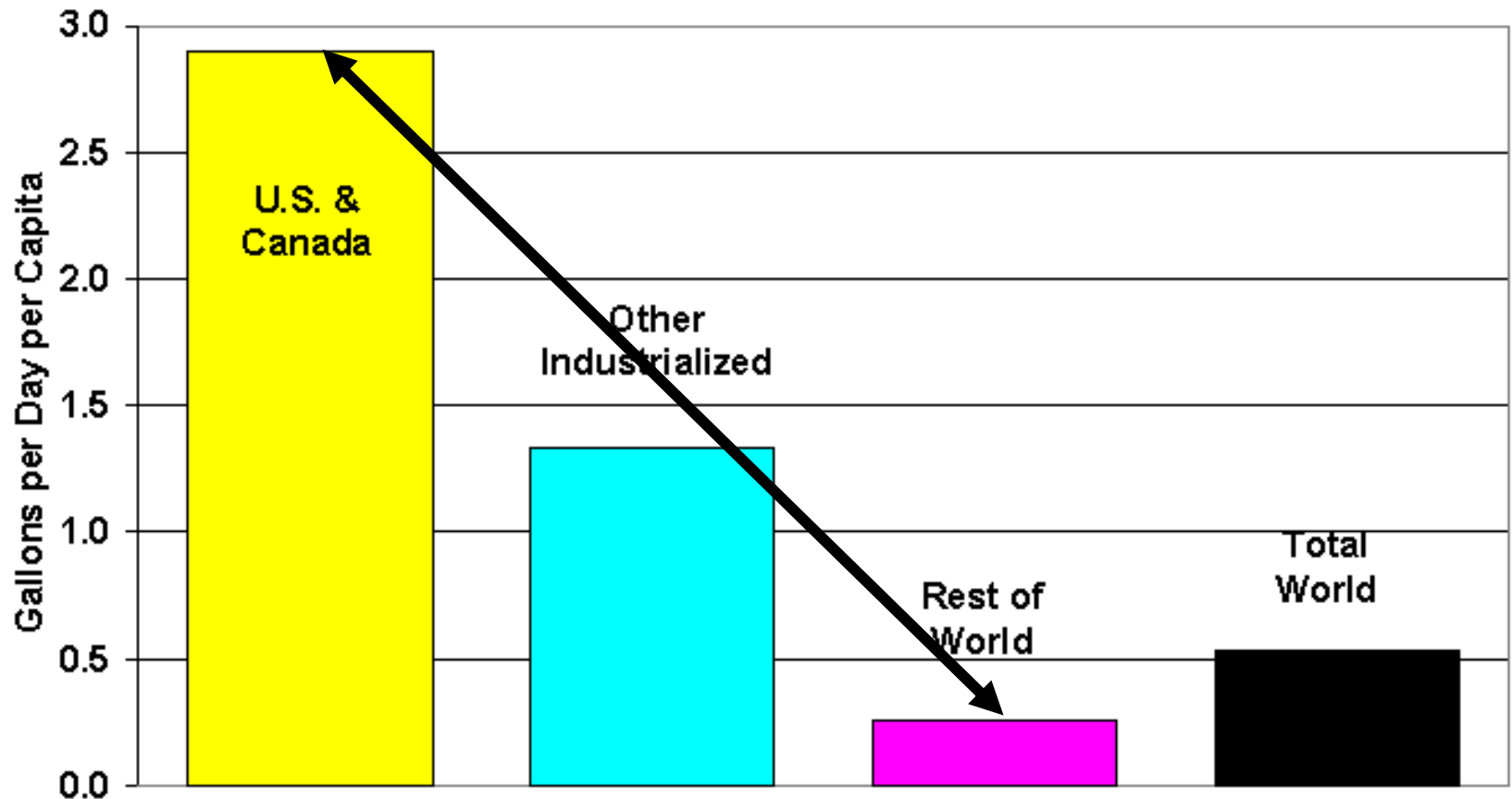
Projected world oil consumption

TAKE HOME MESSAGE

In about 7 years, demand for oil will exceed maximum total oil production.

Then what happens????

Global Consumption of Oil per Capita, 2003

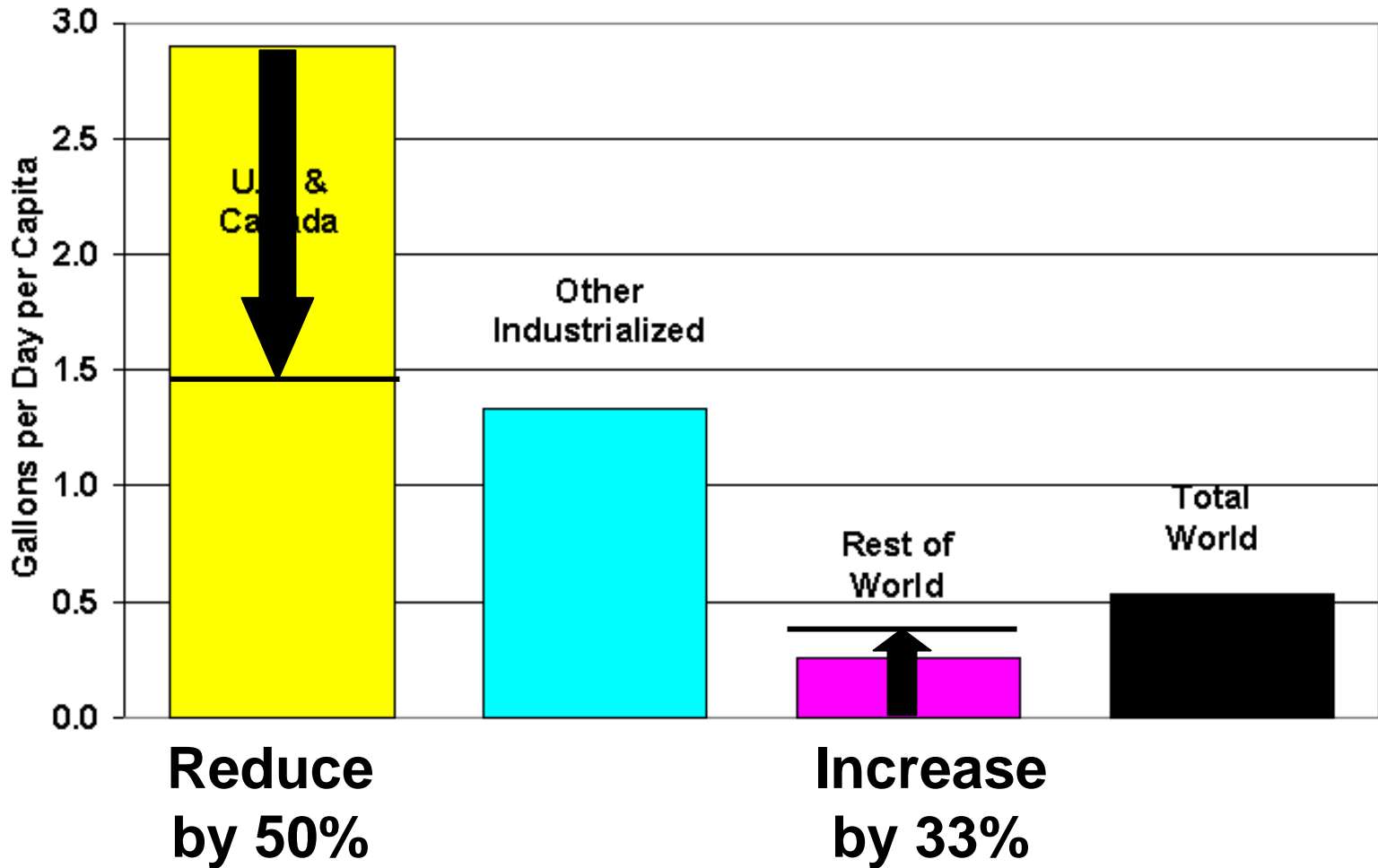


US and them

**Are you ready to make the
“ultimate sacrifice”?**

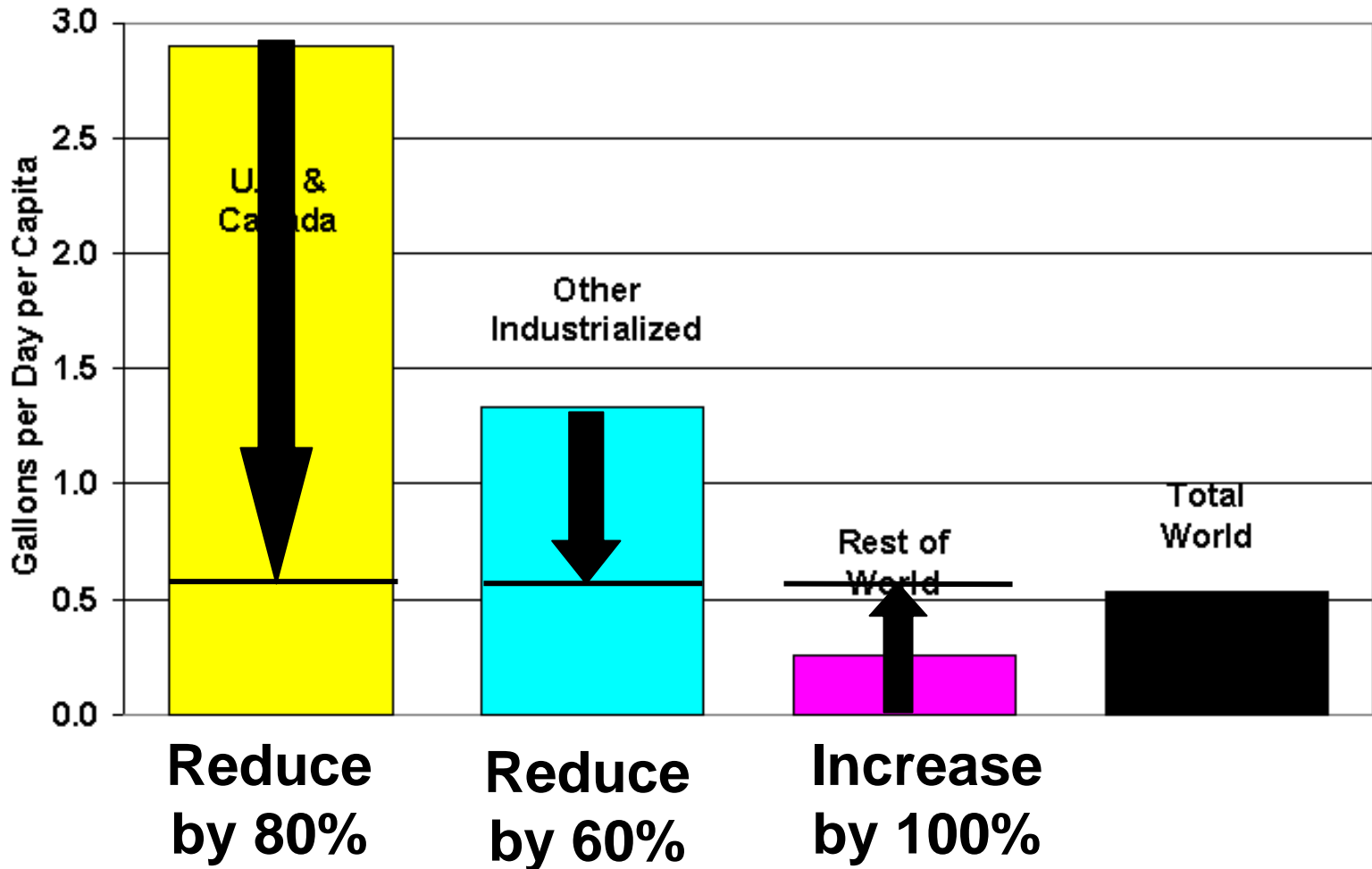
**And cut your oil consumption
by half?**

Global Consumption of Oil per Capita, 2003



We would still be using 3.5x as much oil.

Global Consumption of Oil per Capita, 2003



Is everybody happy, now?



Have a nice day!!

