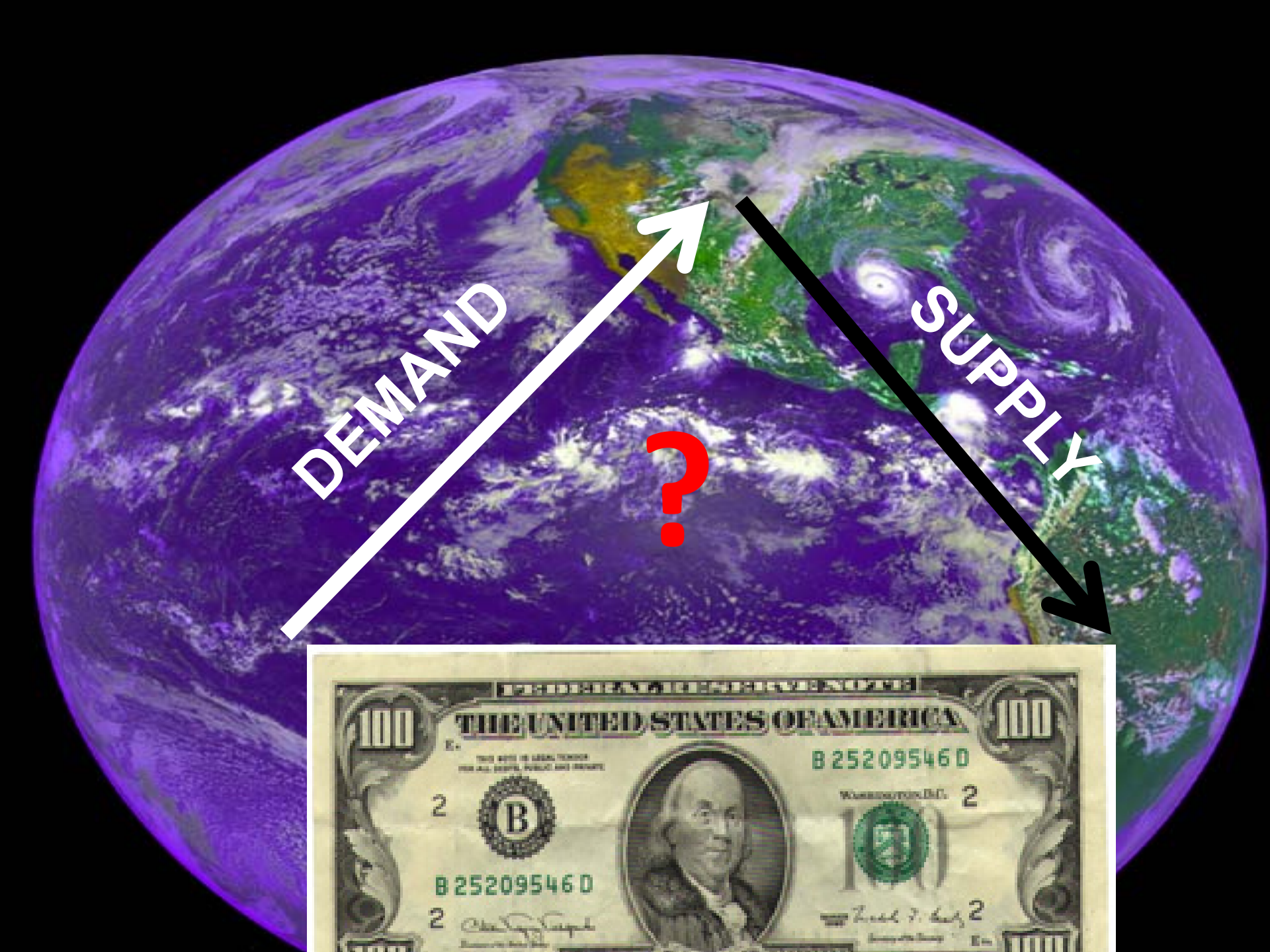
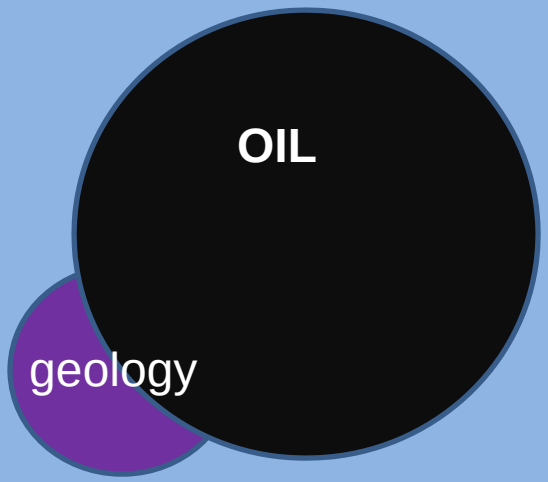
An Umbrella View of Resource Depletion and Human Behavior

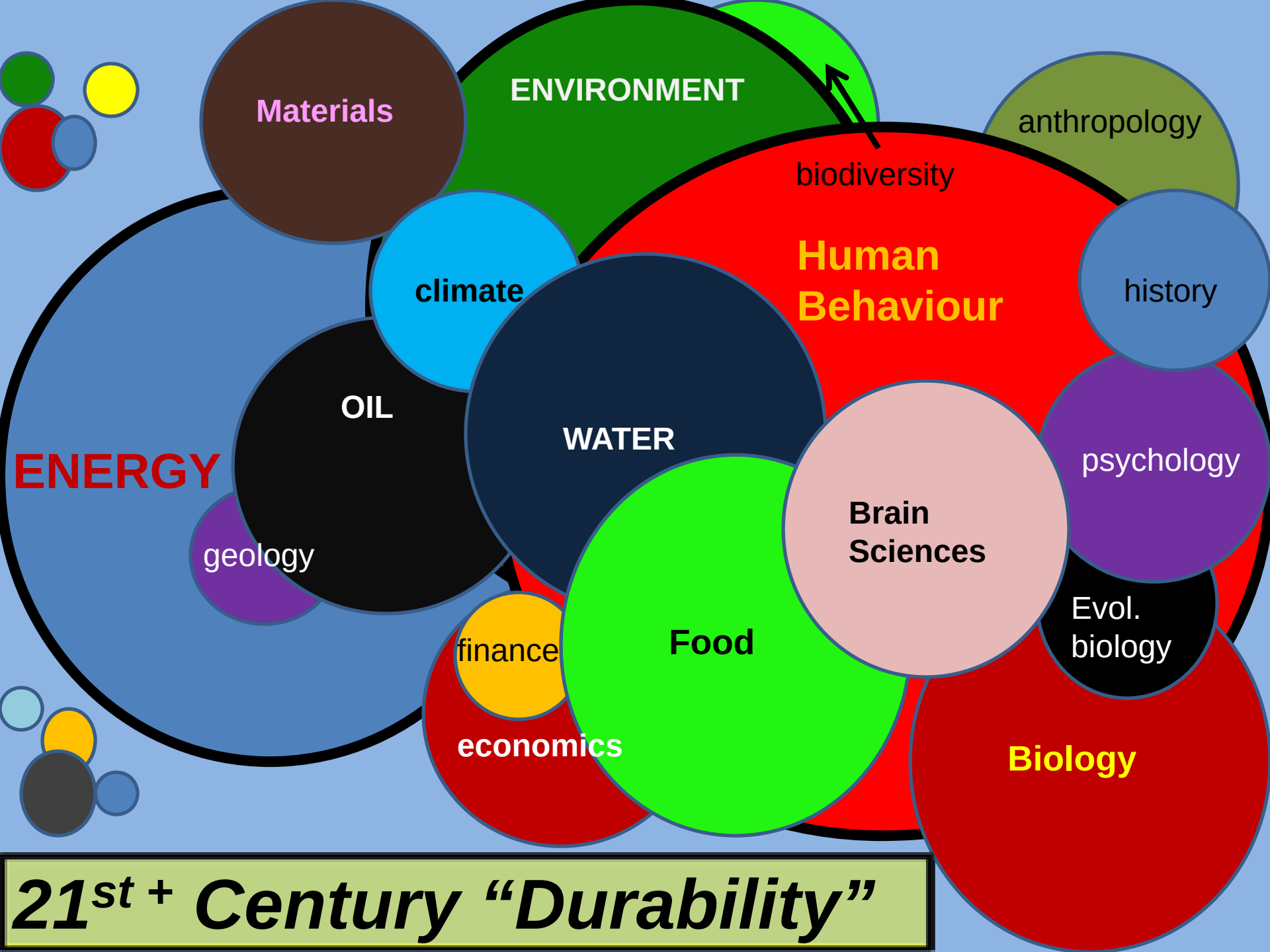

DEMAND
SUPPLY
?
THE UNITED STATES OF AMERICA
100
B 25209546 D

*The Present Economic** System*

ECONOMICS:** ***the allocation between ends and scarce means which have alternative uses.



Peak Oil


Materials
ENVIRONMENT
anthropology
biodiversity
Human Behaviour
climate
history
OIL
WATER
ENERGY
psychology
Brain Sciences
geology
Evol. biology
finance
Food
economics
Biology
21st + Century "Durability"

UMBRELLA OVERVIEW OF CURRENT TRAJECTORY

DEMAND

(*Drivers*)

- Relative Fitness
- Habituation/Novelty

(Barriers to change)

- Steep Discount Rates
- Cognitive Load
- Beliefs/Self-deception
- Control

SUPPLY

- Energy Quantity
- Energy Quality
- Non-energy Inputs
- Externalities
- Time

GLUE

- Economics

*Umbrella Overview from **Scotland***

Scottish Lass
(Clan Mearns)

PART I - SUPPLY

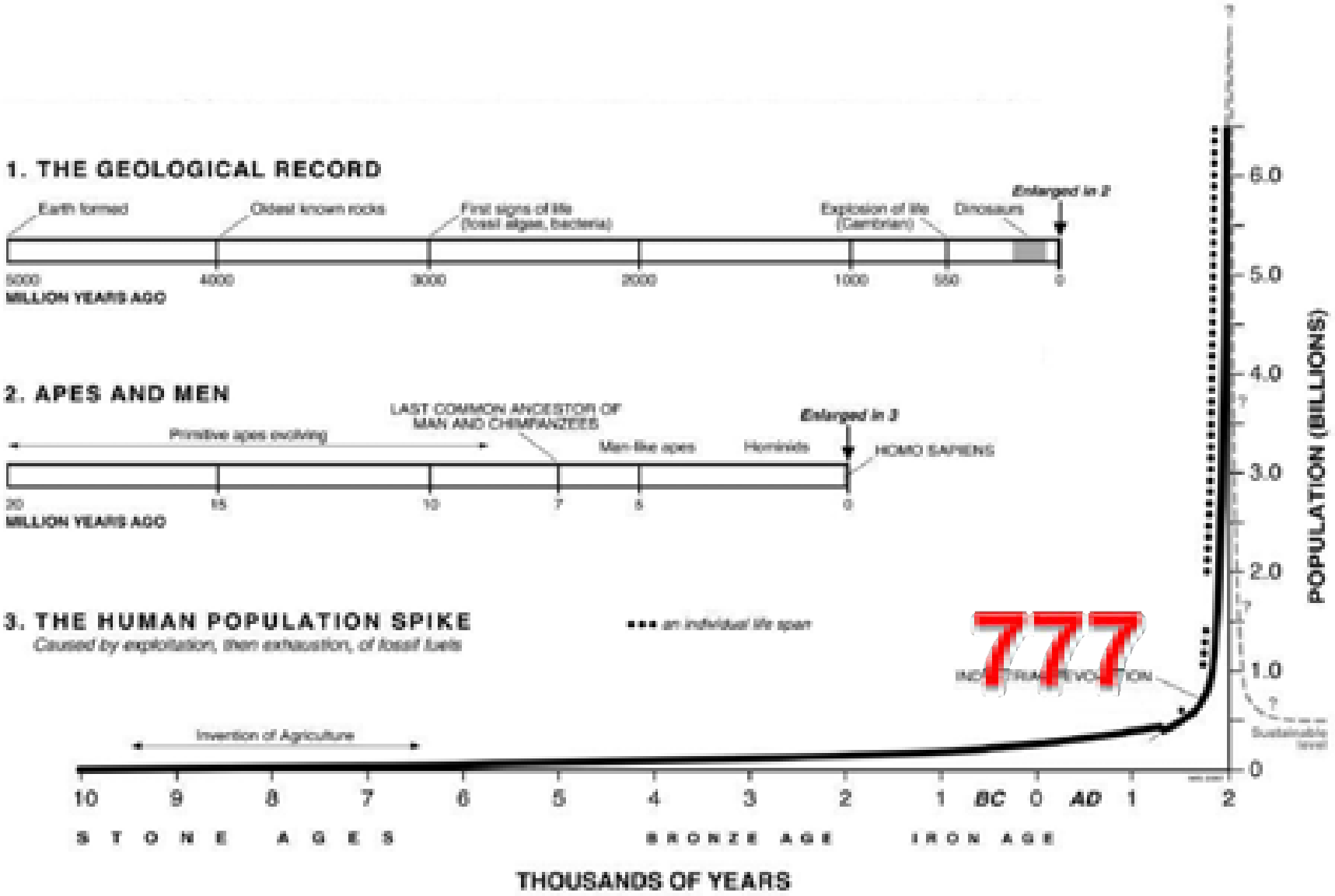
Energy is (just about) Everything!

All Energy is not equal

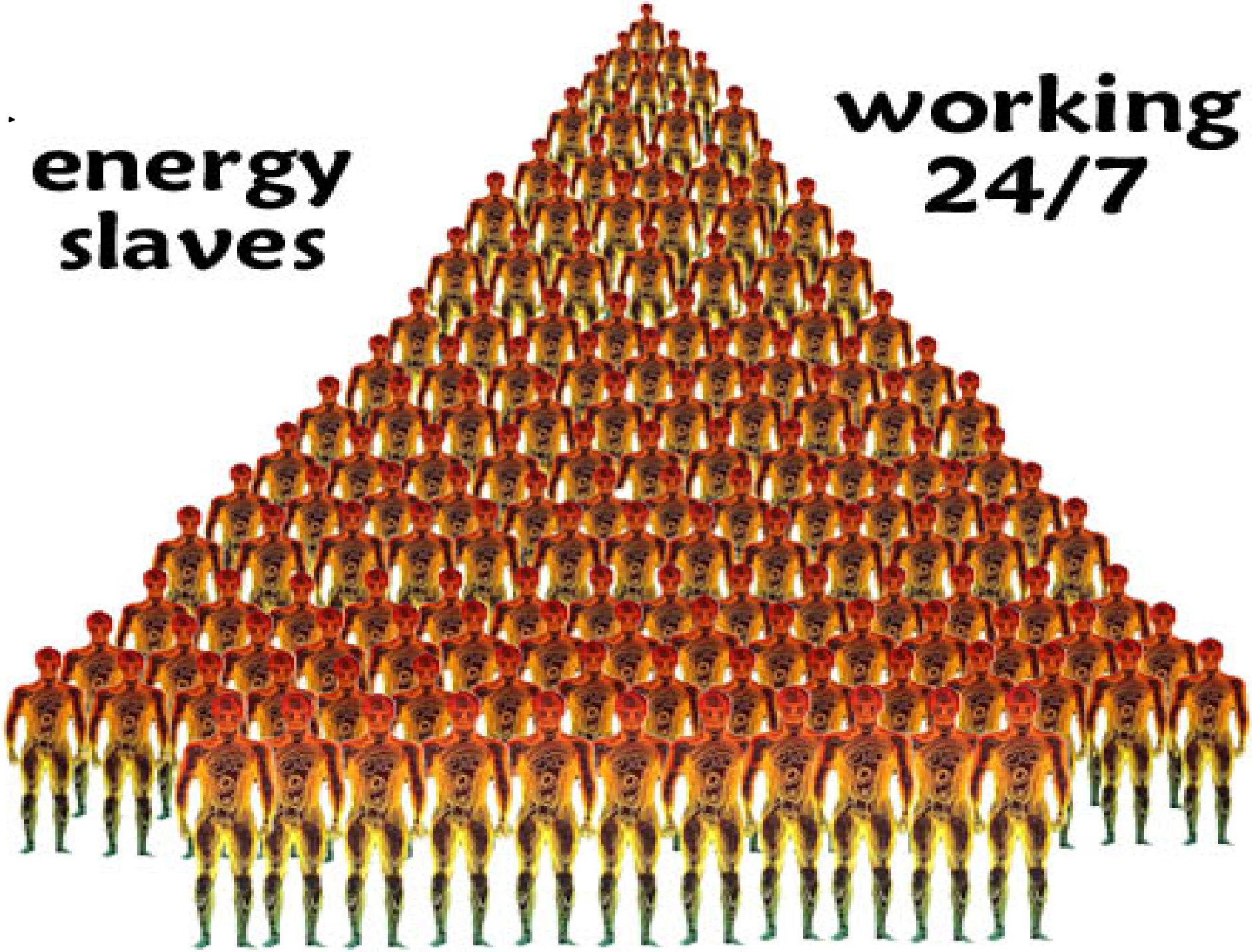
Procuring Energy entails Costs

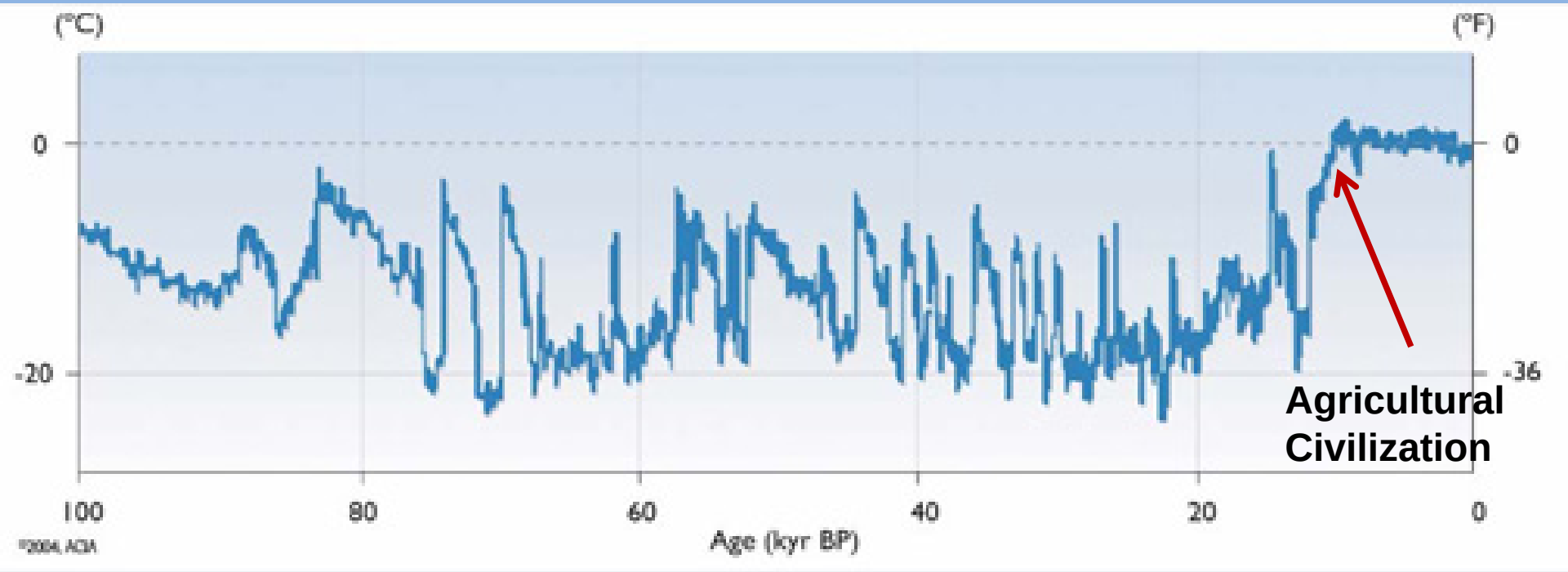
Externalities matter!

The History of Life on Earth and Human Evolution



Graph credit – Dr. William Stanton


energy
slaves
working
24/7

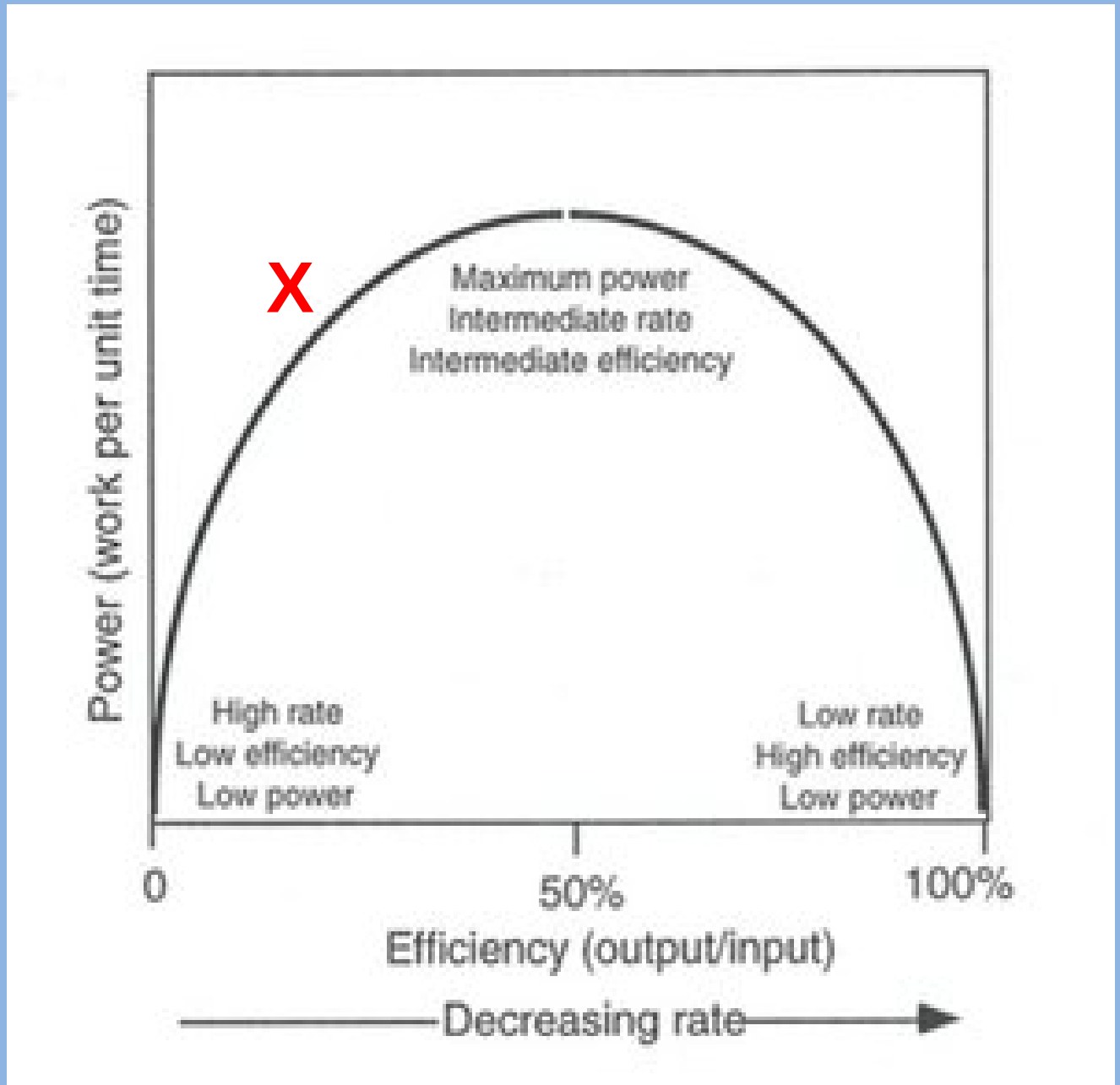

(°C)
(°F)
0
0
-20
-36
Agricultural
Civilization
100
80
60
40
20
0
Age (kyr BP)

Why does ‘Peak Oil’ matter?

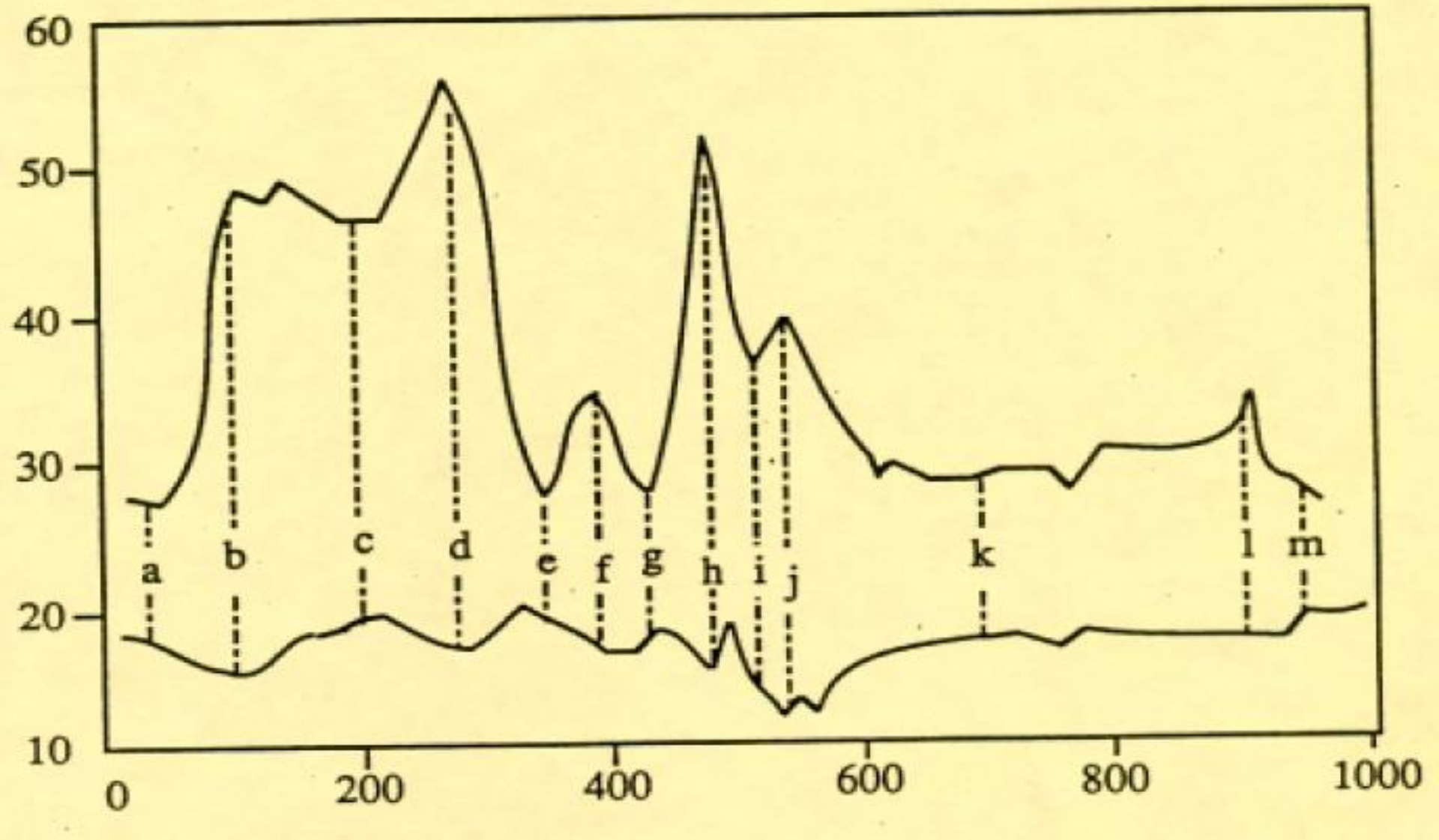
- **80-95% of all transport on the planet is fuelled by oil products and transport accounts for 70% of oil use**
- **All petrochemicals are produced from oil**
- **99% of all lubrication is done with oil products**
- **95% of all goods in the shops get there using oil**
- **99% of our food involves oil or gas for fertilisers, agrochemicals, tilling, cultivation and transport**


Sasquatch stole
my underpants

The Maximum Power Principle…



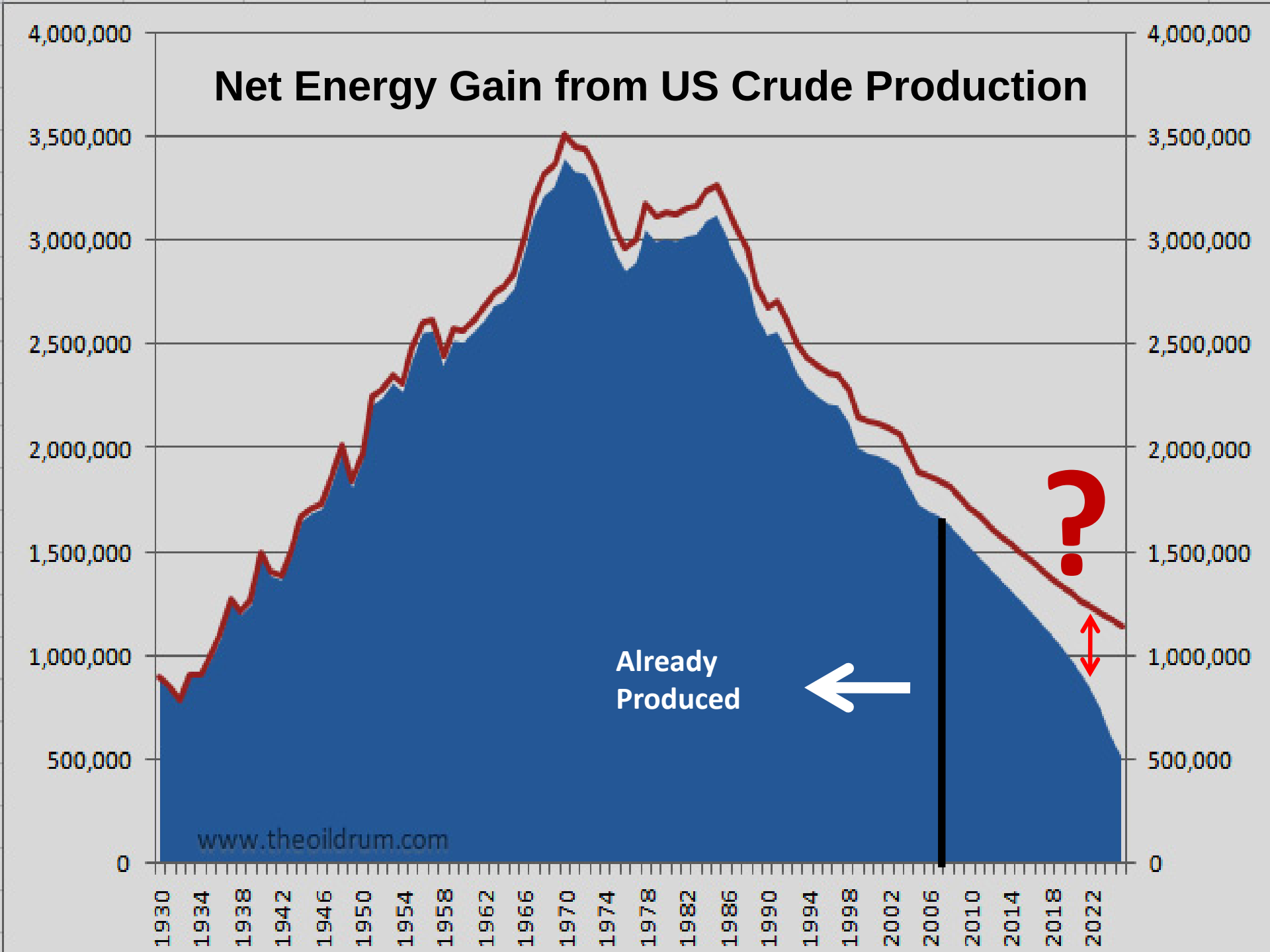
Organisms/ecosystems most effective at degrading energy gradients have had evolutionary advantages



Energy Return on Energy Investment

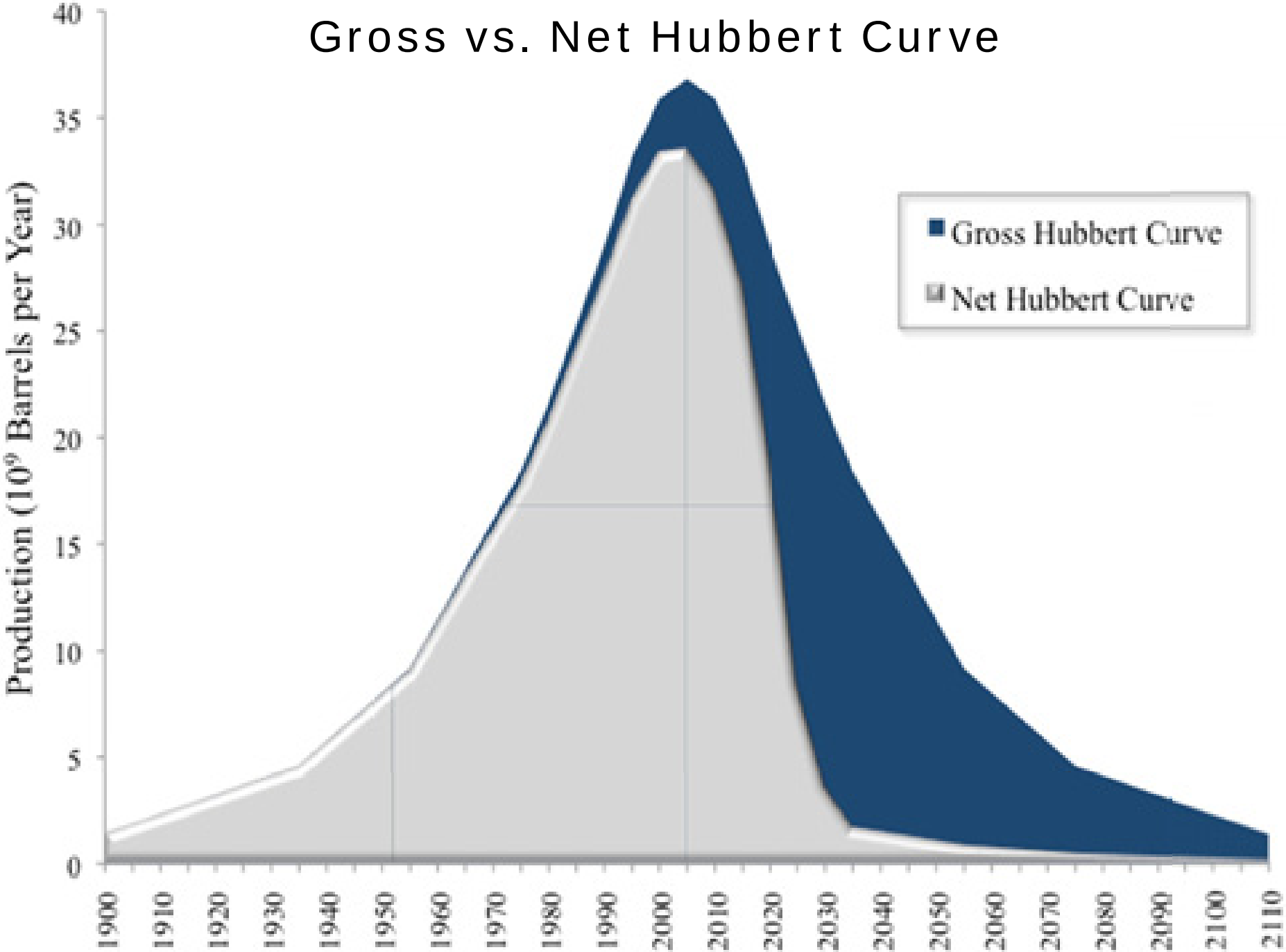
Energy Return on Energy Investment

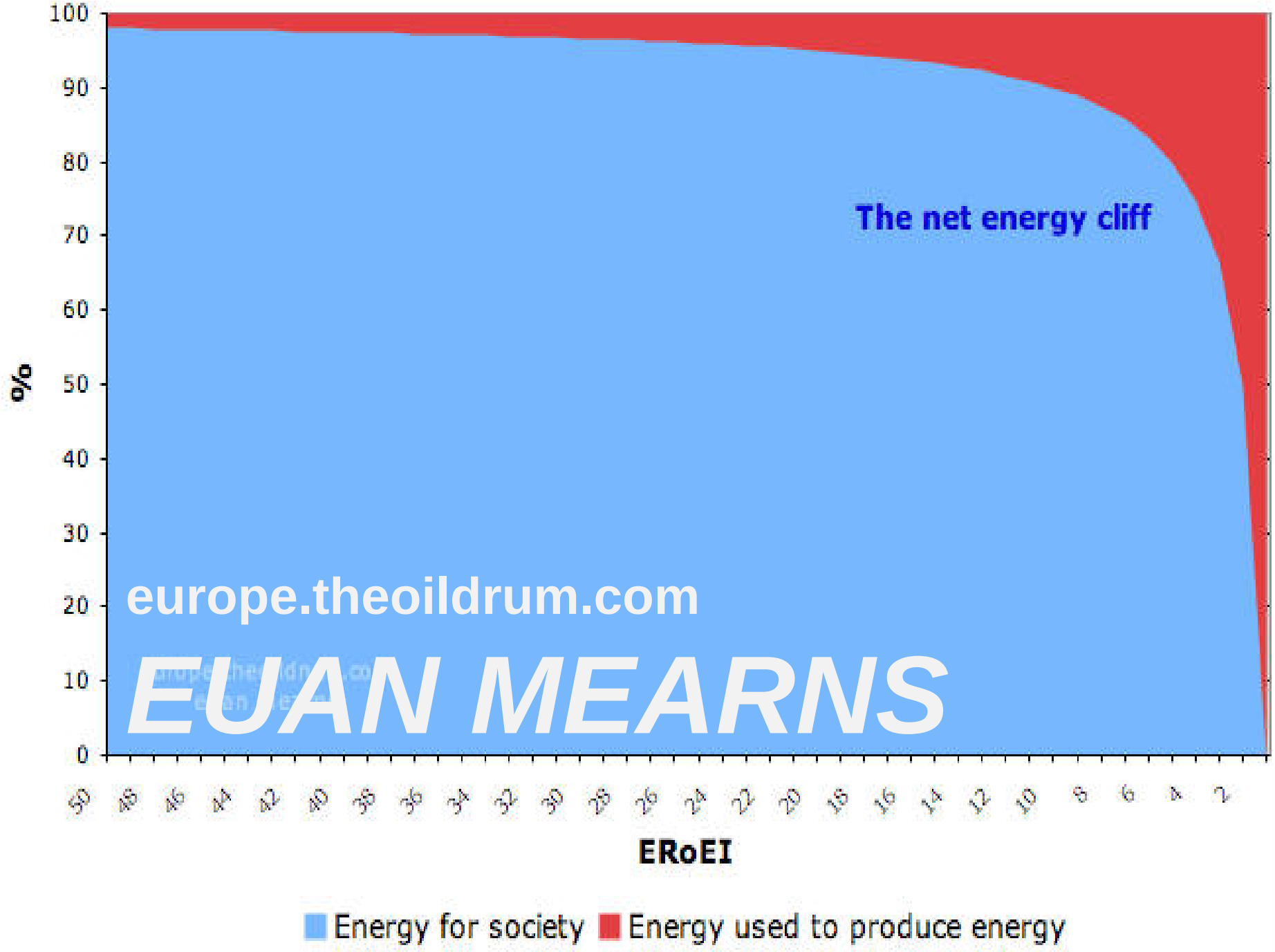
Energy (OF NEEDED FORM/QUALITY) Return on Energy Invested PER UNIT TIME


Net Energy Gain from US Crude Production
4,000,000
3,500,000
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
?
Already
Produced
www.theoildrum.com
1930
1934
1938
1942
1946
1950
1954
1958
1962
1966
1970
1974
1978
1982
1986
1990
1994
1998
2002
2006
2010
2014
2018
2022

HIGH EROI DOES NOT NECESSARILY MEAN HIGH SCALE

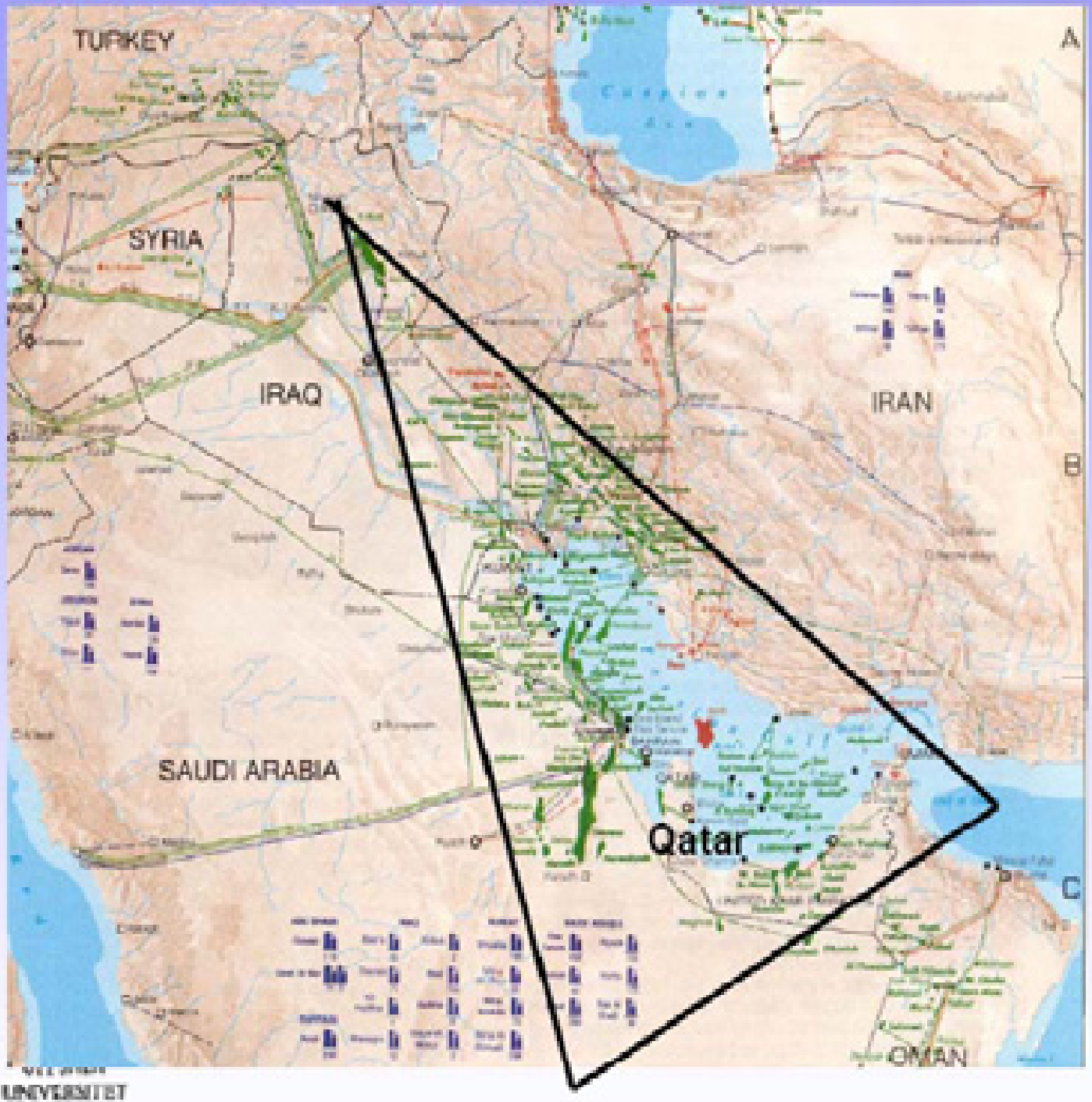
Gross vs. Net Hubbert Curve




100
90
80
70
60
50
40
30
20
10
0
%
The net energy cliff
europe.theoildrum.com
EUAN MEARNS
50 48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 8 6 4 2
EROEI
Energy for society
Energy used to produce energy

Some Points on Energy Return on Investment (EROI)

1) Energy and natural resources are what we have to spend (not $)
2) EROI does not measure scale
3) Boundaries of analysis are important
4) All BTUs are not equal (energy quality)
5) The market values short term flows over long term flows, (even if long term has higher energy return)
6) Much of our current 'energy gain' is based on energy inputs made in last 20-30 years (marginal vs. fixed EROI) (EROI of current flow rate is overestimated)
7) Conventional EROI metrics do not adjust for risk (mean/standard deviation)

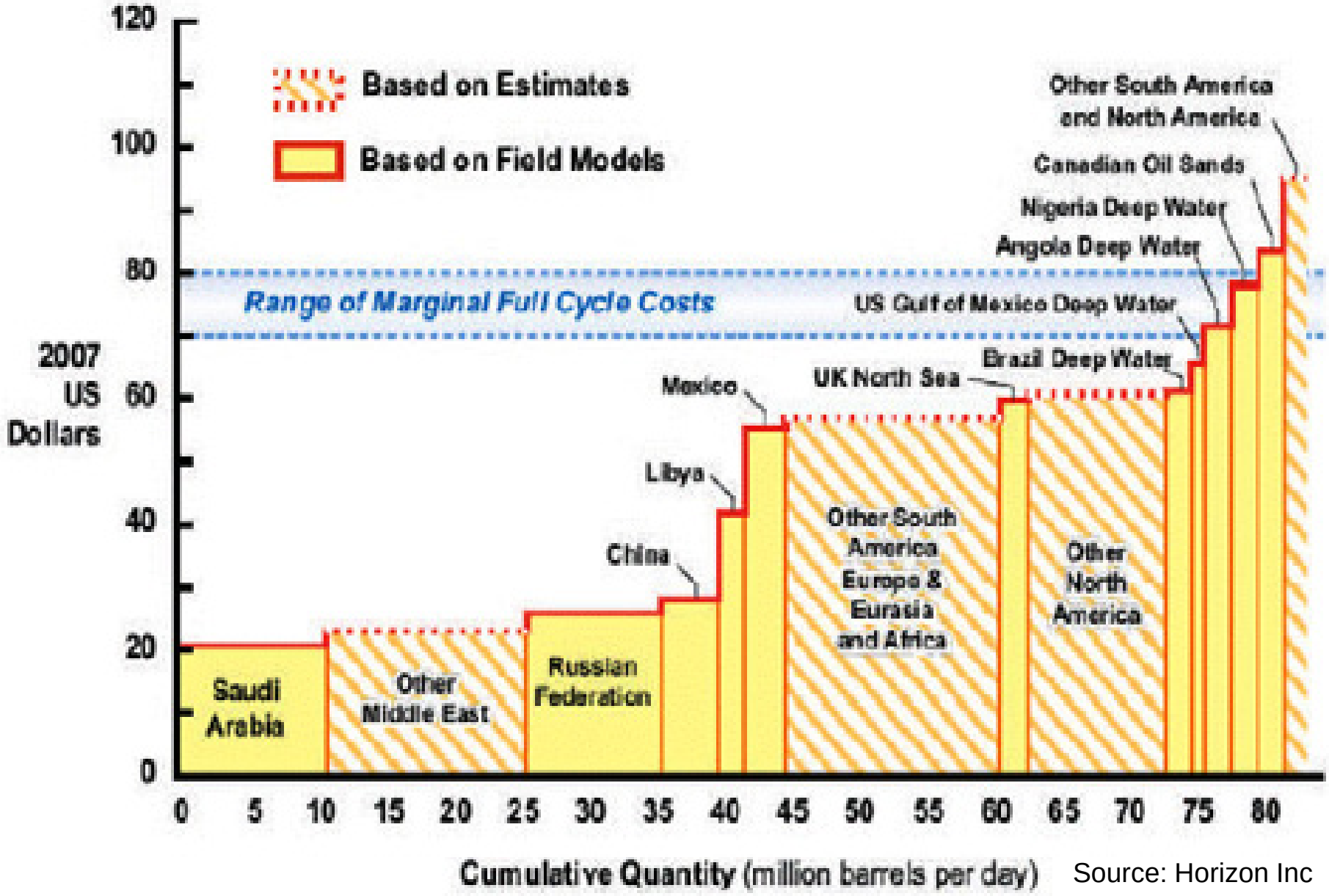


The Oil Triangle

Within the Oil Triangle you can find roughly 60 percent of the remaining oil reserves in the world. The 2001 Cheney report, US Energy Policy, says that in year 2020 around 54 to 67 percent of the world producttion of oil needs to come from the Oil Triangle.

www.peakoil.net

OIL PRICES ARE CURRENTLY (FAR) BELOW MARGINAL COSTS



Source: Horizon Inc

All Energy is Not Equal

- Physical
- Chemical
- Technical
- Economic
- Environmental
- Social
- Energy Density
- Power Density
- Emissions
- Cost/efficiency of Conversion
- Storability
- Risk /Dispersion
- Spatial Distribution
- Intermittency
- Transportability

Different infrastructure requires different POWER DENSITIES!

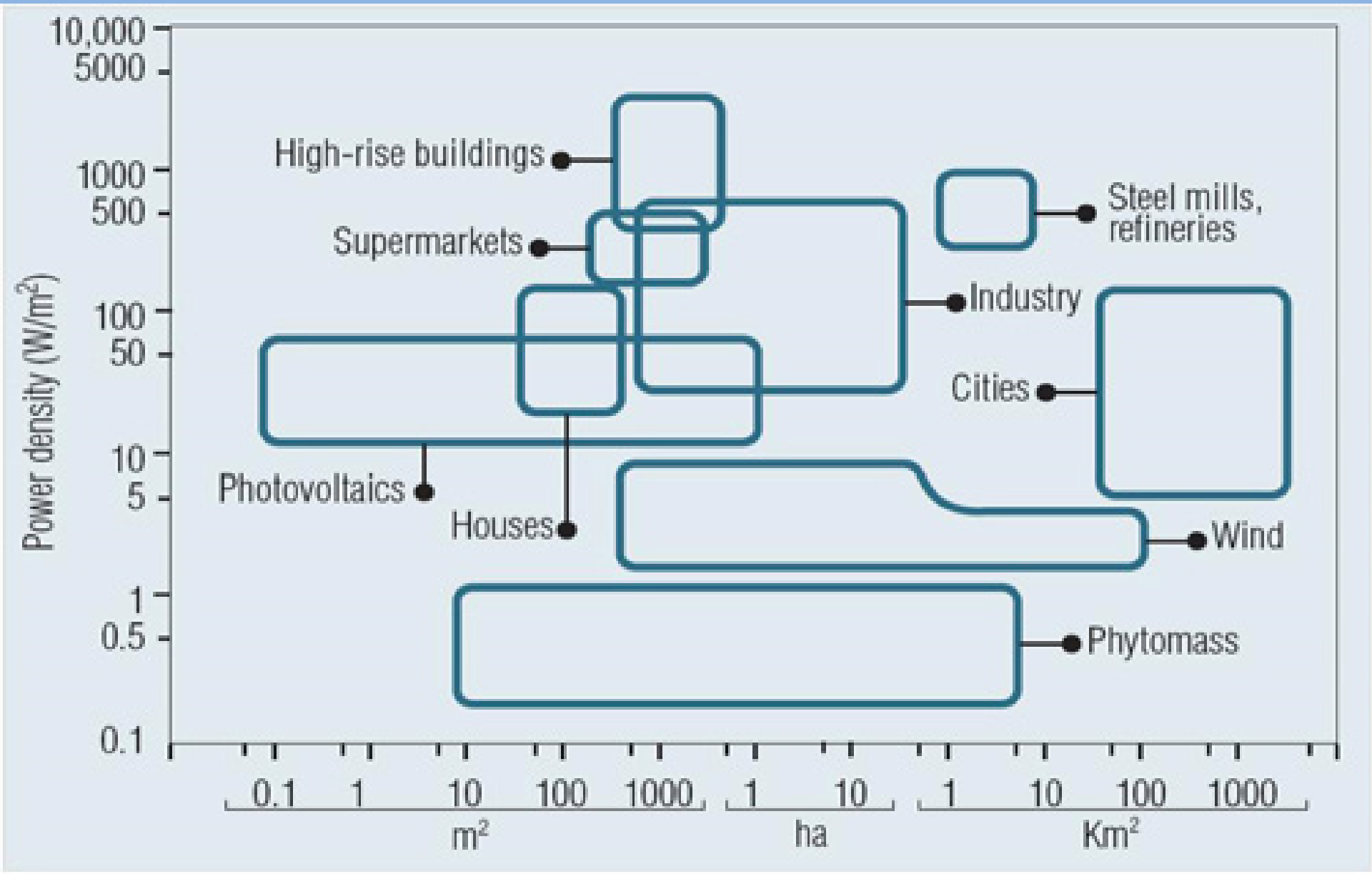
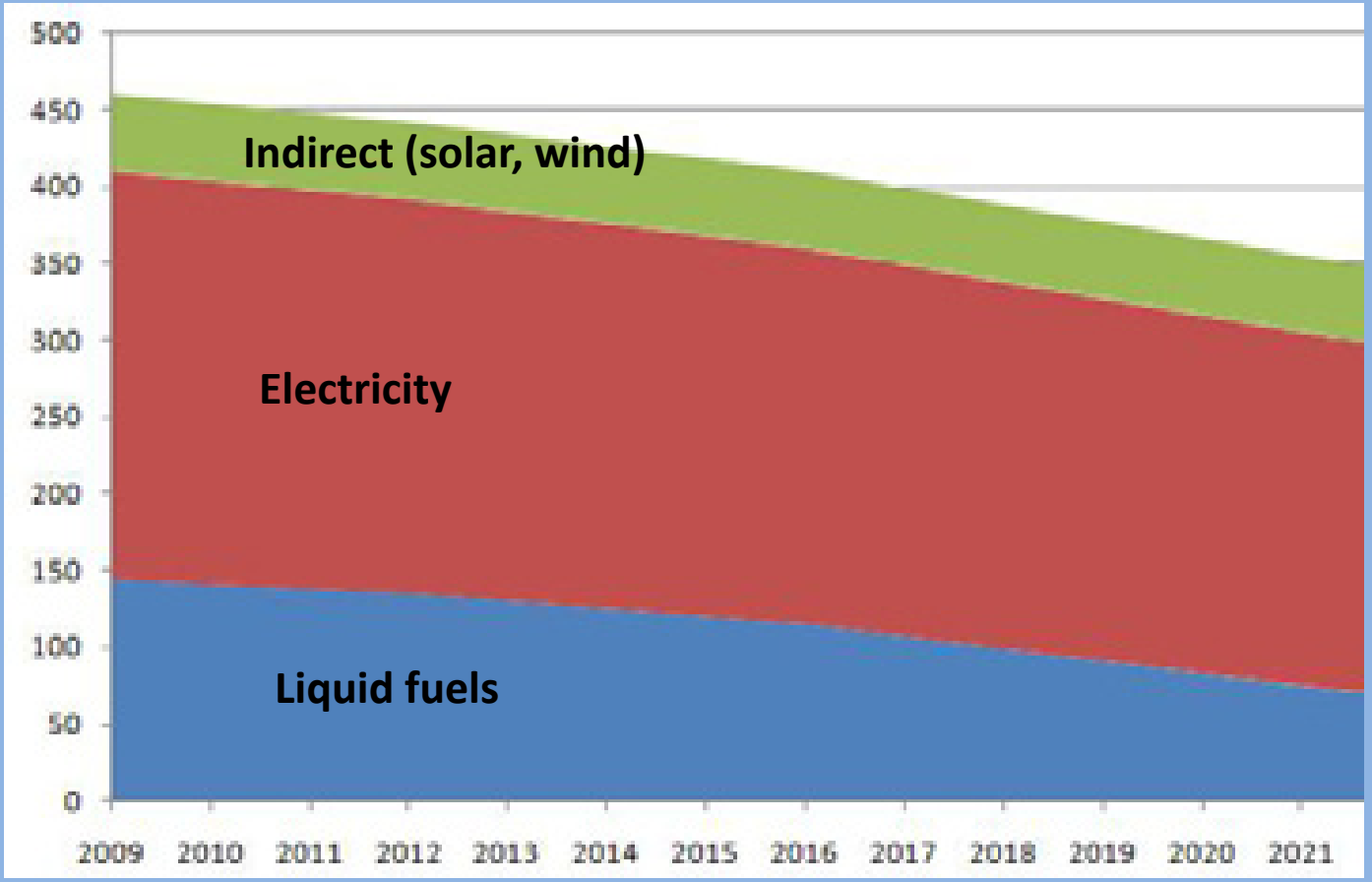
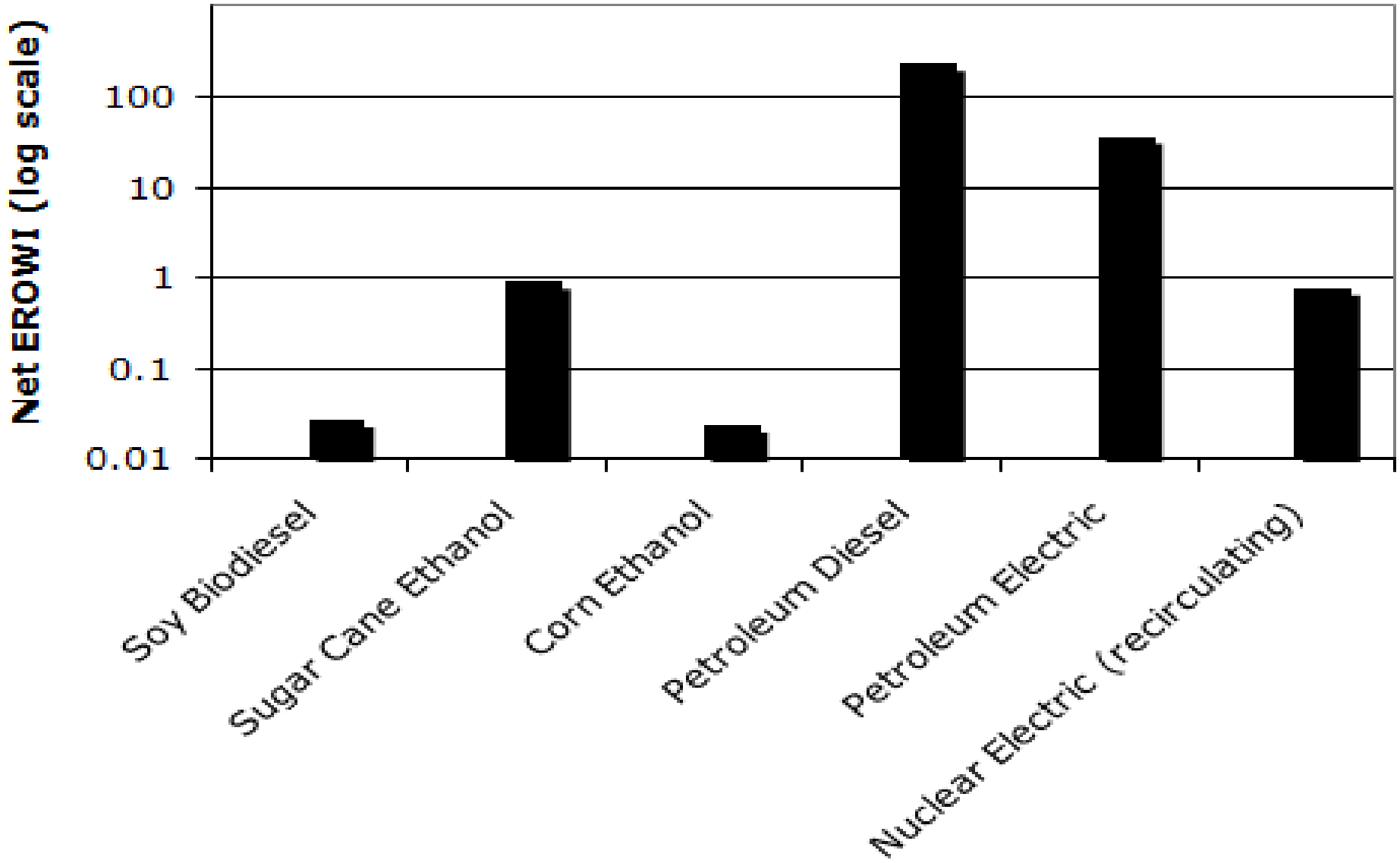


Figure 5. Power densities for fossil and renewable fuels. (Source: Smil, V. 2006. "21st century energy: Some sobering thoughts." OECD Observer 258/59: 22-23.)

3 Main types of Energy quality power modern civilization

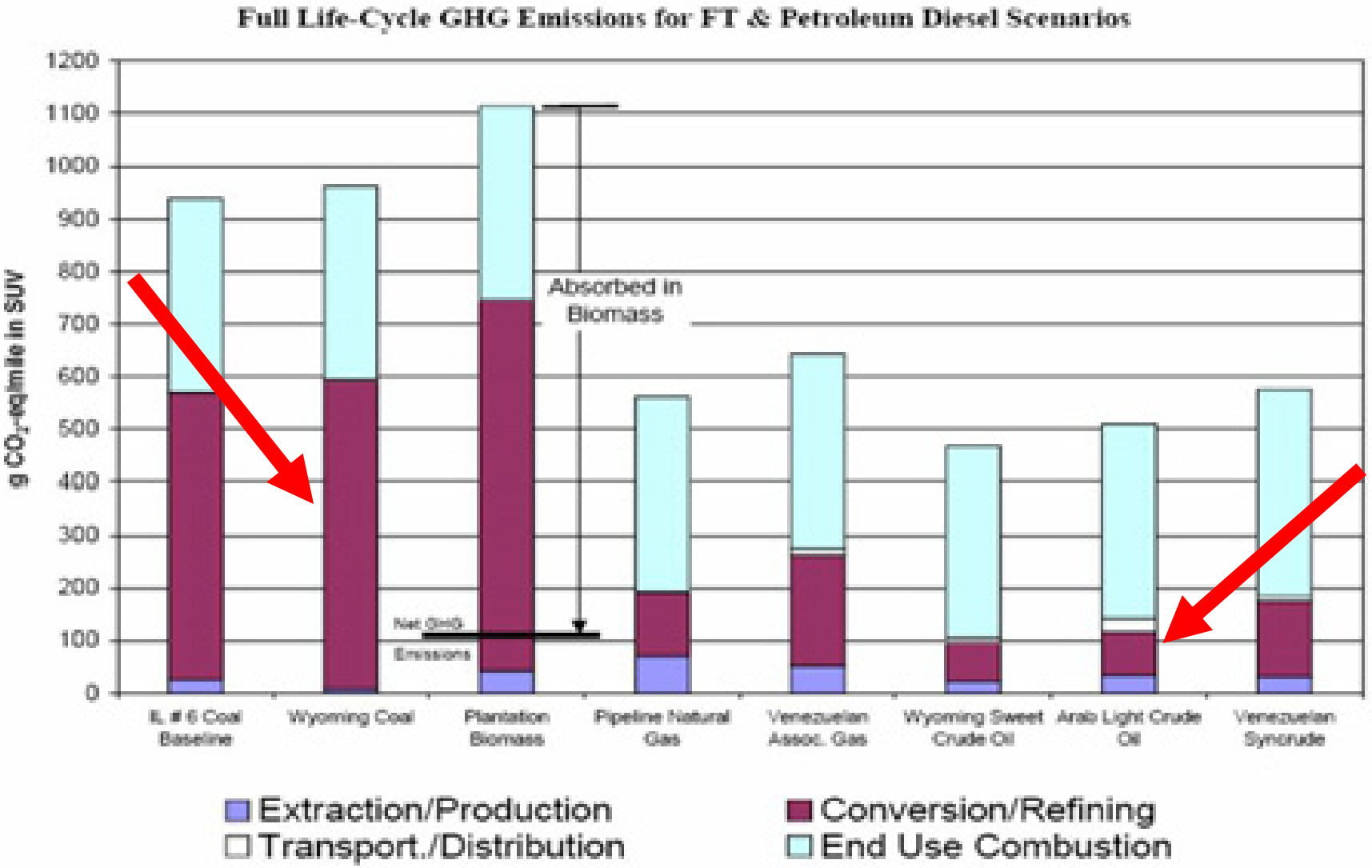


NON-ENERGY INPUTS



Source: *Energy Return on Water Invested*, AMBIO In Press Mulder K, Hagens N.

Externalities must be accounted for…



Data from Marano, Ciferno 2004

A FRAMEWORK FOR SUPPLY

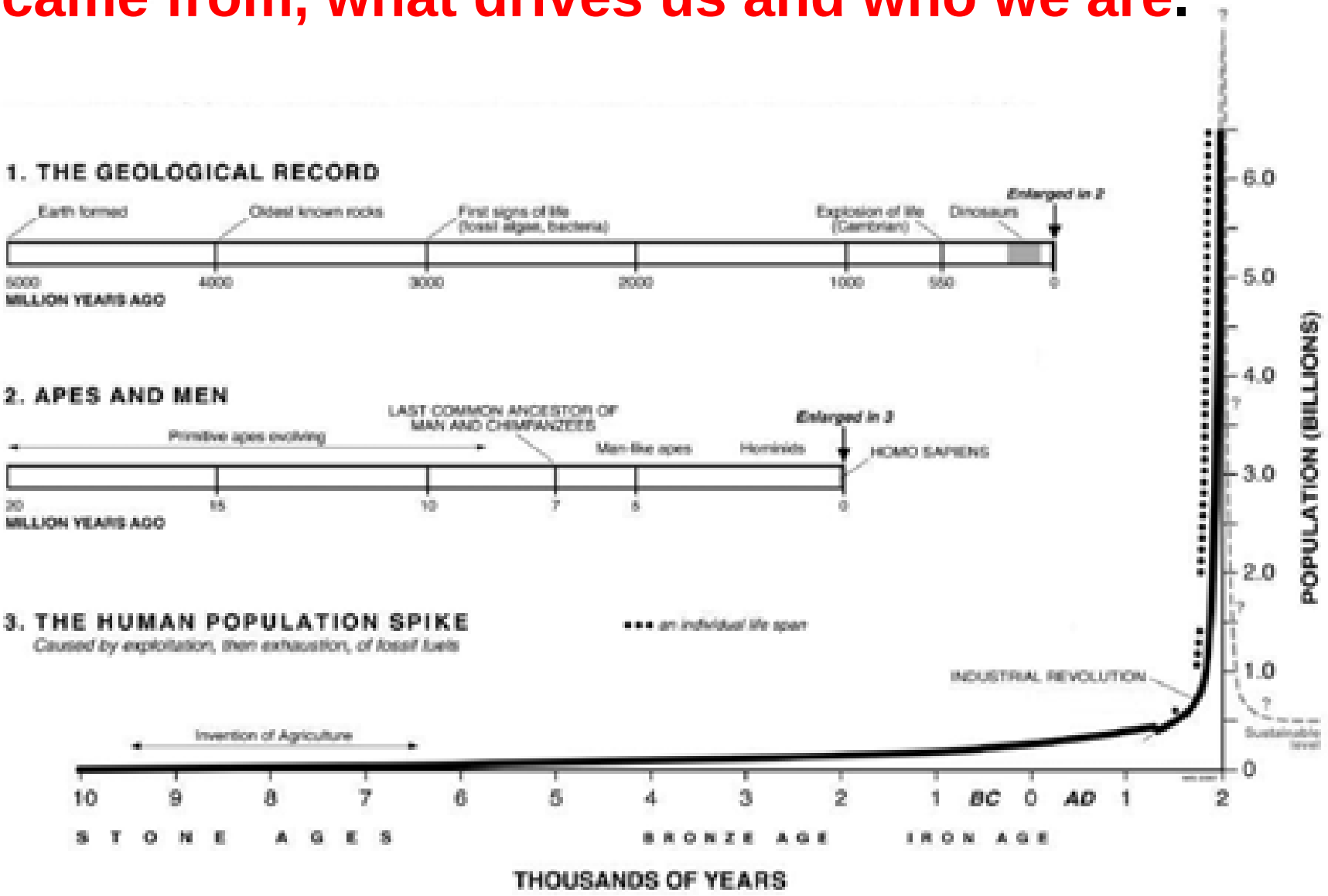
ENERGY QUANTITY – It takes energy to procure and deliver energy – the NET is what matters to society

ENERGY QUALITY – All BTUs are not equal in their impact on society

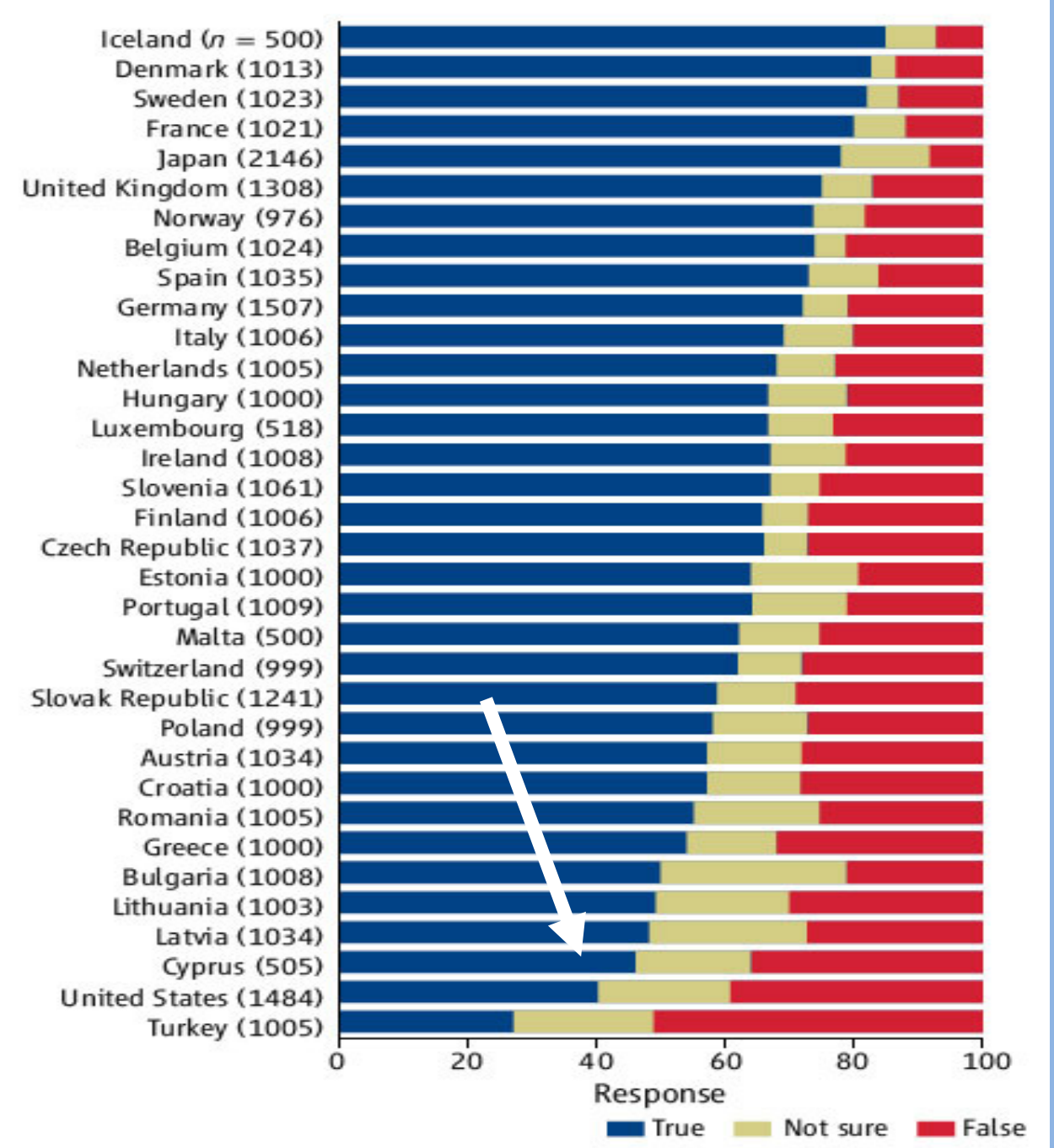
NON-ENERGY INPUTS – As we move away from best-first, other inputs will begin to limit scale: Water, Land, Soil, GHGs, animal habitat, etc.

1. We value the present disproportionately more than the future via **steep discount rates.**
2. We easily become **distracted** by and **habituated** to readily available **novelty**.
3. Via natural selection, we are programmed to **compete for RELATIVE status (and resources)** by whatever metric our current environment dictates.

To know where we are going we have to know where we came from, what drives us and who we are.



Graph credit – Dr. William Stanton



Public acceptance of evolution in 34 countries, 2005.

A BARRIER TO CHANGE?

Source: SCIENCE 8/2005

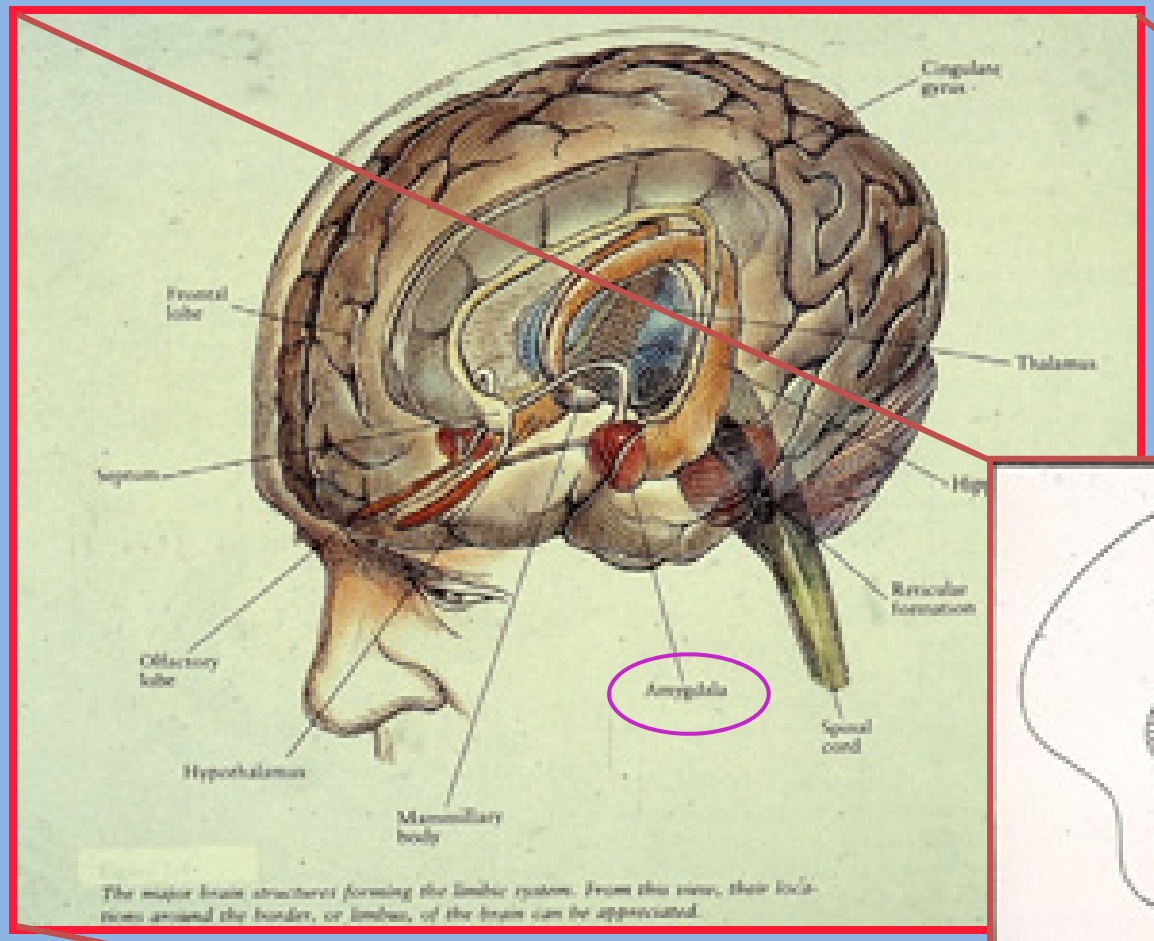
The Impact of Generations

YEARS AGO	GENERATIONS (assuming 1 per 20/yrs)	
4,000,000,000		First life on earth
1,000,000,000		Multicellular life
600,000,000		'Explosion' of Life forms
200,000,000	Millions	First Mammal
5,700,000	**285,000**	Chimp/Human Split
1,100,000	**55,000**	Early Homo Sapiens
200,000	**10,000**	Modern Homo Sapiens
10,000	**500**	Agricultural Revolution
150	**7**	Industrial Revolution / Oil

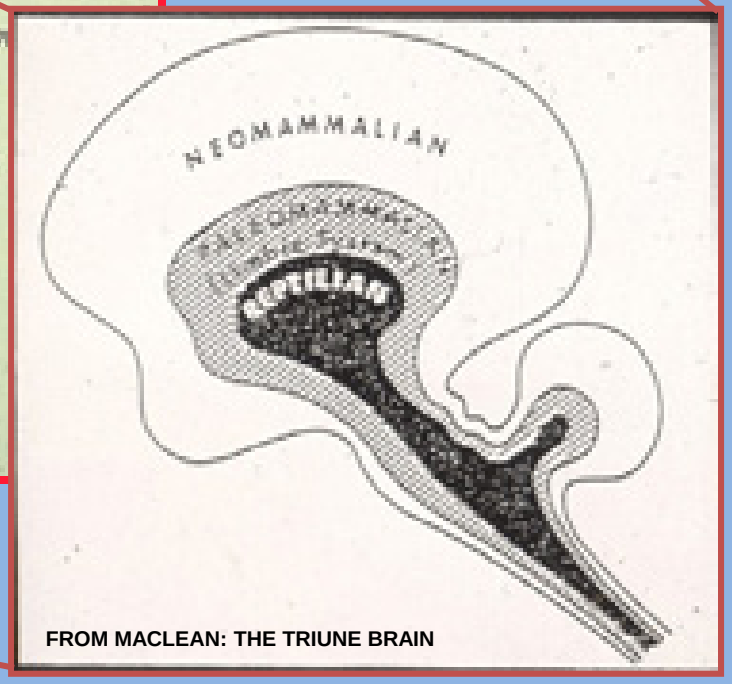
As humans, our impact on the planet has happened in a fraction of the evolutionary time it took to develop our brain wiring

BEHAVIOR IS BEST UNDERSTOOD THROUGH THE LENS OF EVOLUTION

HOMO SAPIENS EVOLVED AMIDST SCARCITY



The major brain structures forming the limbic system. From this view, their locations around the border, or limbus, of the brain can be appreciated.



FROM MACLEAN: THE TRIUNE BRAIN

Graphic Credit: Dr. Peter Whybrow – UCLA – Author of "*American Mania*"


Optimally, our brain regions work in concert. But the older the brain part, the more potential it has to trump our behaviour.

A) STEEP DISCOUNT RATES

A THOUGHT EXPERIMENT

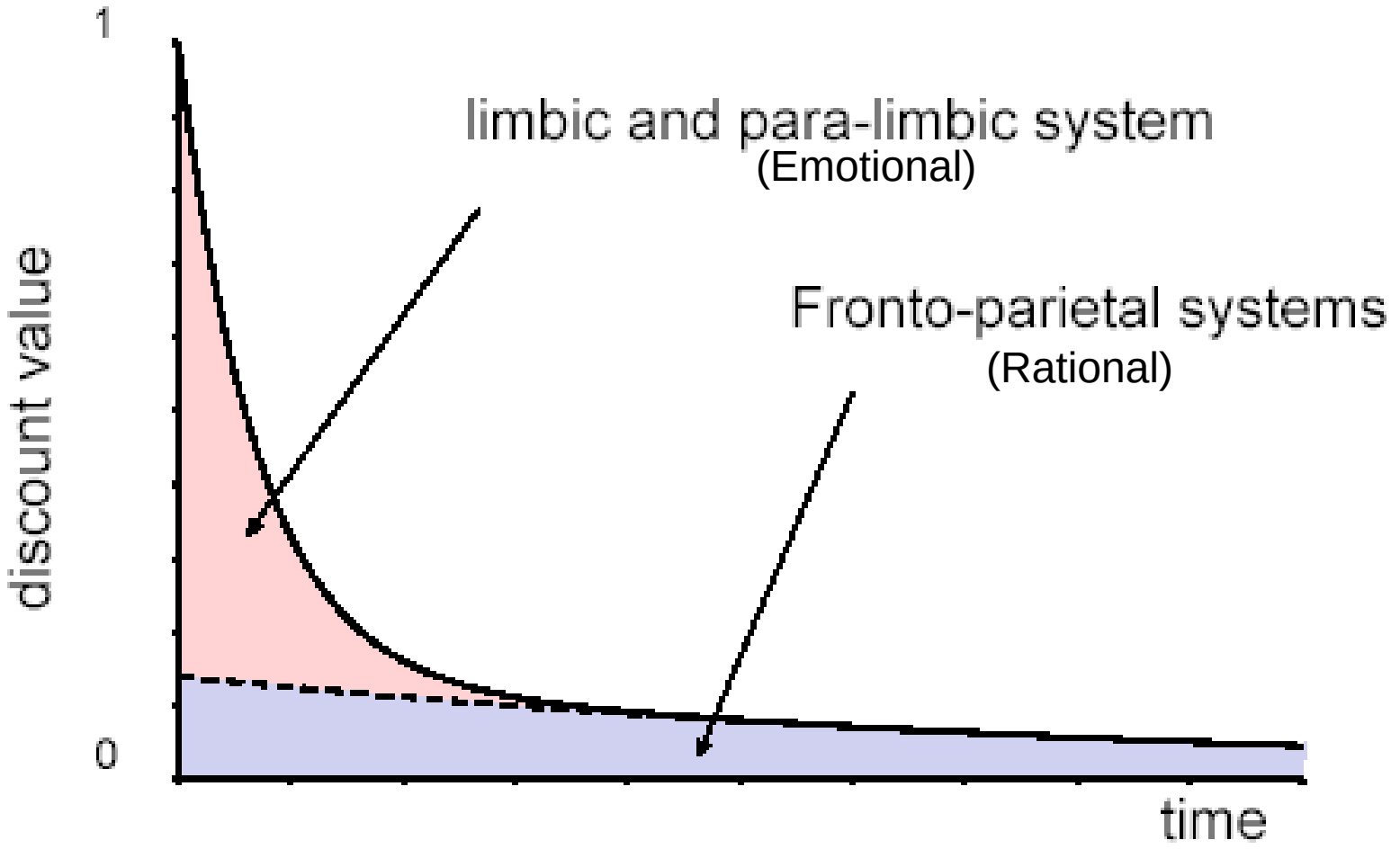
Would you prefer a 20 minute massage right now or a 30 minute massage in 2 hours?

OR

Would you prefer a 20 minute massage in one week or a 30 minute massage in a week and 2 hours from now?

CORNELIUS, CAUGHT WORRYING ABOUT WATERING HOLE DEPLETION RATES**, DID NOT LEAVE ANY DESCENDANTS**….

When using our emotional brain we STEEPLY value the present



The Limbic (emotional) system is myopic – it cannot see the future
The Neocortex (rational) system treats the future the same as the present

(Laibson, 2005)

Pathological Behavior – Dynamic Inconsistency

- Patient activities that many of us plan (and intend) on doing tomorrow
- Watch less TV
- Read more books
- Spend less on credit cards
- Exercise more
- Improve diet, floss, quit smoking,etc
- Save the environment…..

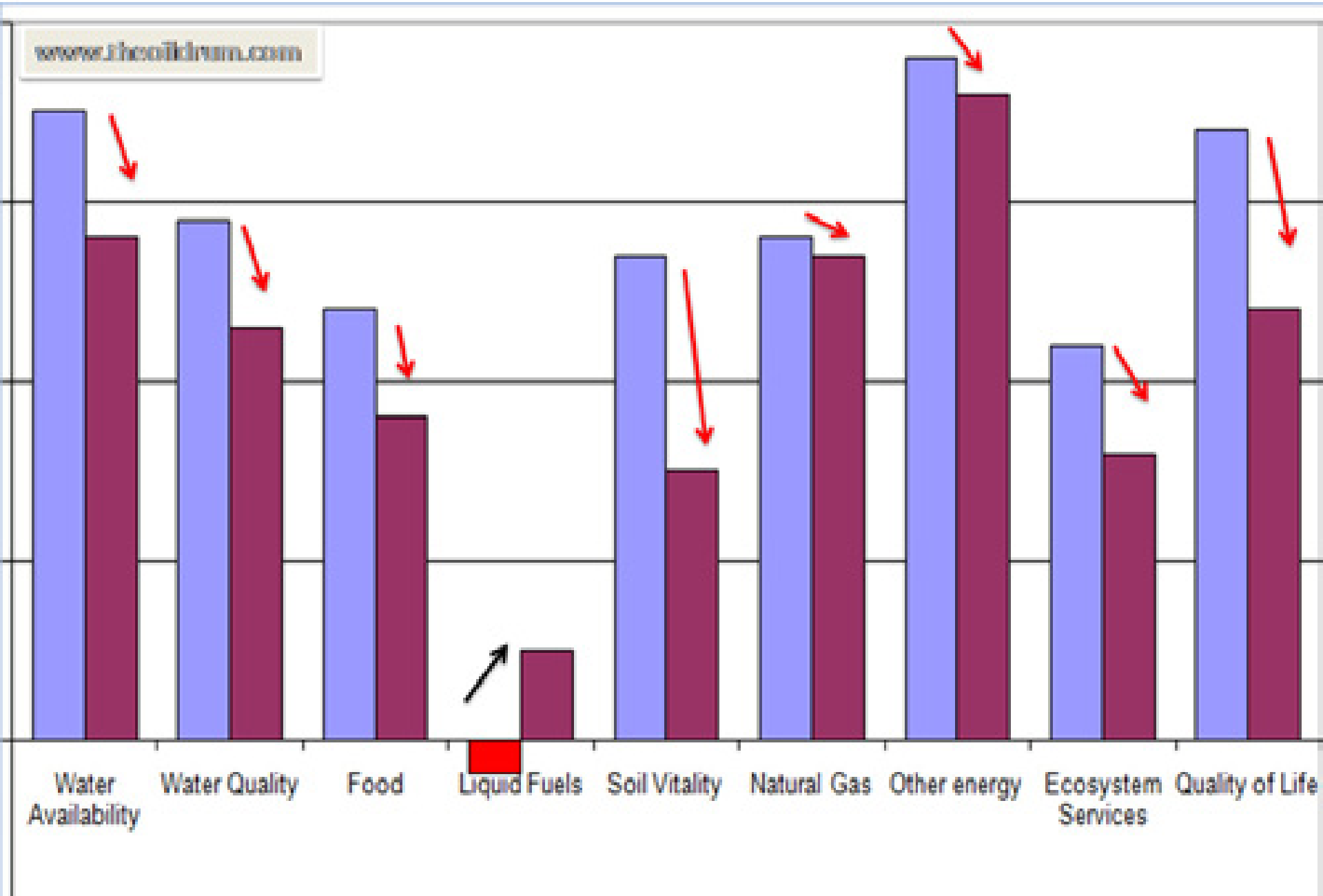
Within 24 hours tomorrow turns into today

STEEP DISCOUNT RATES AND IMPULSIVITY

- Current **smokers**>non-smokers or ex-smokers
- **Alcohol** dependent subjects> controls
- **Cocaine** dependent subjects> controls
- **Heroin** addicts > age-matched controls
- Pathological **gamblers** > age matched controls
- Children > **young** adults > older adults
- "**High risk**" takers > "low risk" takers
- **Low scorers** on standard math tests > high scorers
- **Stressed** people > relaxed people
- **Men** > women (Daly/Wilson)
- **Cognitively maxed out** people > people below cognitive load

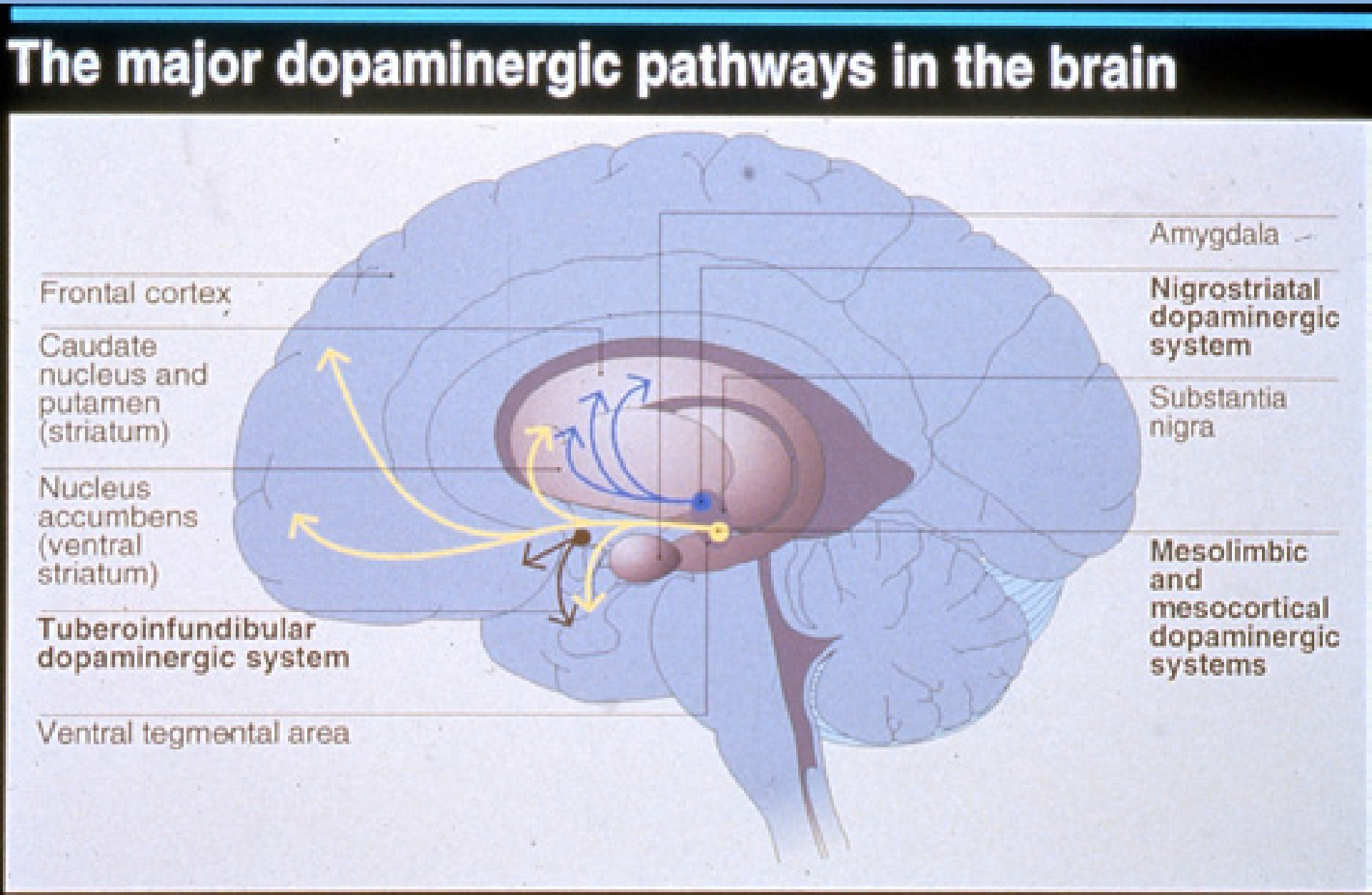
SOURCE: "Intertemporal Choice" Chablis et Al, *The New Palgrave Dictionary of Economics* 2007

An Increase in Liquid Fuels at What Cost?



B) HABITUATION / ADDICTION

HIJACKED BY NOVELTY!



UNEXPECTED REWARD IS KEY DRIVER

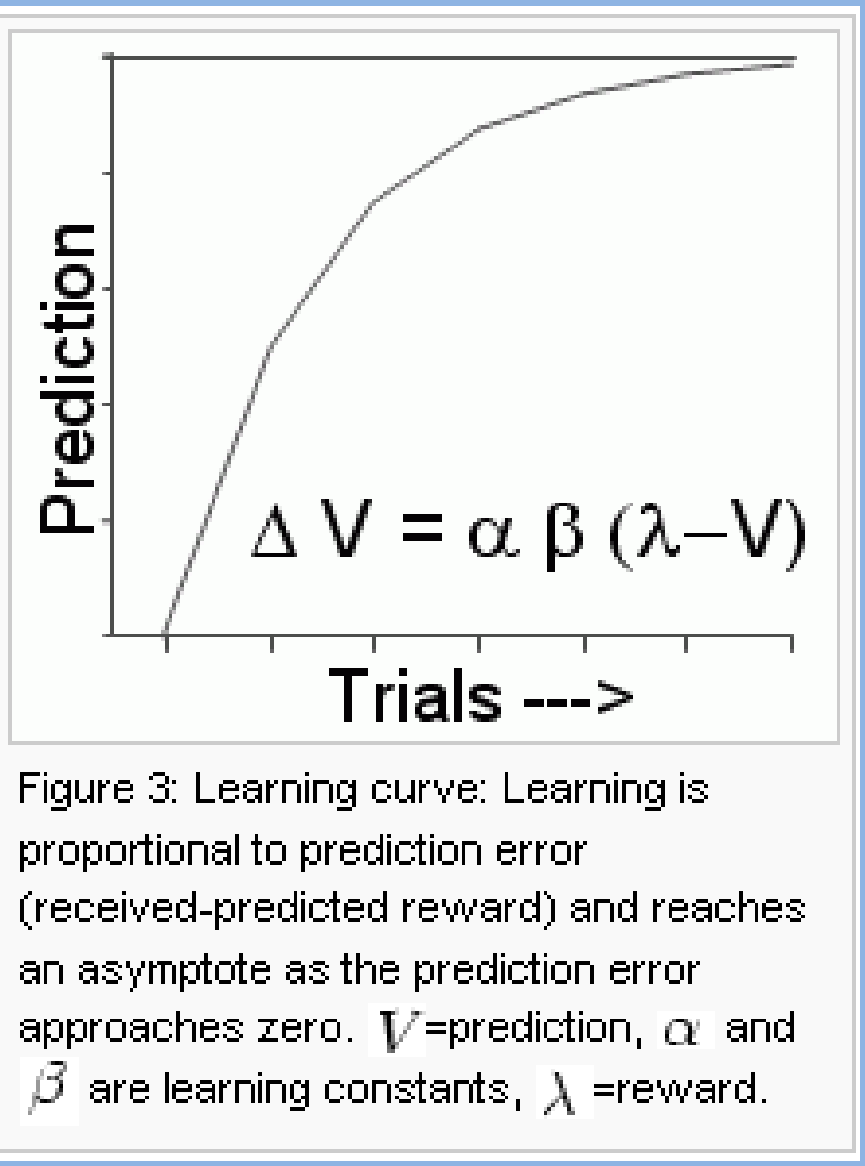


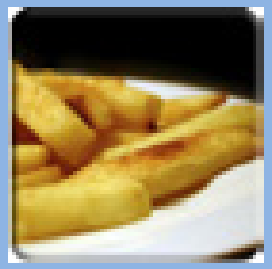
Figure 3: Learning curve: Learning is proportional to prediction error (received-predicted reward) and reaches an asymptote as the prediction error approaches zero. V=prediction, α and β are learning constants, λ =reward.

Dr Wolfram Schultz testing on chimpanzees – Cambridge University 2003

The Grass, (___) is always GREENER…

me, anne (2)	»	how goes it? - Hope your tourguide of the ruins wasn't a hot italian chick. Sounds like prime fuc
Cambridge Energy	»	Daniel Yergin admits 2005 oil peak. Renounces Catholicism for Buddhism
Mom	»	Where the hell are you? CALL HOME
Netherlands -Office of T.	»	President Koppelaar requests your presence..
The Vatican	»	VaticanAlert!! Climate Change Marketing Campaign Run by Illuminati
Bellisima Escorts	»	Hot Perugia Women Want to Meet You!!
HO Geordie Coal Corp.	»	H.O. Geordie Coal Annual Shareholders Meeting
Wedding Planners Inc	»	Tverberg/Staniford Wedding Directions
brendan fisher	›	water footprint and bioenergy... - Lads, just thought you'd like to see this article just out in PNA

According to July 2007 Time Magazine, **2 million+** pathological gamblers



4 Million+ addicted to food

15 million+ compulsive shoppers

16 million+ addicted to sex or pornography

Unknown millions (still a debate on whether a formal addiction)

19 million+ addicted to alcohol (7.7%)

3.6 million addicted to illegal drugs

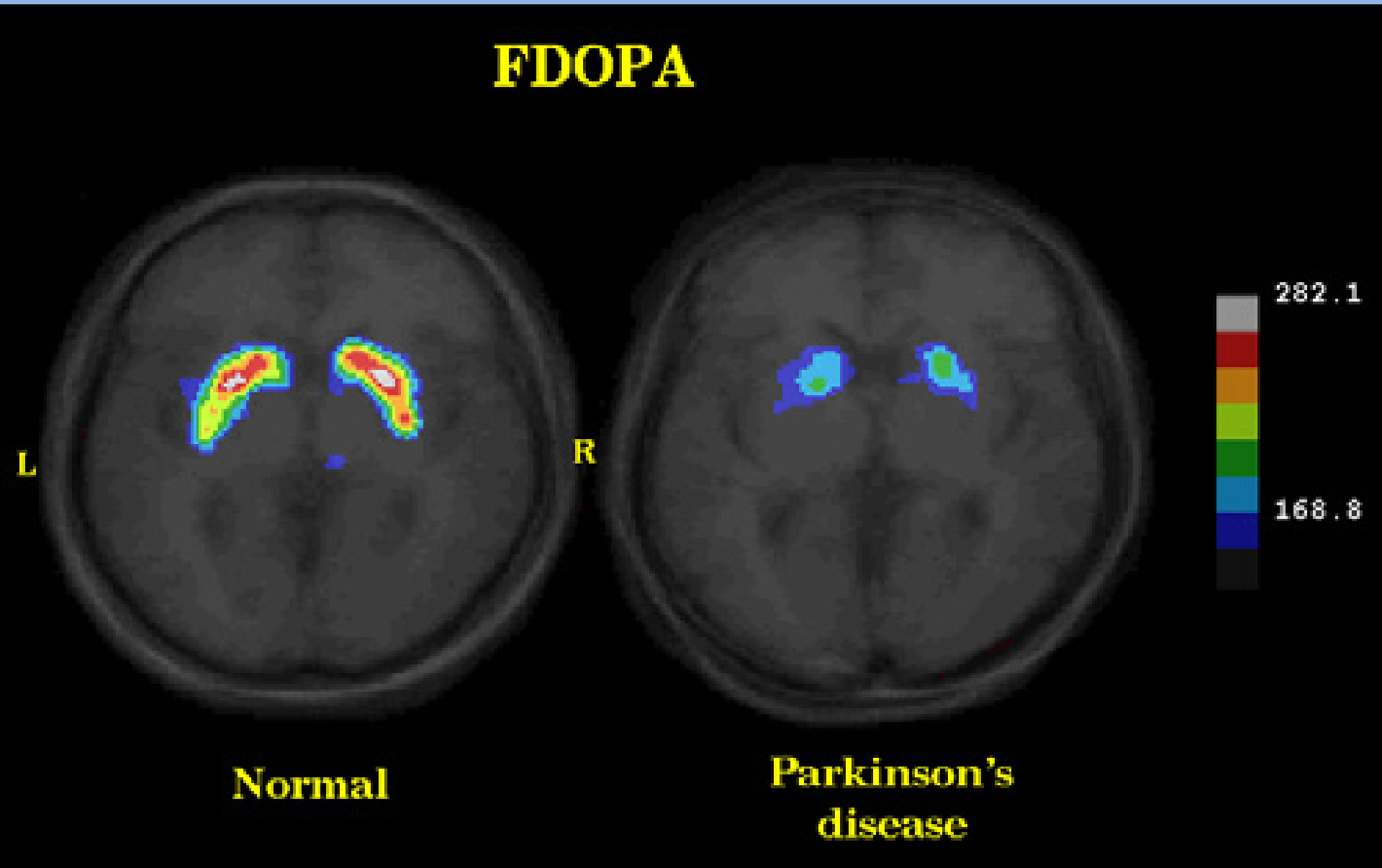
71.5 million addicted to nicotine

80-90% of adults routinely ingest caffeine

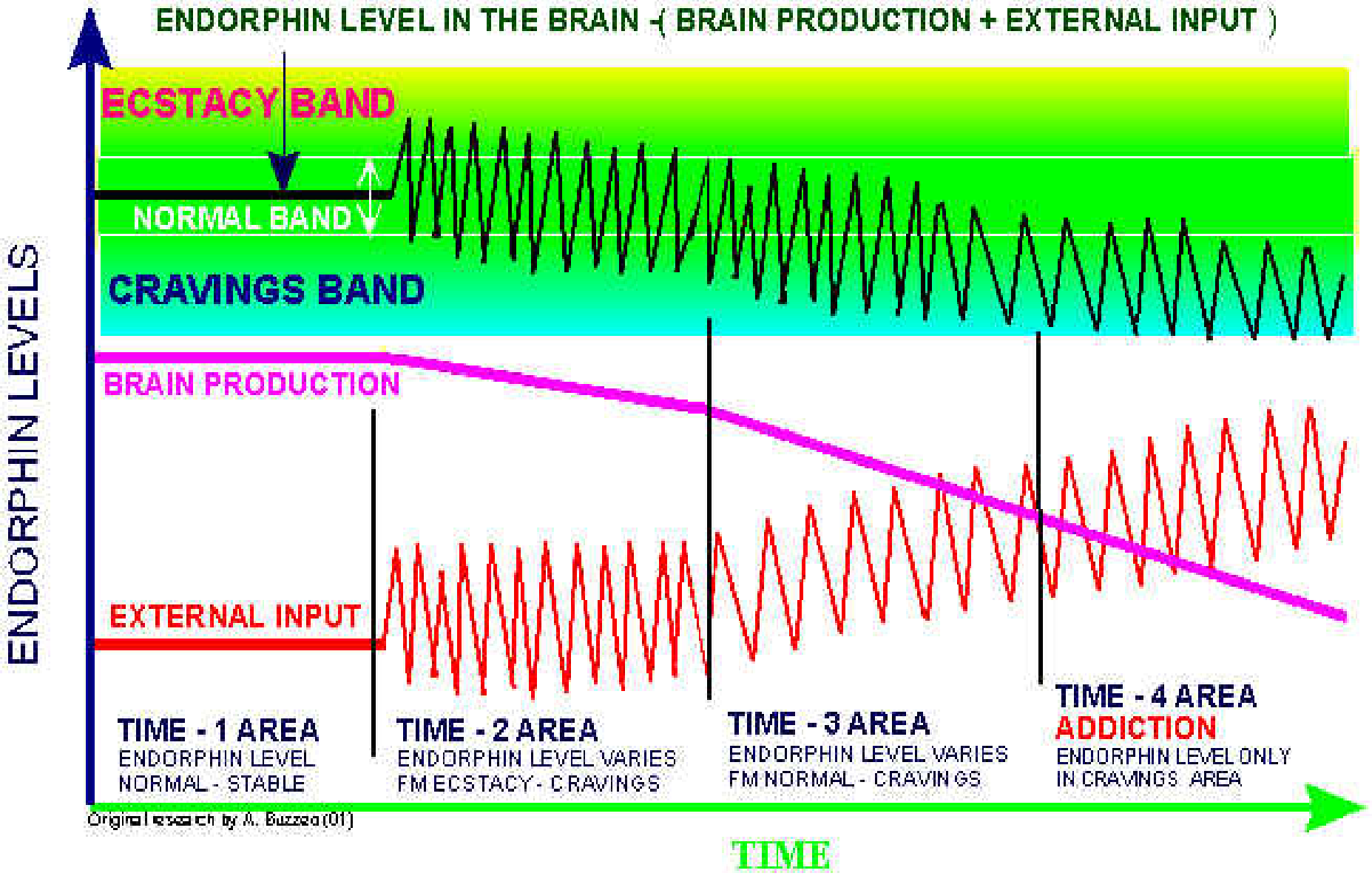
?

But USA only has 300 million people!!

The “*Wanting* ” feels better than the “*Having*”

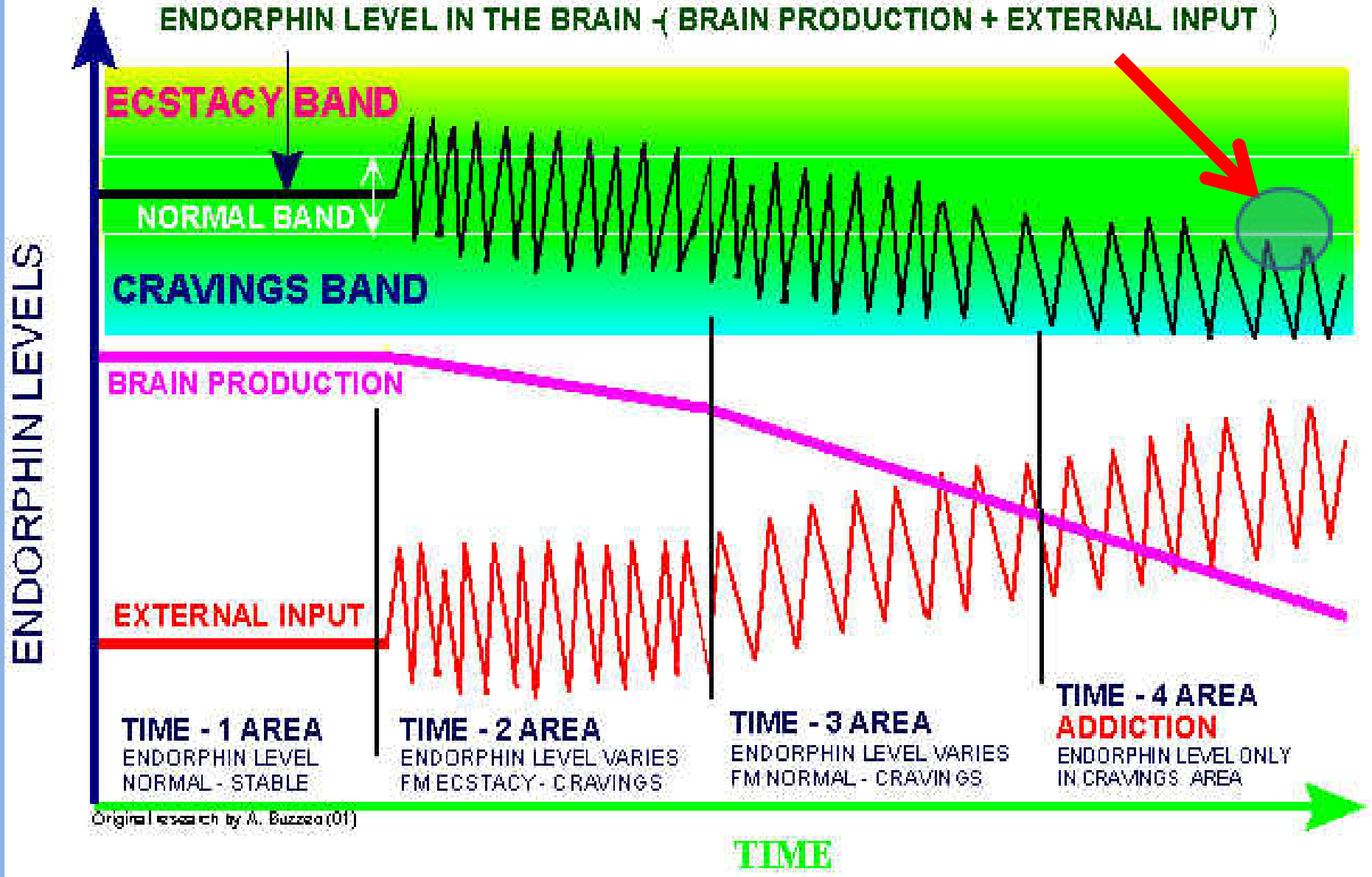


THE MECHANISM OF ADDICTION/HABITUATION



ADDICTION PROCESS FOR DRUGS, ALCOHOL, NICOTINE, FOOD & ANOREXIA

ANHEDONIA



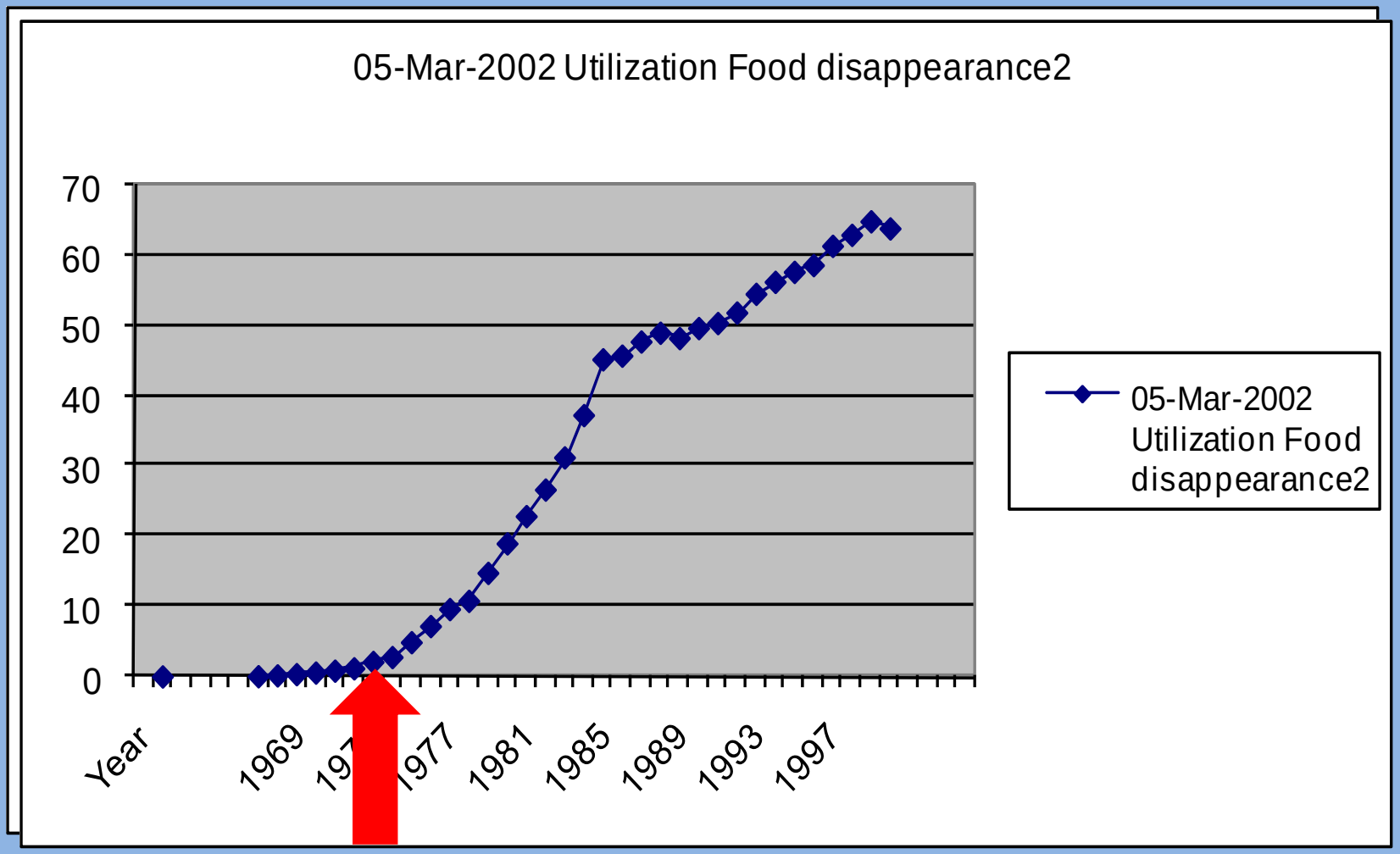
ADDICTION PROCESS FOR DRUGS, ALCOHOL, NICOTINE, FOOD & ANOREXIA

(One) Example of Cultural Change Conforming to our Neural Wiring

Carbohydrate Consumption

- Increase of 50% in refined carbohydrates from 1970 *(USDA Economic Research Service)*
- 4000+% increase in consumption per annum per person of high fructose corn syrup *(USDA Economic Research Service)*
- Additional average 300 daily calories consumed attributed to increase in carbohydrate consumption *(CDC 2004)*

US Per Capita High Fructose Corn Syrup
1967 – 2000, Pounds / Year



Some Sweet Research

- Sugar induces **physical dependency** *(Colantuoni and Hoebel 2002)*
- Diets **high in sugar** will cause release of **dopamine** in the pleasure center of the brain *(Hoebel 2005)*
- Sugar is a **'gateway'** substance that increases likelihood of addiction to other substances, e.g. amphetamines *(Hoebel 2003)*
- Sugar and fat together create significantly **increased consumption behavior** *(Kelley 2003)*
- Low serotonin linked to carbohydrate craving, obesity and depression *(Wurtman 1986, 1995)*

Enjoy an ice cream cone shortly before lunch.

Sugar can be the willpower you need to undereat.

When you're hungry, it usually means your energy's down.

By eating something with sugar in it, you can get your energy up fast. In fact, sugar is the fastest energy food around.

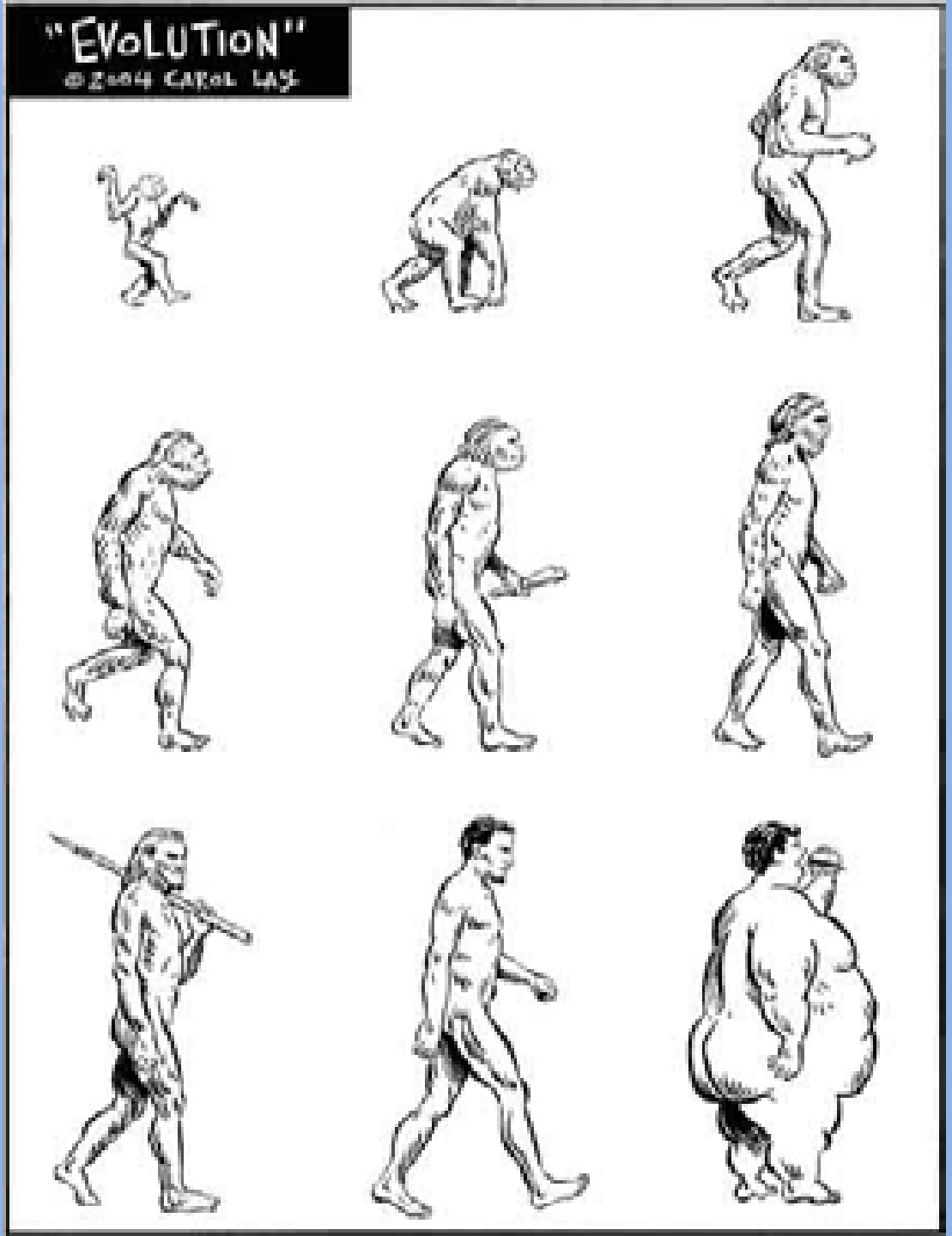
And when your energy's up, there's a good chance you'll have the willpower to undereat at mealtime.

How's that for a sweet idea? *Sugar . . . only 18 calories per teaspoon, and it's all energy.*

Sugar Information
General Post Office Box 94, New York, N.Y. 10001

Marketing bypasses our rational processes (by targeting our emotions)

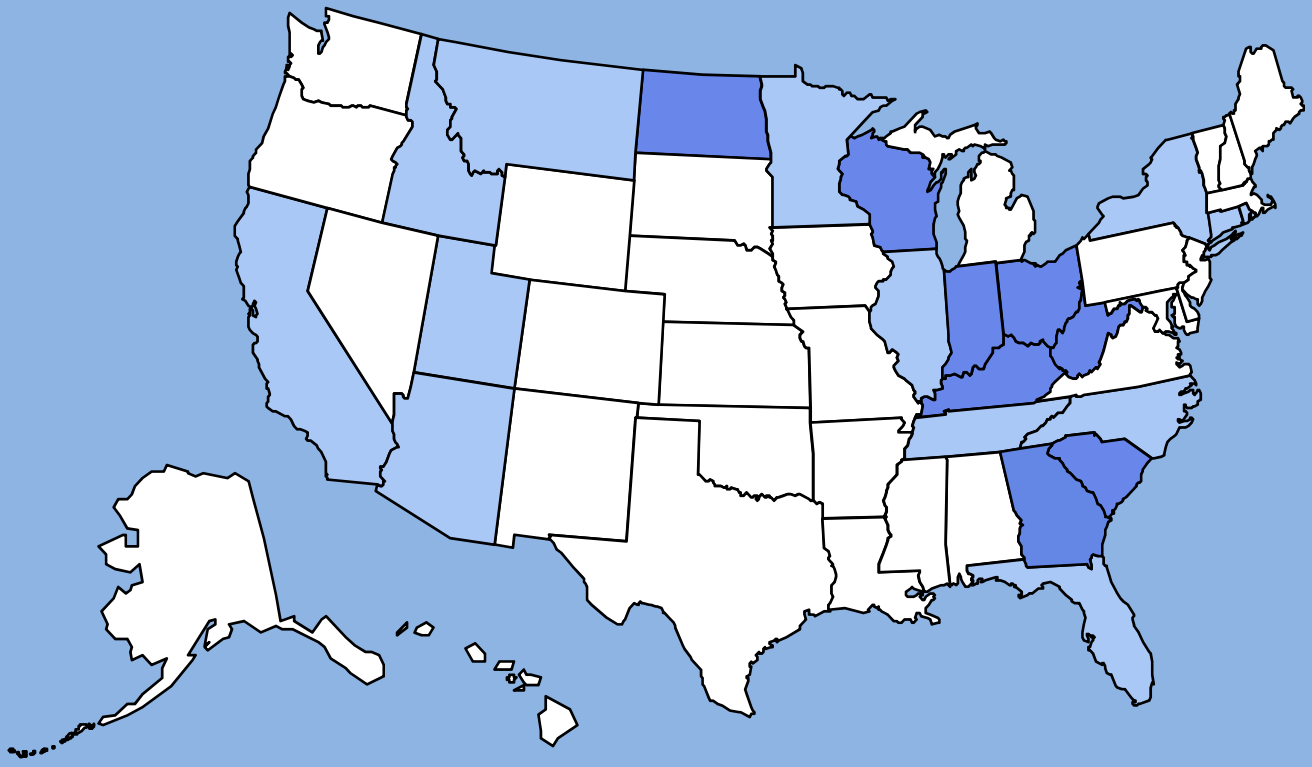
MARKETING is the greatest technological advance of our species….

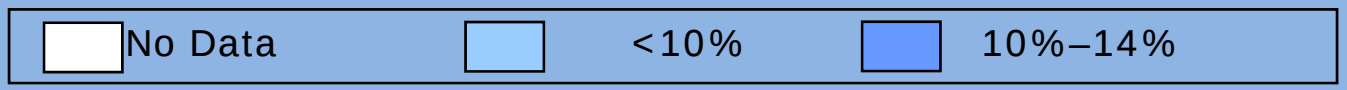

"EVoLUTioN"
©2004 CAROL LAY

Obesity Trends* Among U.S. Adults

BRFSS, 1985

(*BMI ≥30, or ~ 30 lbs overweight for 5’ 4” person)





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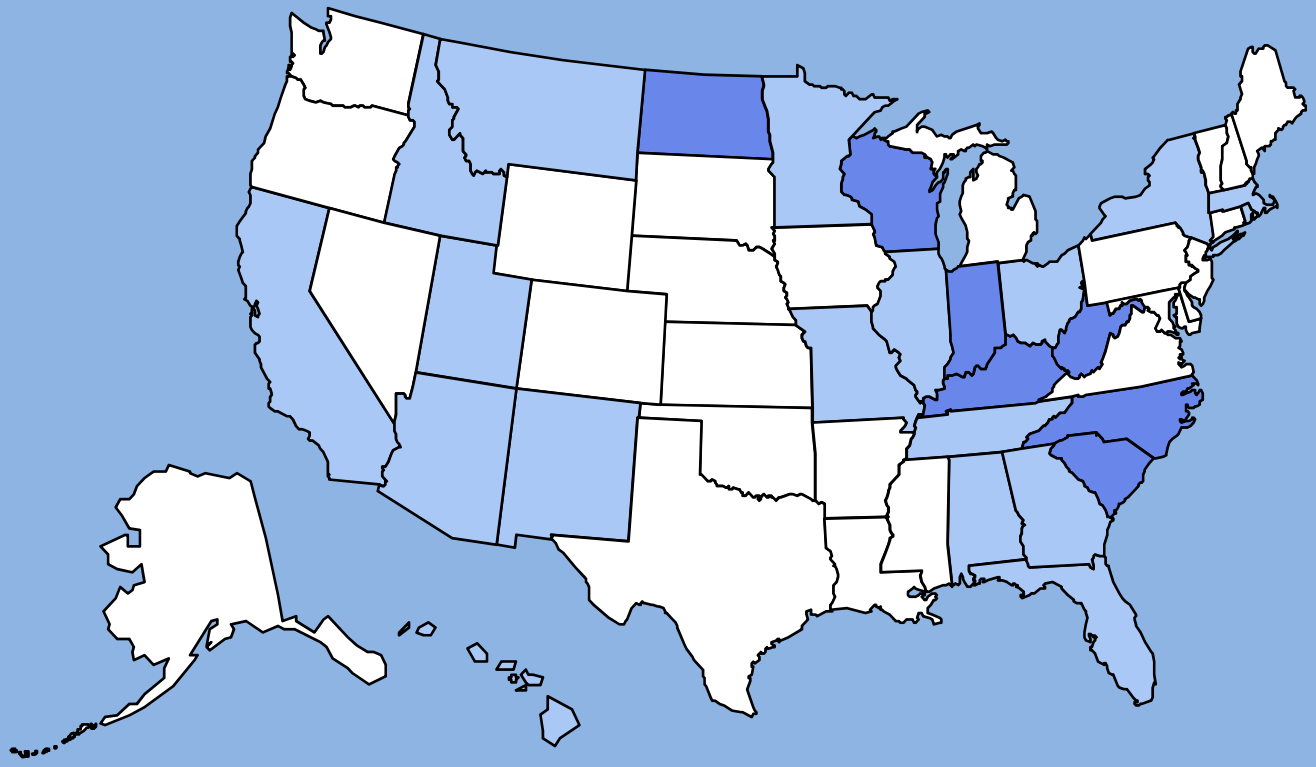

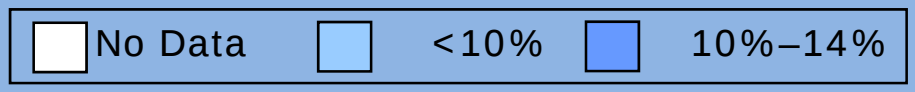

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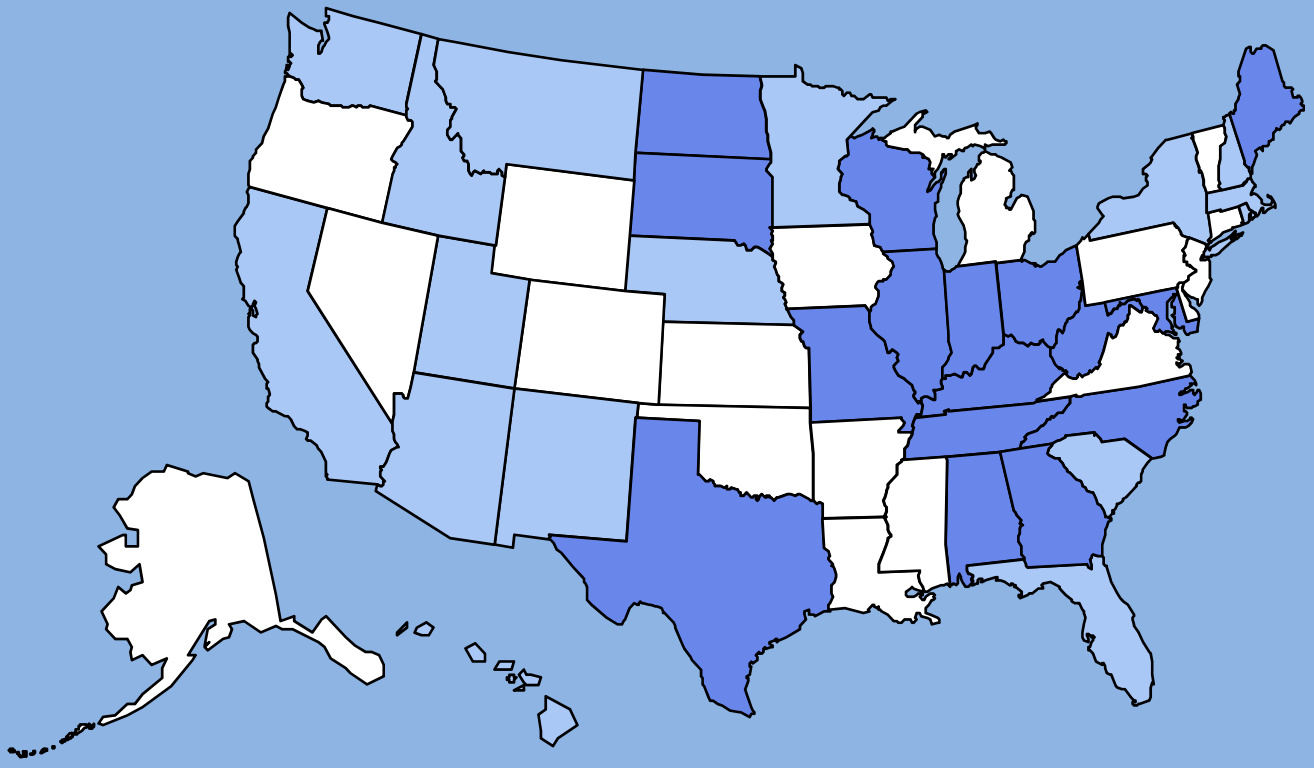
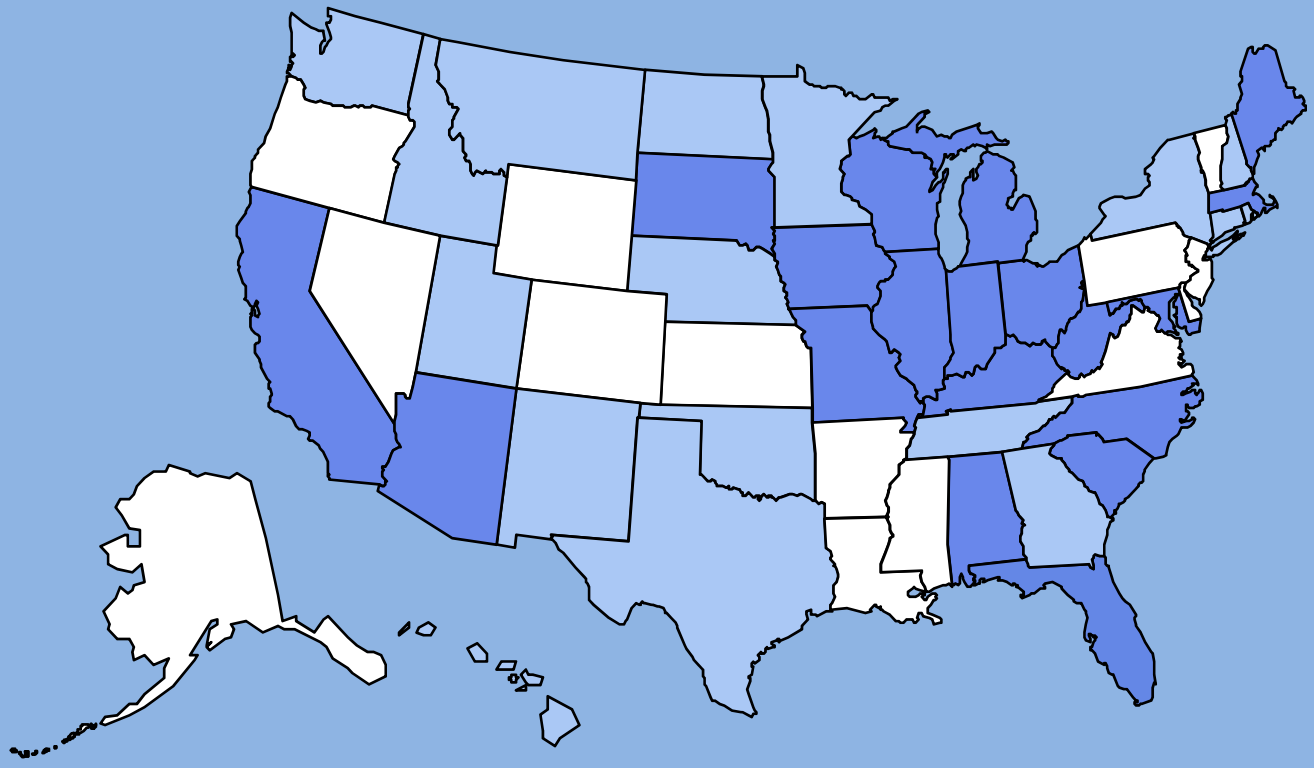
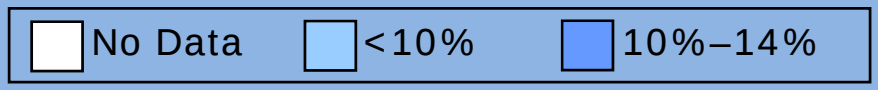


Obesity Trends* Among U.S. Adults

BRFSS, 1988

(*BMI ≥30, or ~ 30 lbs overweight for 5’ 4” person)

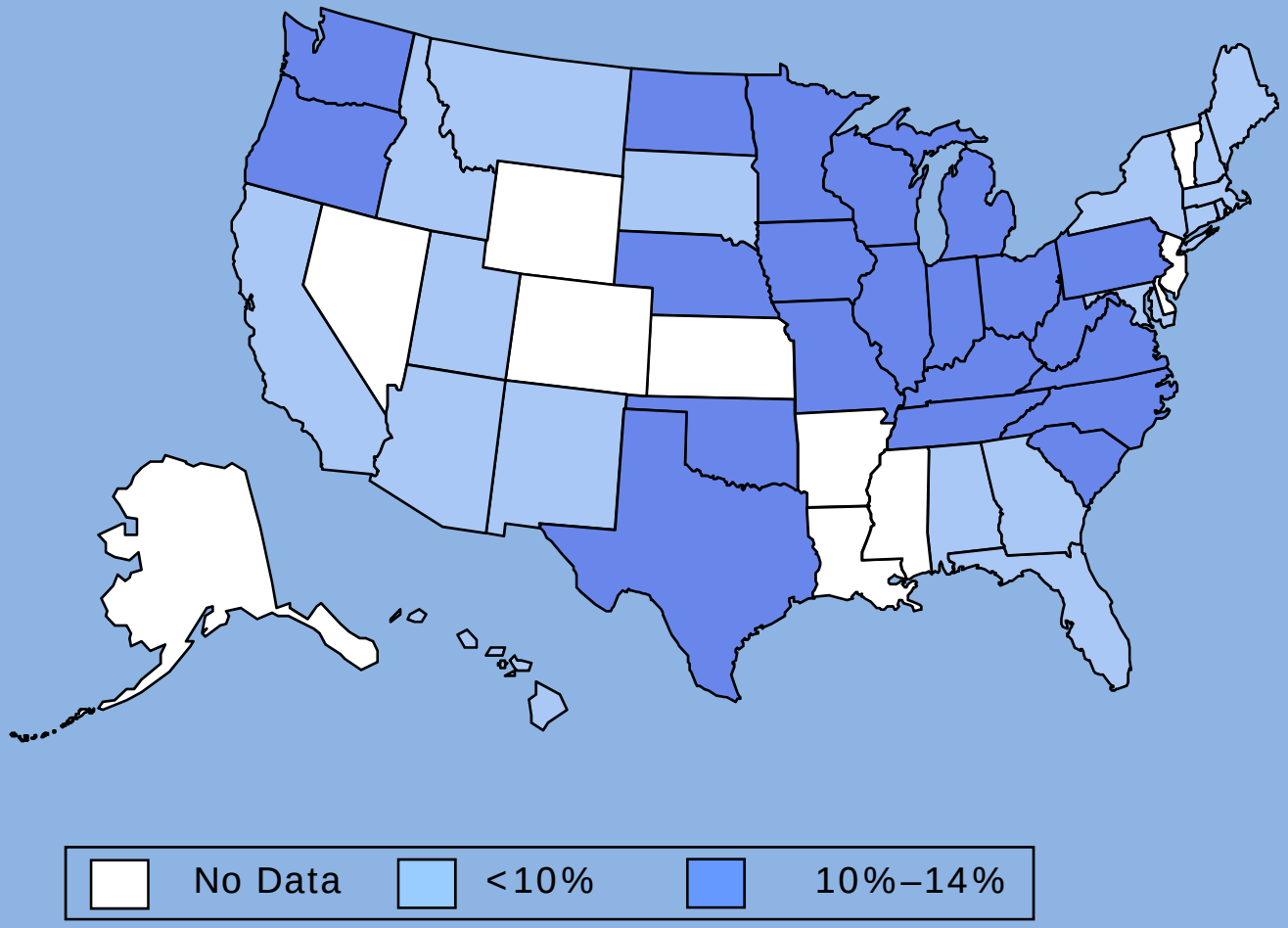




Obesity Trends* Among U.S. Adults

BRFSS, 1989

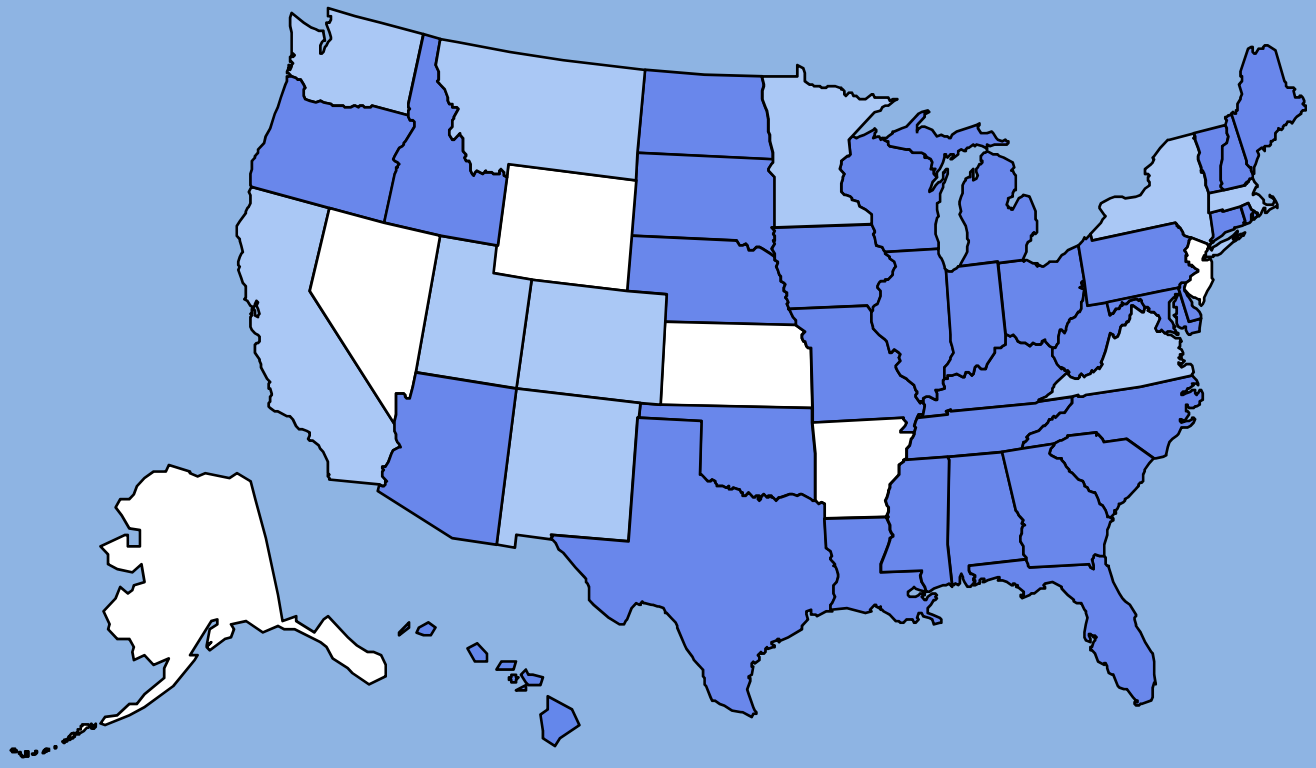
(*BMI ≥30, or ~ 30 lbs overweight for 5’ 4” person)



Obesity Trends* Among U.S. Adults

BRFSS, 1990

(*BMI ≥30, or ~ 30 lbs overweight for 5’ 4” person)

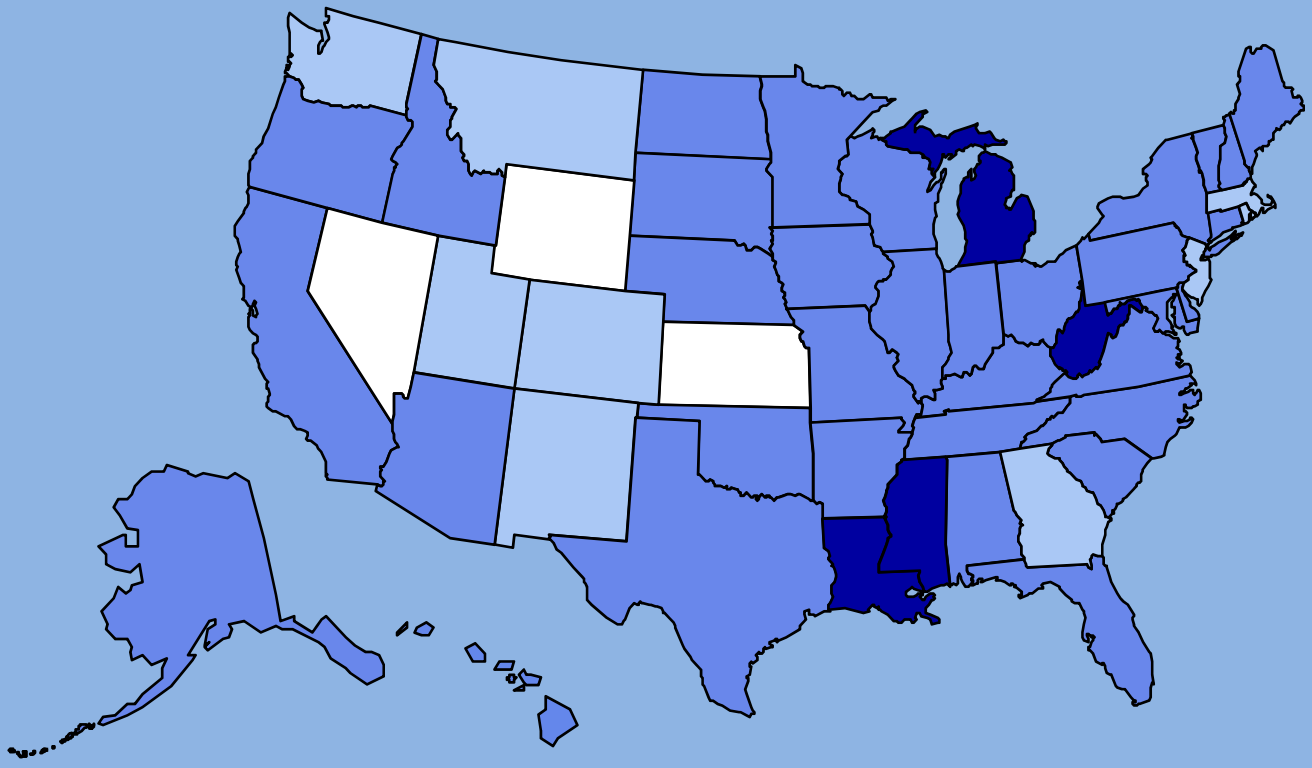


No Data | <10% | 10%–14%

Obesity Trends* Among U.S. Adults

BRFSS, 1991

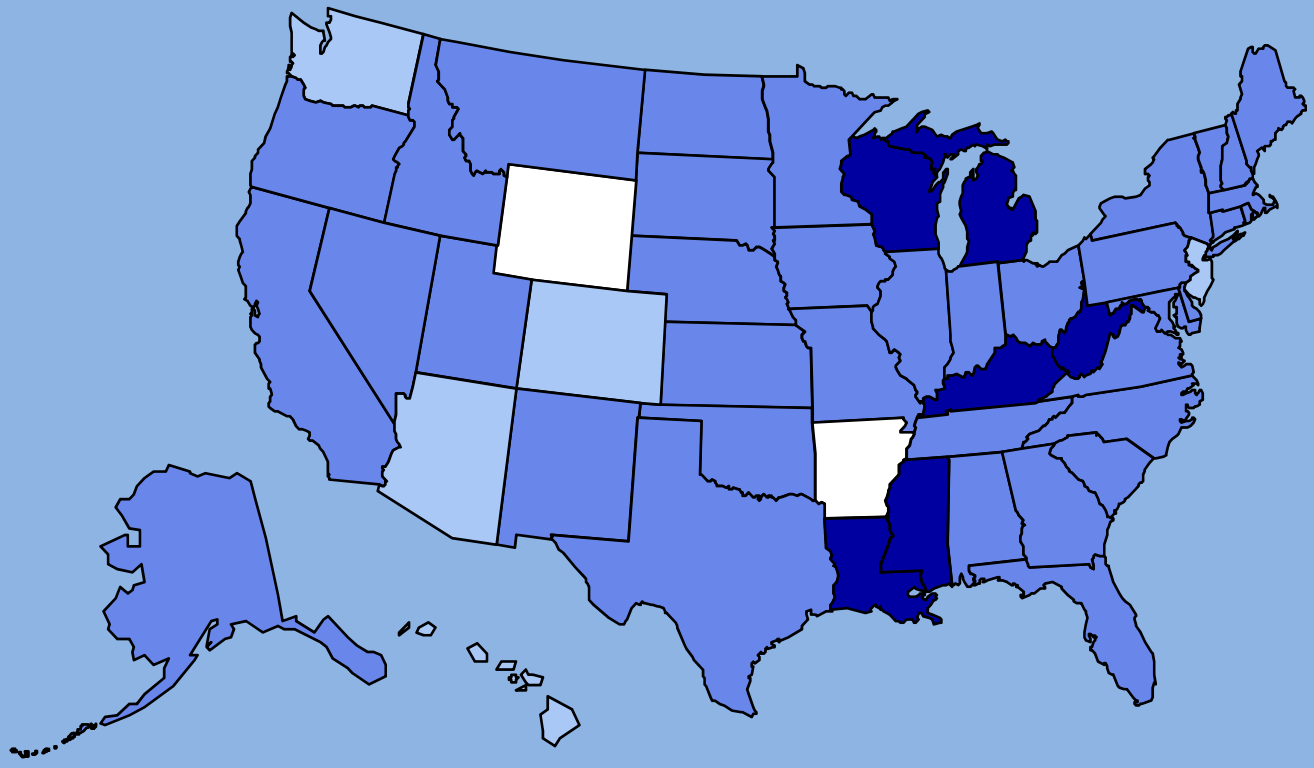
(*BMI ≥30, or ~ 30 lbs overweight for 5’ 4” person)



Obesity Trends* Among U.S. Adults

BRFSS, 1992

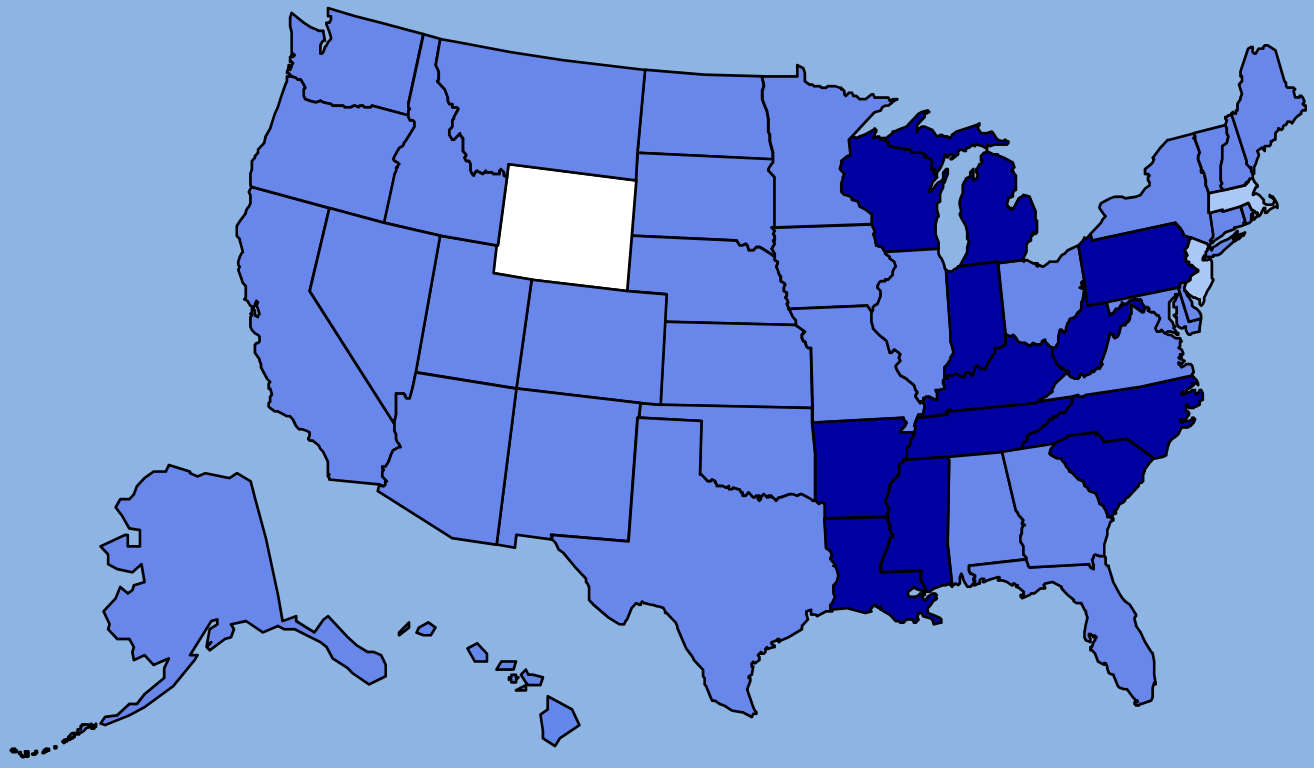
(*BMI ≥30, or ~ 30 lbs overweight for 5’ 4” person)



Obesity Trends* Among U.S. Adults

BRFSS, 1993

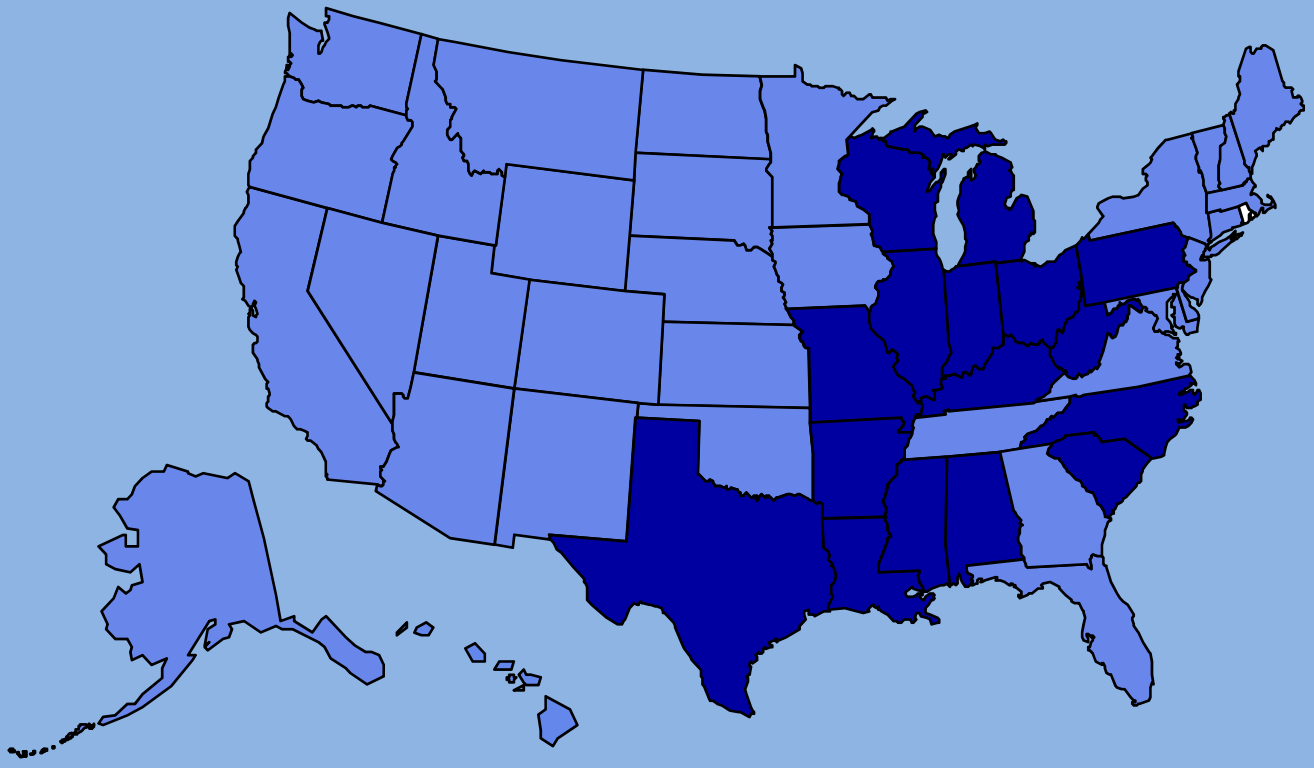
(*BMI ≥30, or ~ 30 lbs overweight for 5’ 4” person)



Obesity Trends* Among U.S. Adults

BRFSS, 1994

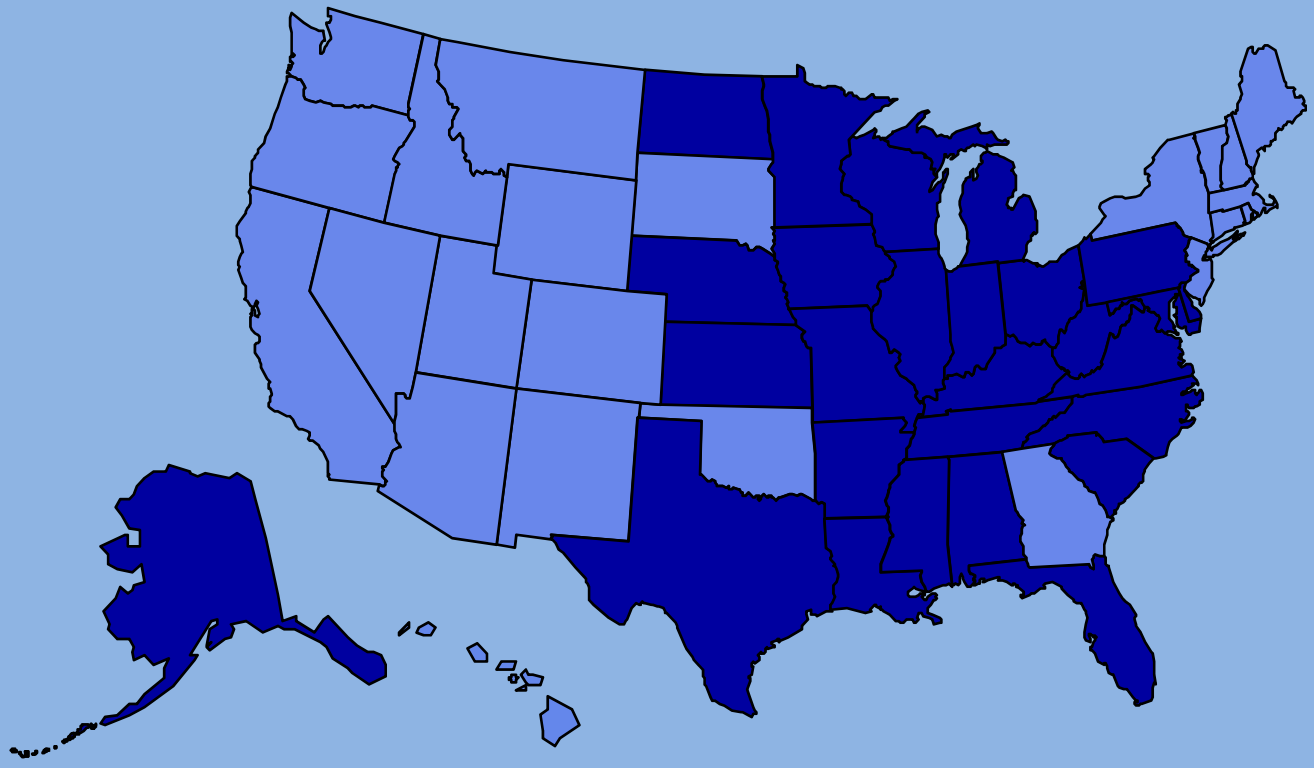
(*BMI ≥30, or ~ 30 lbs overweight for 5’ 4” person)



Obesity Trends* Among U.S. Adults

BRFSS, 1995

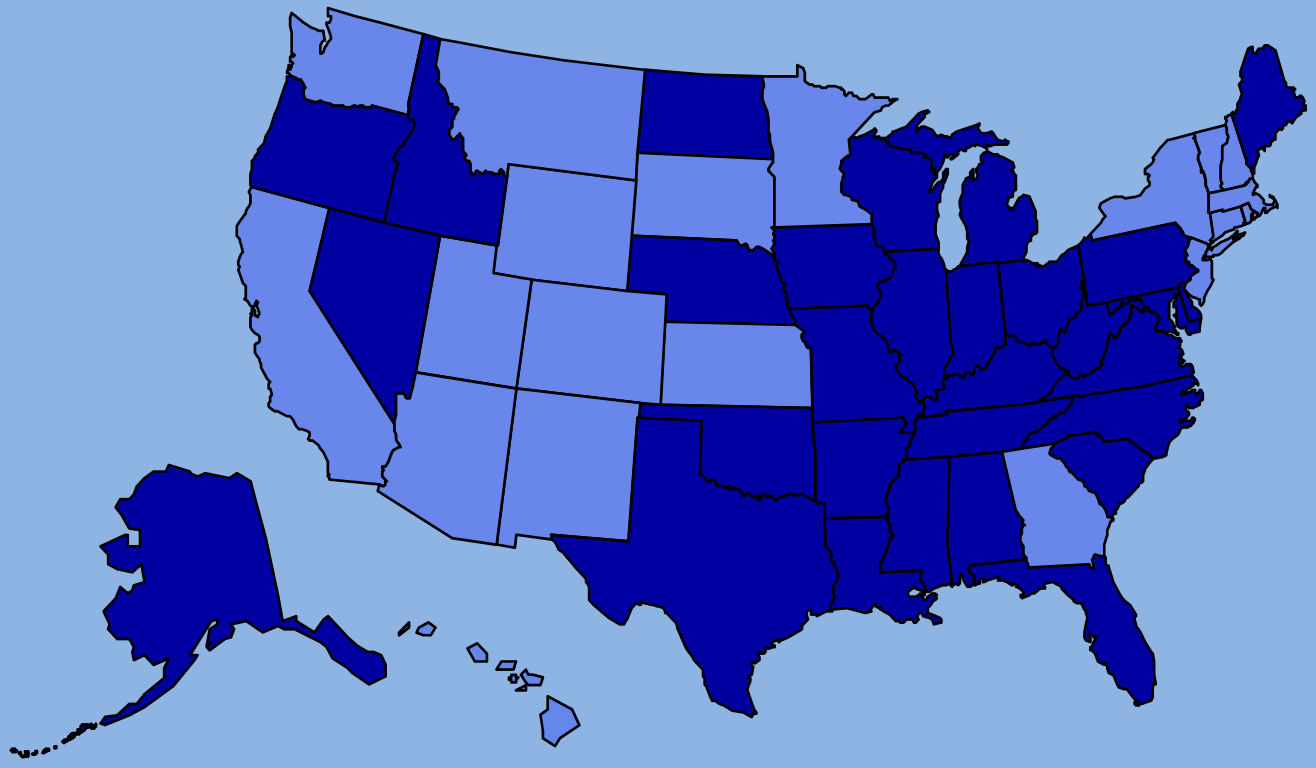
(*BMI ≥30, or ~ 30 lbs overweight for 5’ 4” person)



Obesity Trends* Among U.S. Adults

BRFSS, 1996

(*BMI ≥30, or ~ 30 lbs overweight for 5’ 4” person)

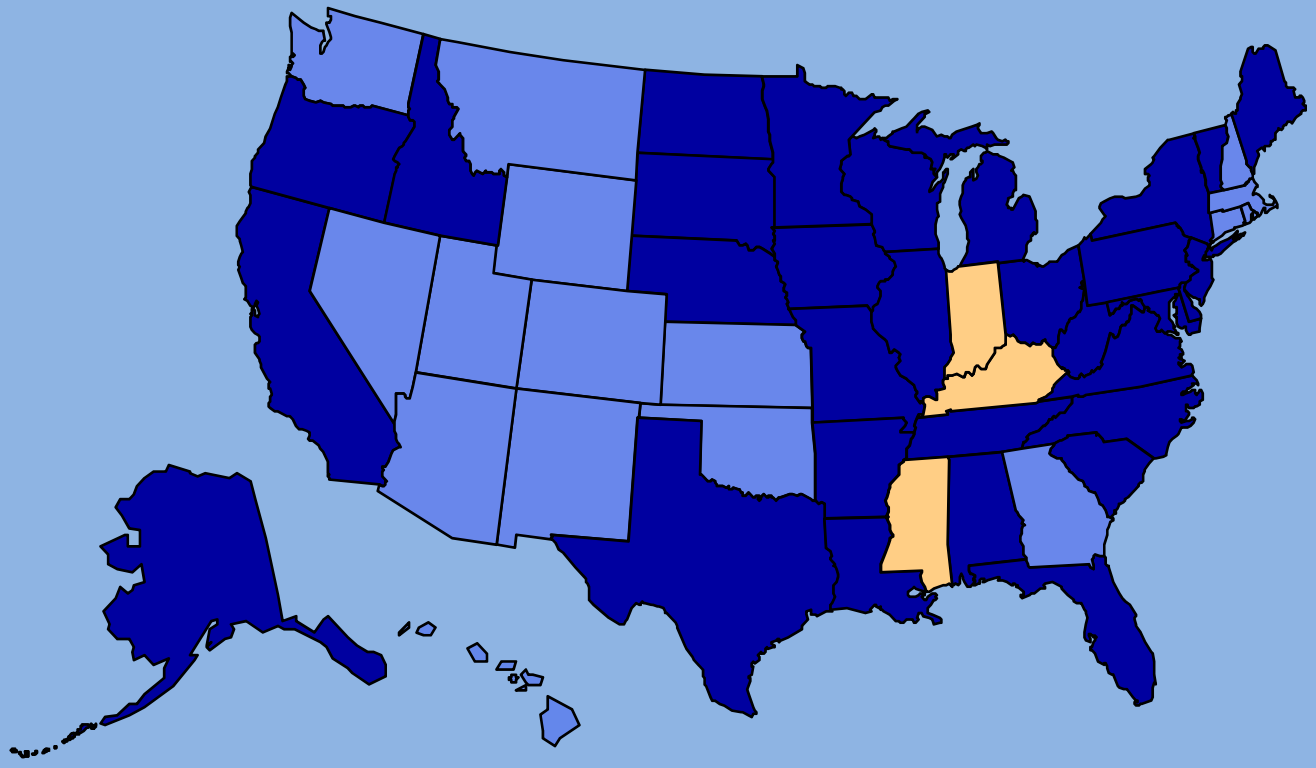


No Data | <10% | 10%–14% | 15%–19%

Obesity Trends* Among U.S. Adults

BRFSS, 1997

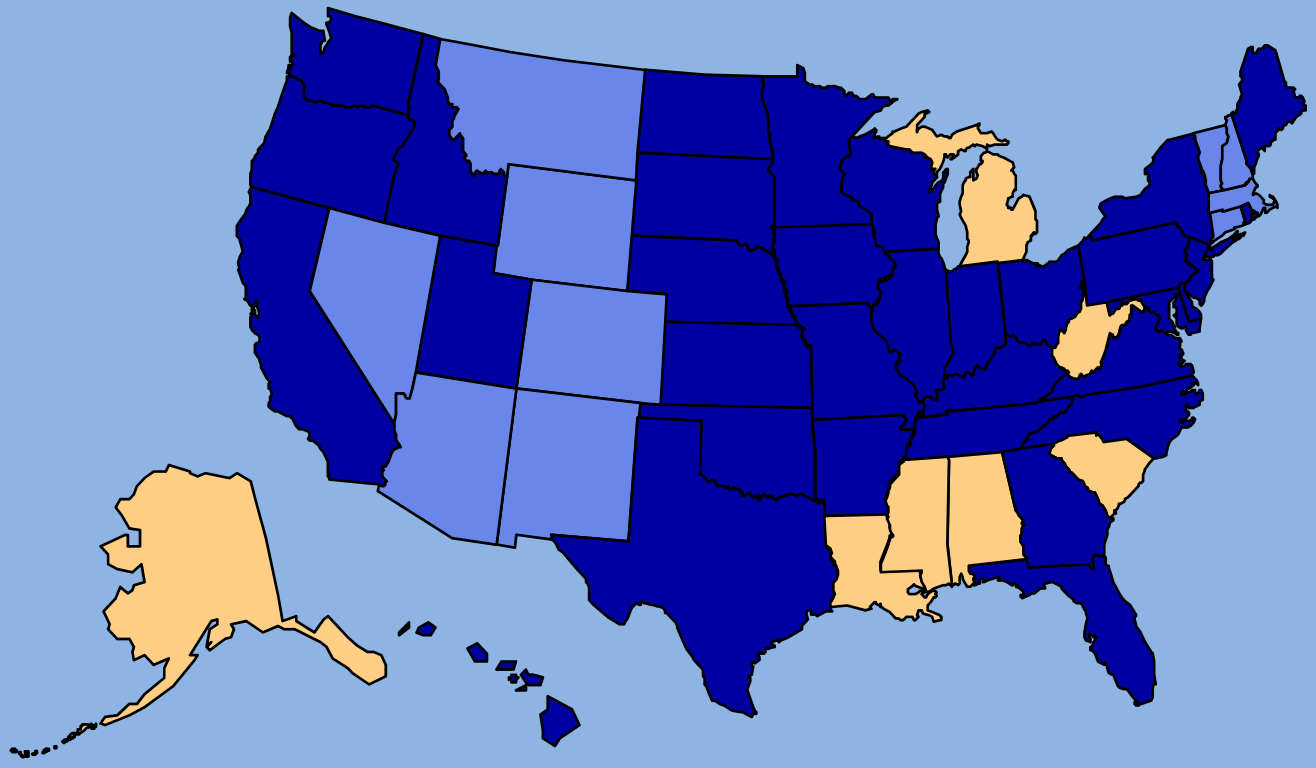
(*BMI ≥30, or ~ 30 lbs overweight for 5’ 4” person)



Obesity Trends* Among U.S. Adults

BRFSS, 1998

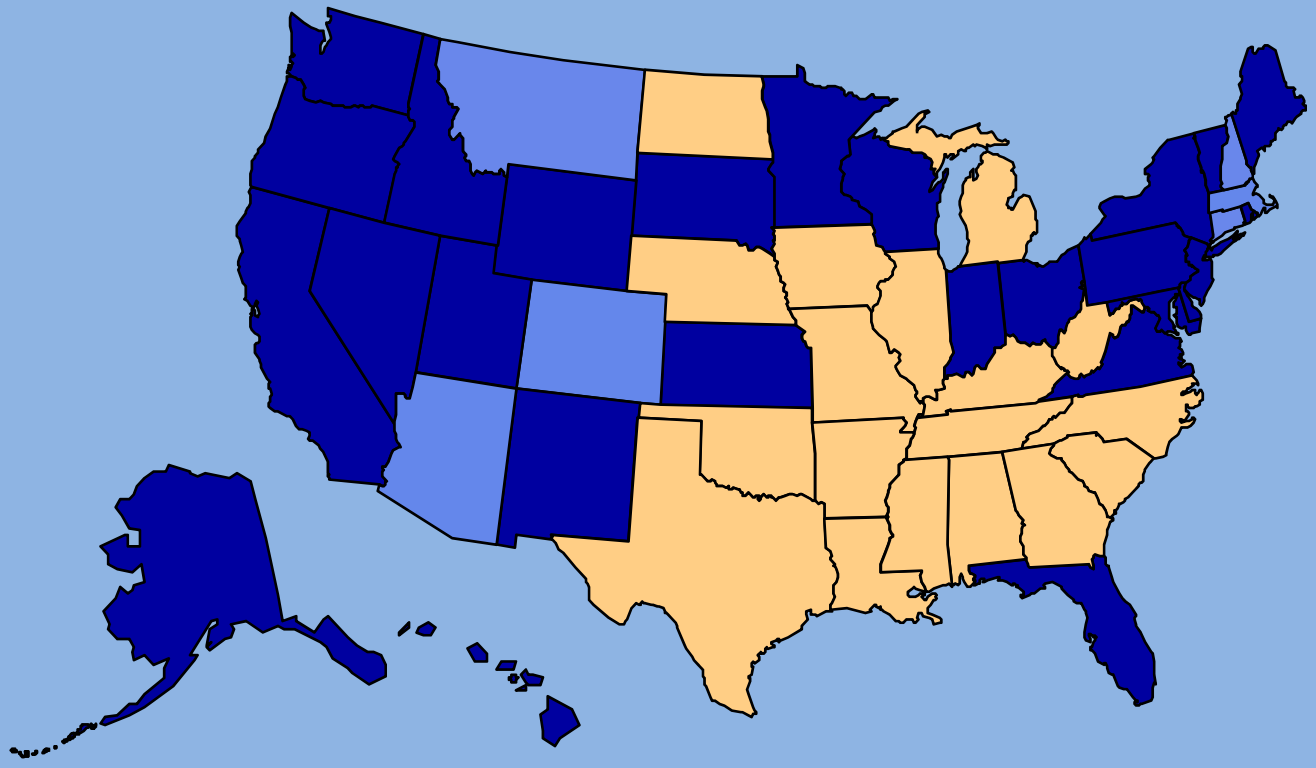
(*BMI ≥30, or ~ 30 lbs overweight for 5’ 4” person)



Obesity Trends* Among U.S. Adults

BRFSS, 1999

(*BMI ≥30, or ~ 30 lbs overweight for 5’ 4” person)

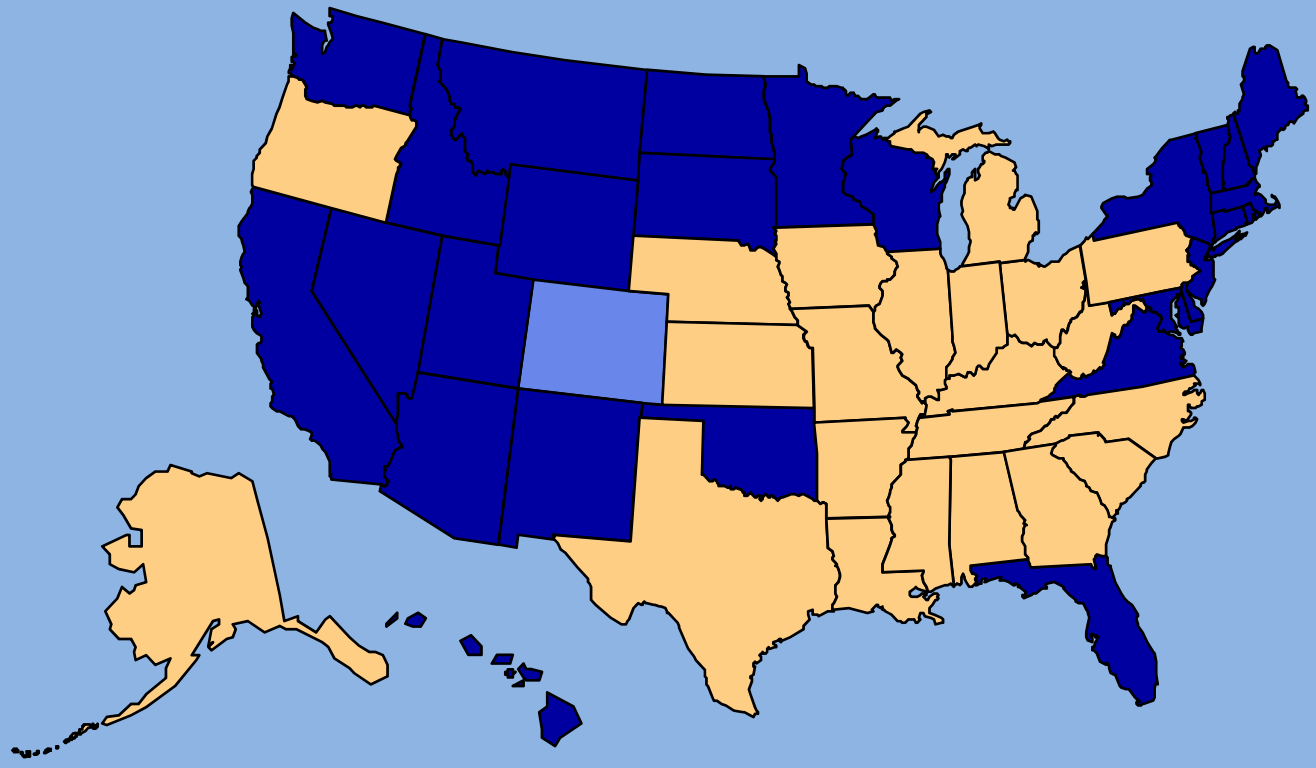


No Data | <10% | 10%–14% | 15%–19% | ≥20

Obesity Trends* Among U.S. Adults

BRFSS, 2000

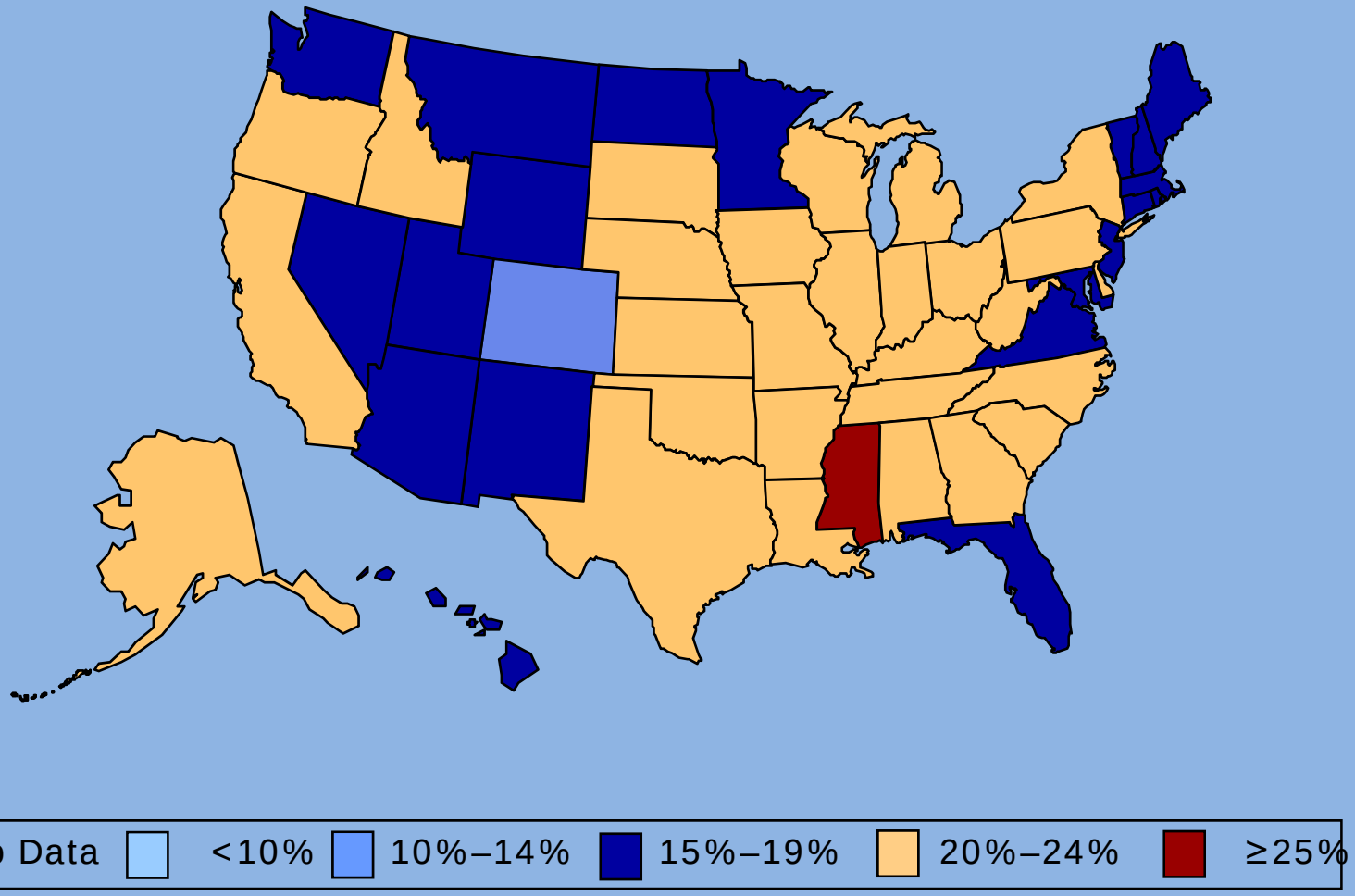
(*BMI ≥30, or ~ 30 lbs overweight for 5’ 4” person)



Obesity Trends* Among U.S. Adults

BRFSS, 2001

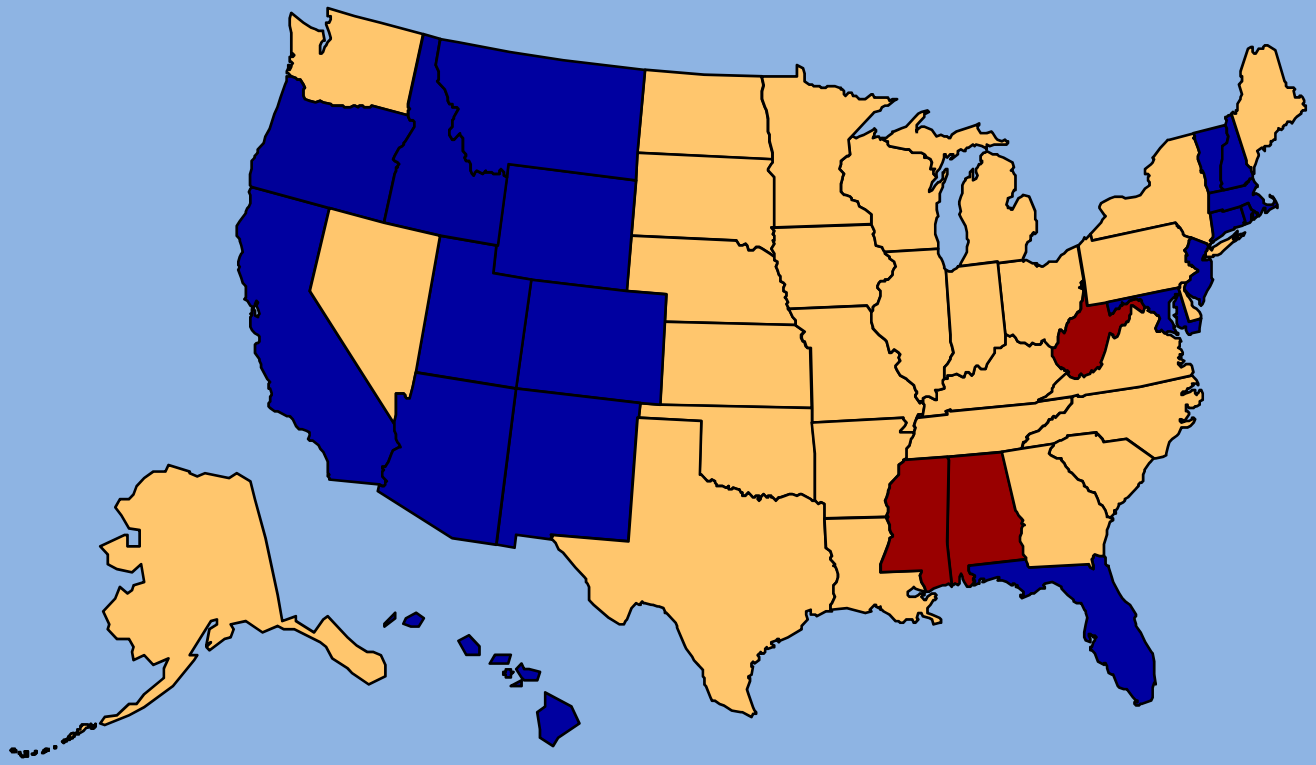
(*BMI ≥30, or ~ 30 lbs overweight for 5’ 4” person)



Obesity Trends* Among U.S. Adults

BRFSS, 2002

(*BMI ≥30, or ~ 30 lbs overweight for 5’4” person)

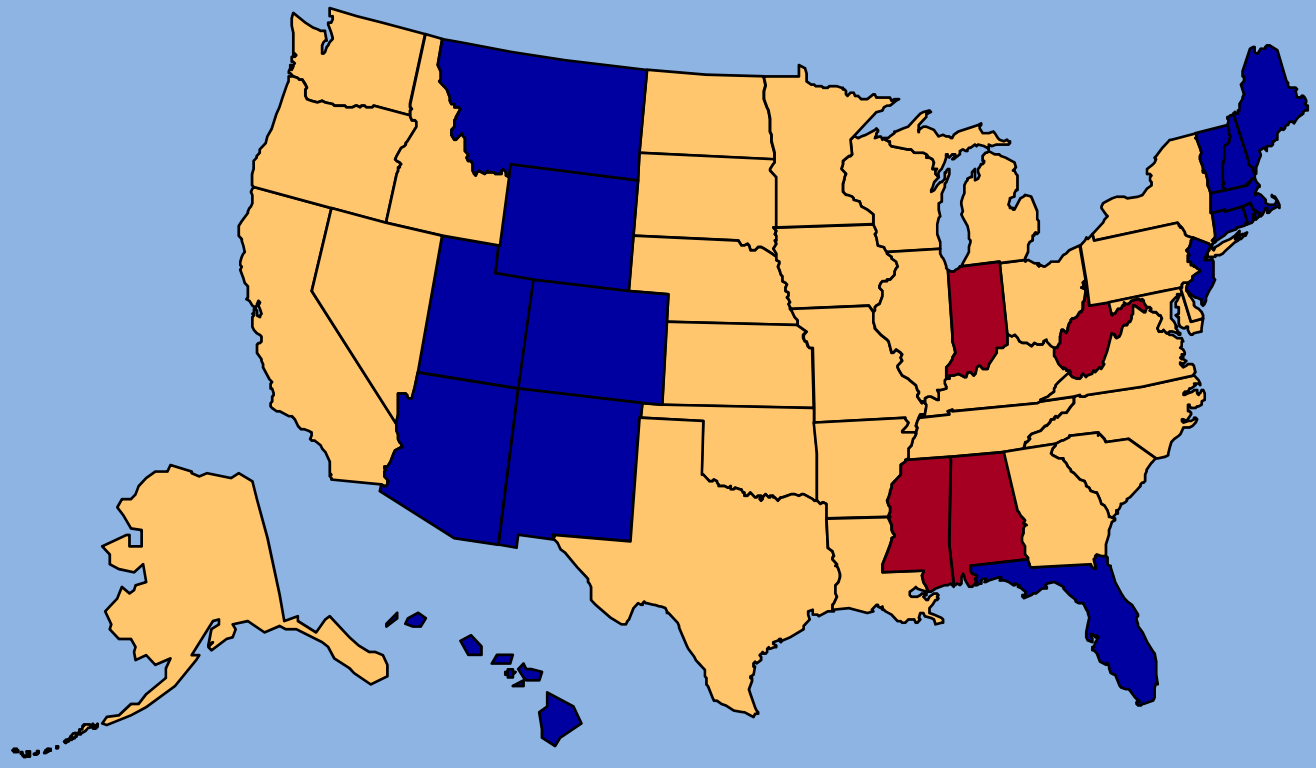


No Data | <10% | 10%–14% | 15%–19% | 20%–24% | ≥25%

Obesity* Trends Among U.S. Adults

BRFSS, 2003

(*BMI ≥30, or ~ 30 lbs overweight for 5’ 4” person)

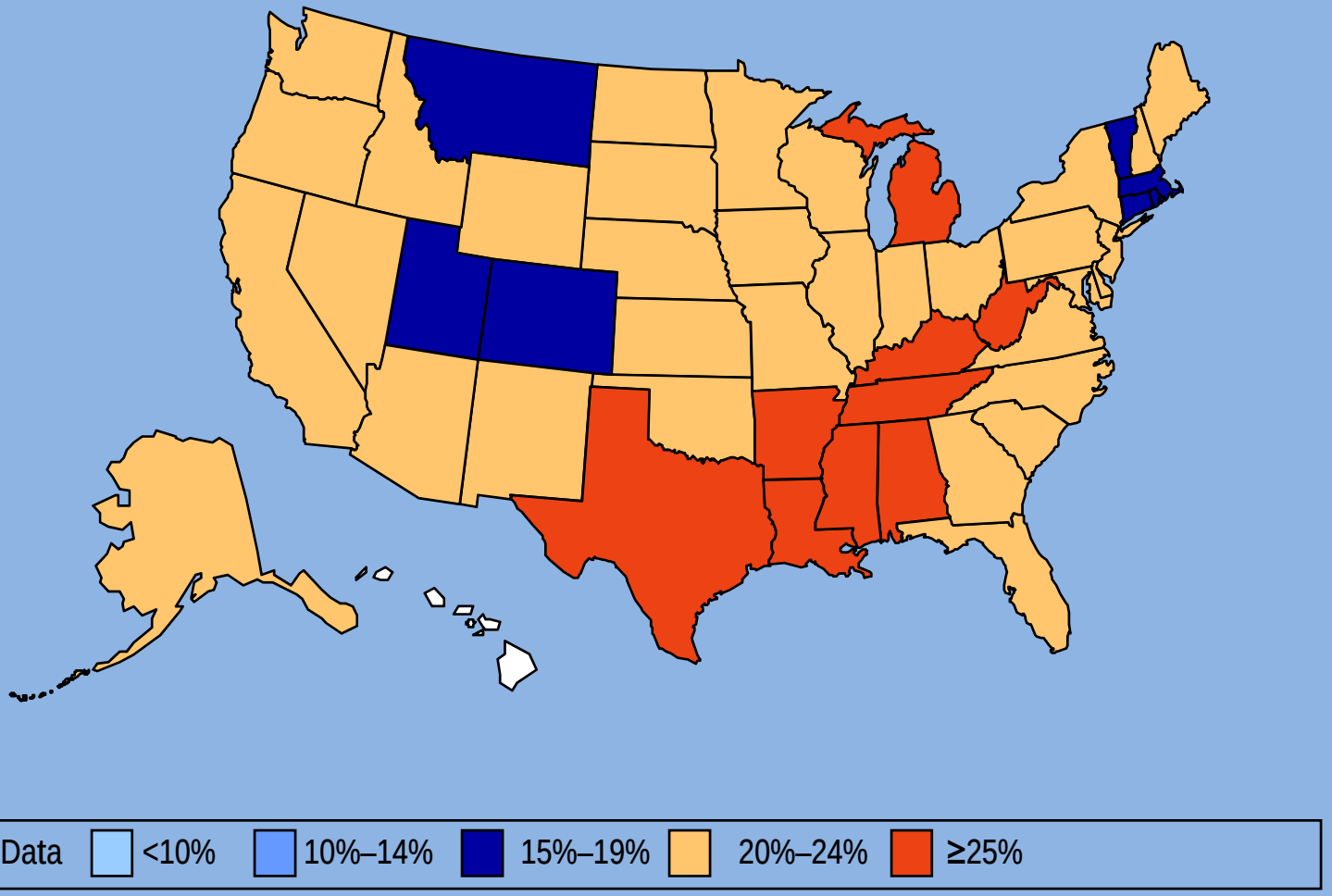


No Data | <10% | 10%–14% | 15%–19% | 20%–24% | ≥25%

Obesity Trends* Among U.S. Adults

BRFSS, 2004

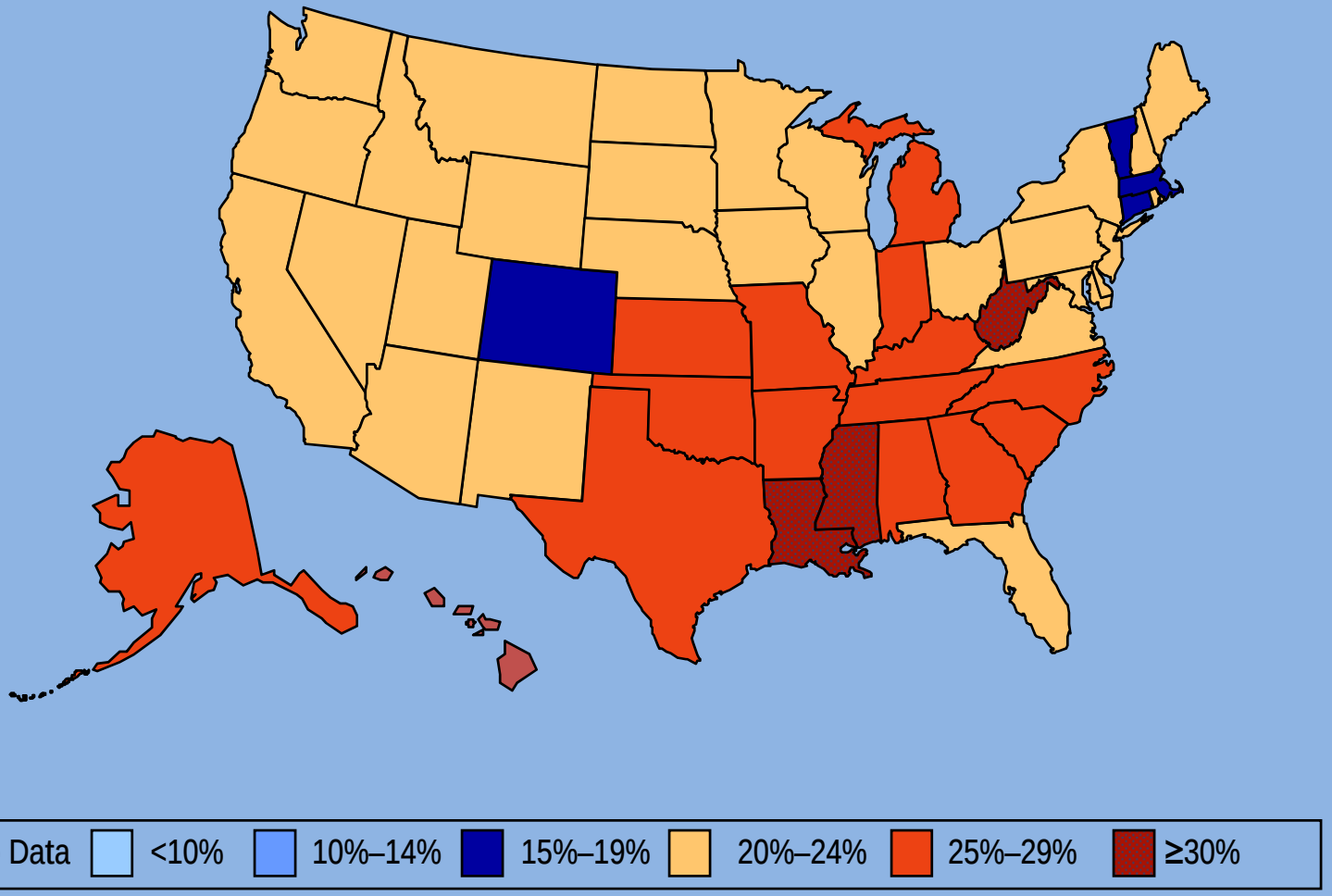
(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)



Obesity Trends* Among U.S. Adults

BRFSS, 2005

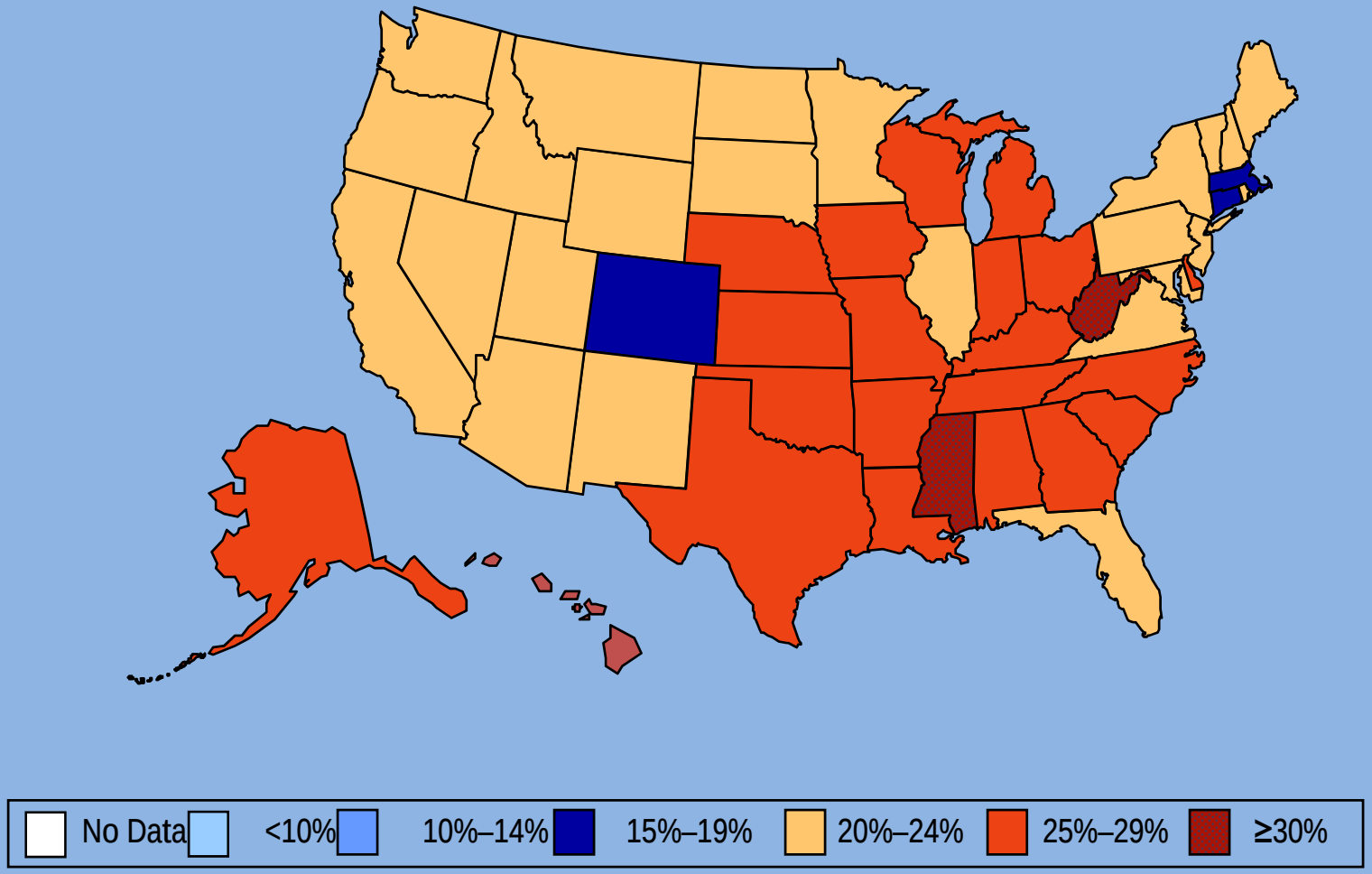
(*BMI ≥30, or ~ 30 lbs. overweight for 5' 4" person)



Obesity Trends* Among U.S. Adults

BRFSS, 2006

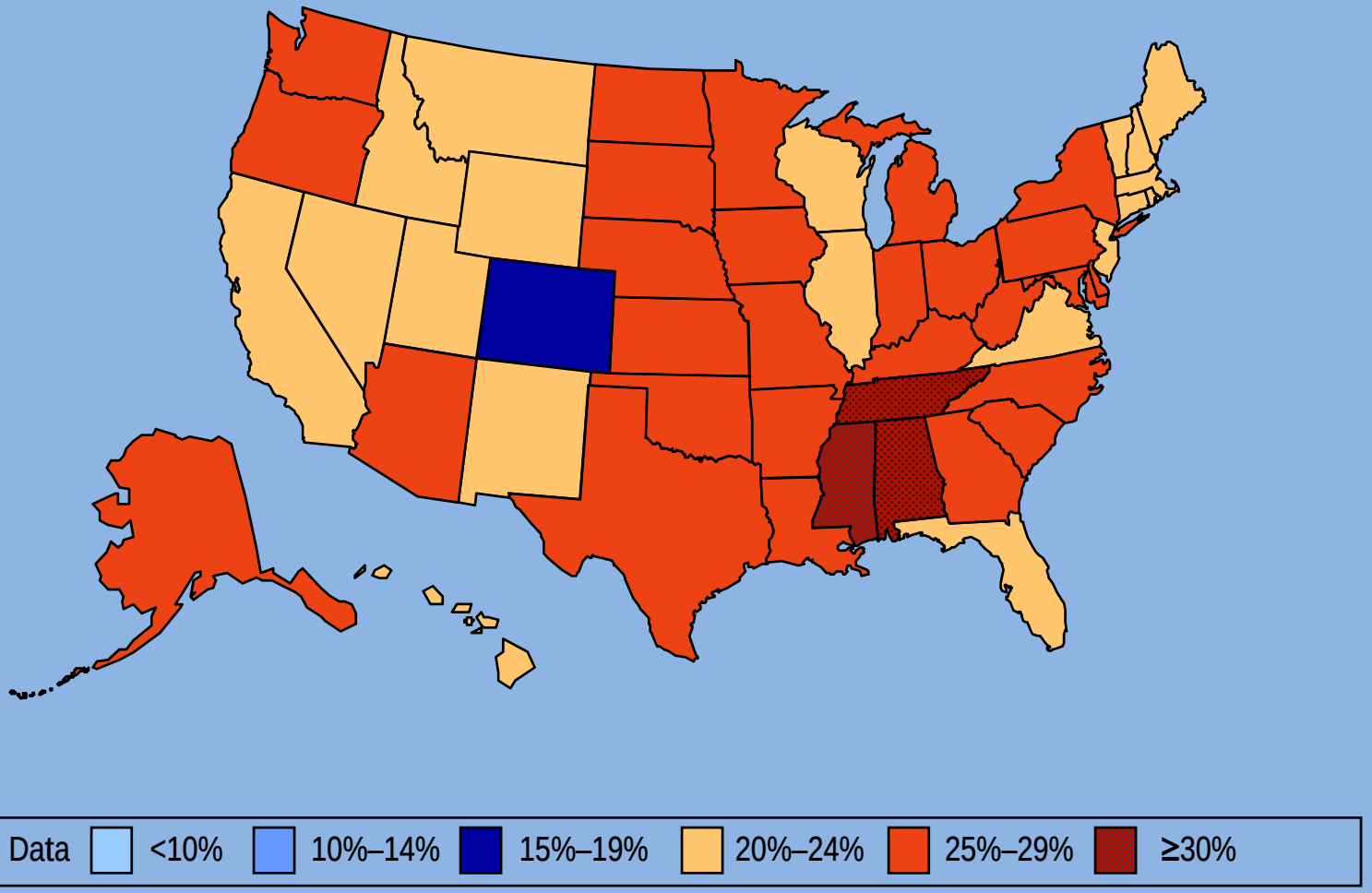
(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)



Obesity Trends* Among U.S. Adults

BRFSS, 2007

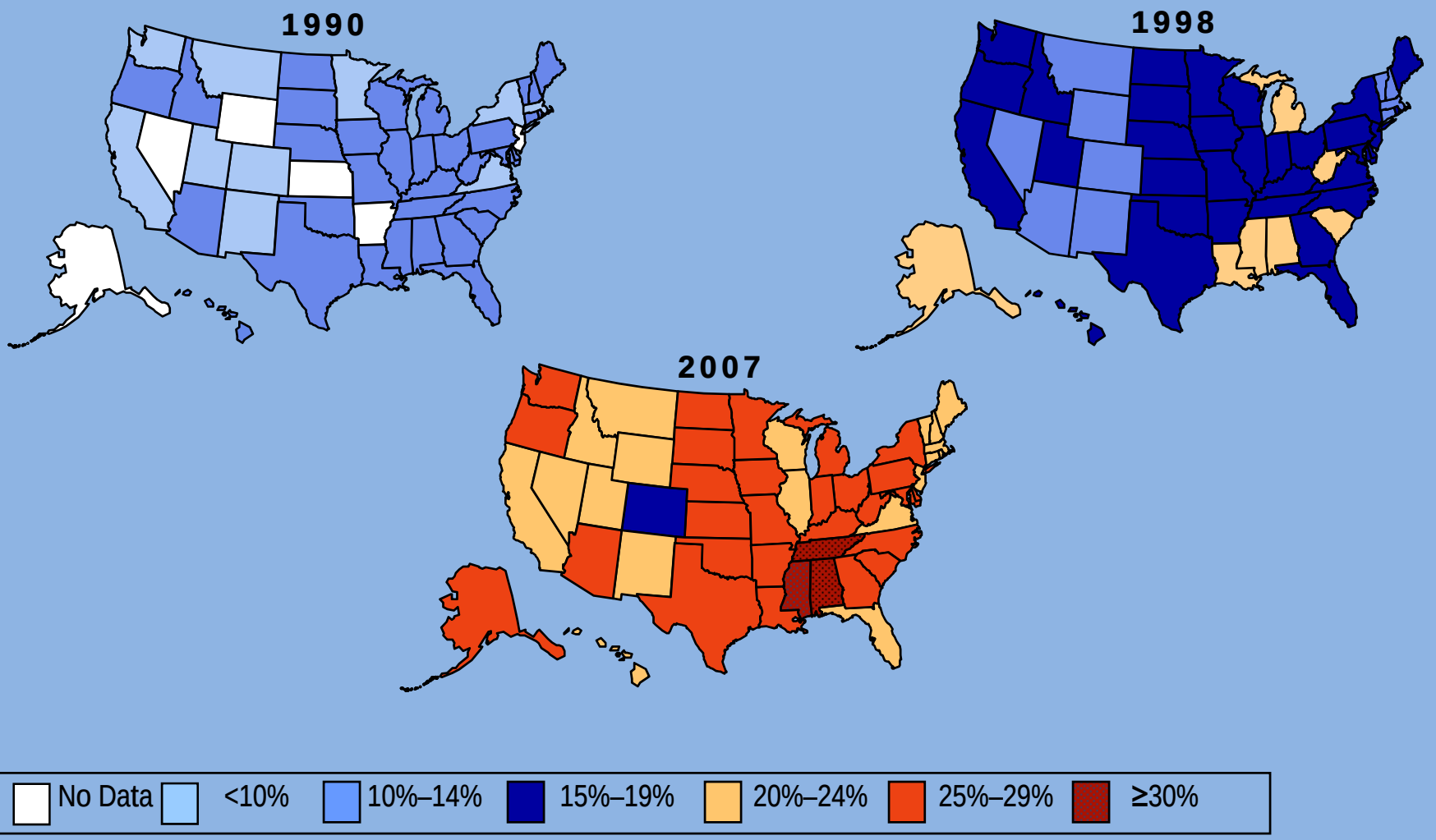
(*BMI ≥30, or ~ 30 lbs. overweight for 5' 4" person)



Obesity Trends* Among U.S. Adults

BRFSS, 1990, 1998, 2007

(*BMI ≥30, or about 30 lbs. overweight for 5’4” person)



C) RELATIVE FITNESS / STATUS

"I hate to admit it, but a man with a big carbon footprint makes me hot."

THE ORIGINS OF CONSPICUOUS CONSUMPTION

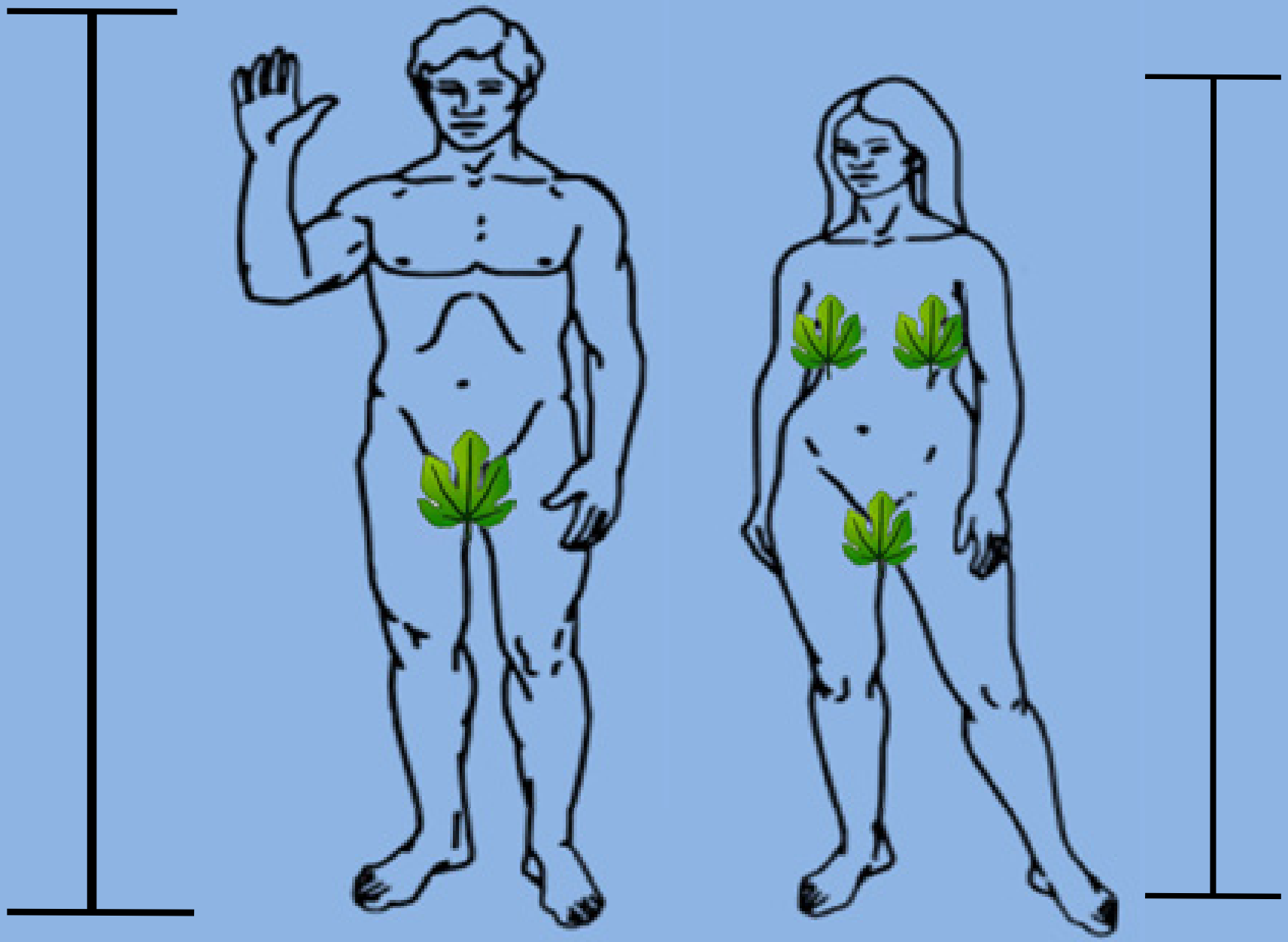
SEXUAL SELECTION

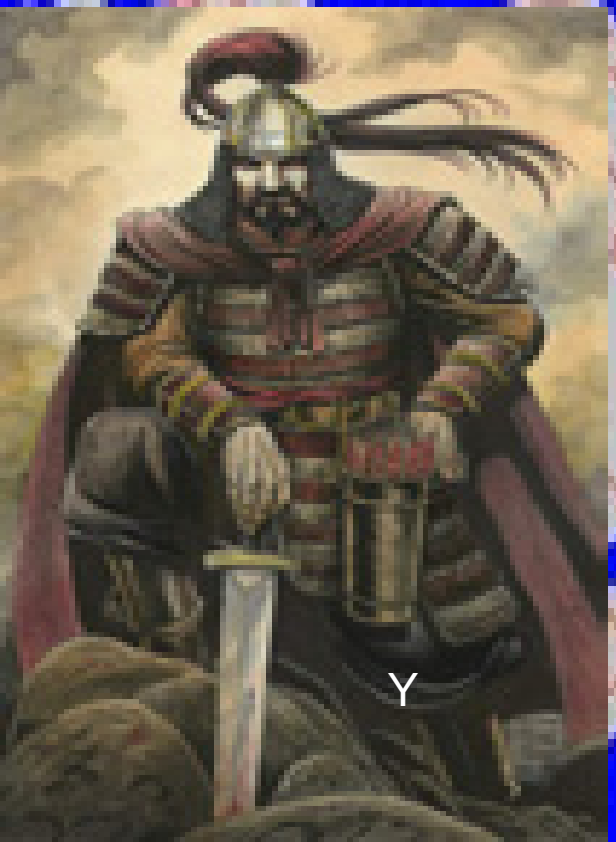
A) MALE MALE COMPETITION

B) FEMALE CHOICE

SEXUAL DIMORPHISM

Tournament?
Or Pair Bond?





Y

GHENGIS KHAN –

800,000 X more descendants than average male 1200 AD.

ADVERTISING HIJACKS OUR EVOLUTIONARY WIRING

If I buy that car, will more of my genes successfully make it to the next generation?

If I buy that car, will more of my genes successfully make it to the next generation?

NO.

It is not a conscious connection

Fitness
Maximizers

Adaptation
Executors

200,000 hominid Generations….

INSECURITY

Dude, you're president of France and your wife's smokin' hot.

Really. It's OK.

We consciously AND subconsciously seek approval and to move up our social ladder

SEXUAL SELECTION CONTINUES AS A KEY BEHAVIOURAL DRIVER

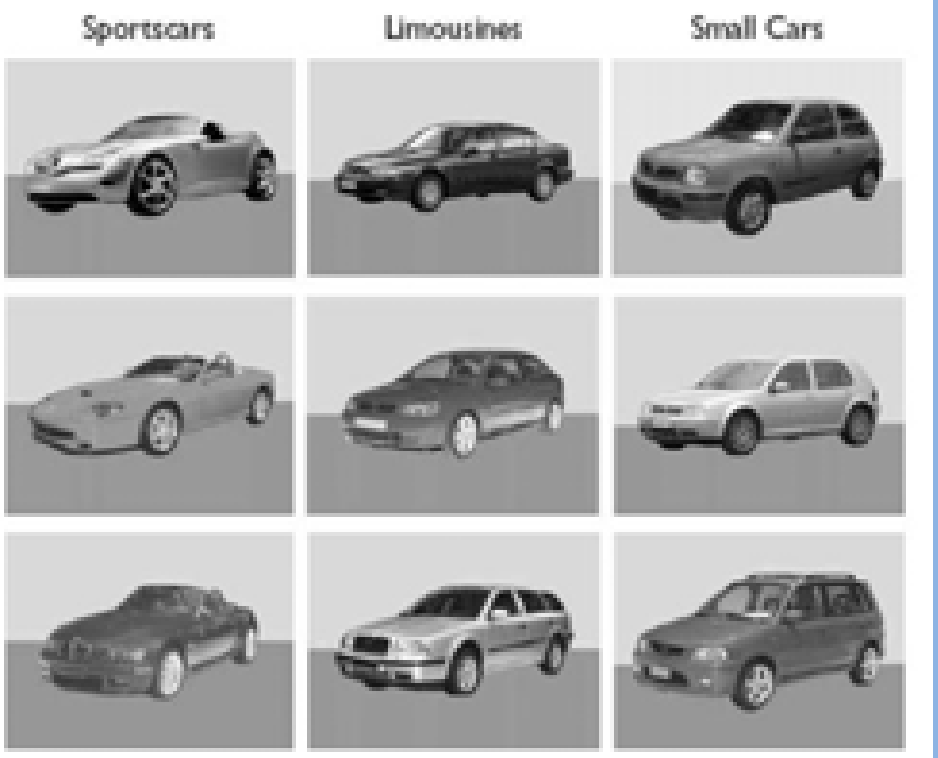
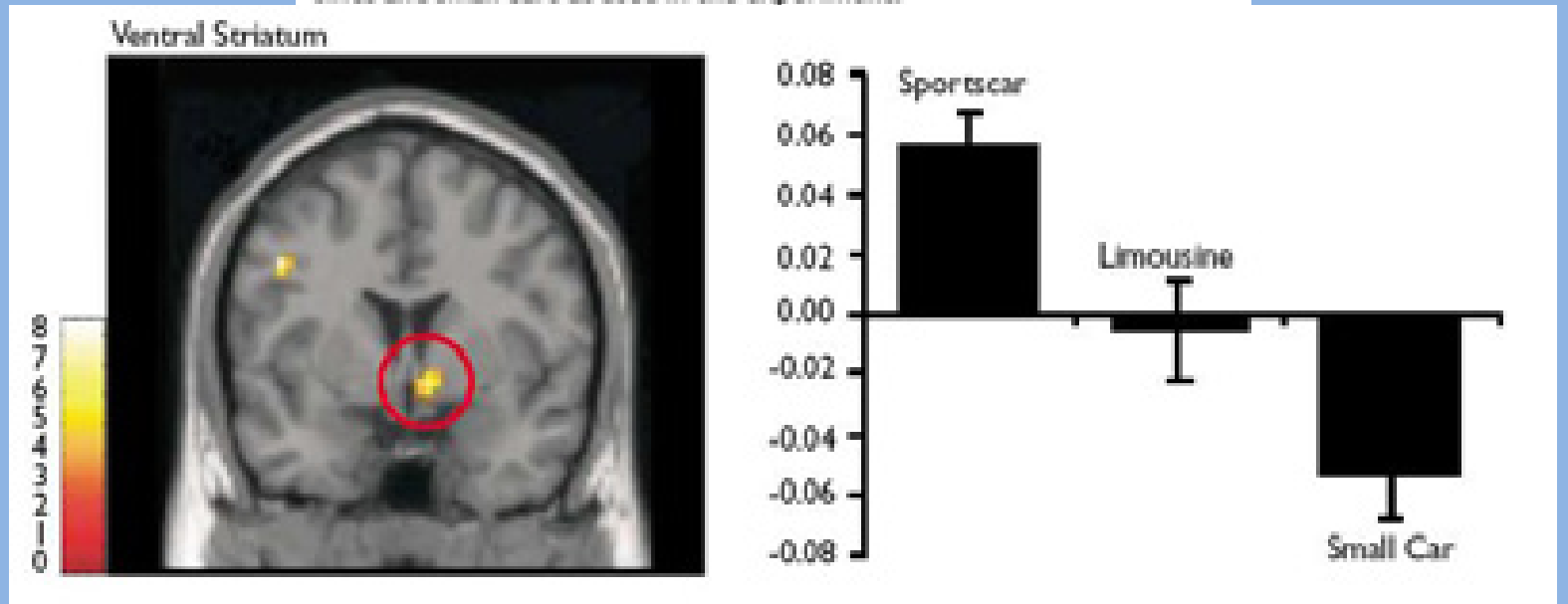
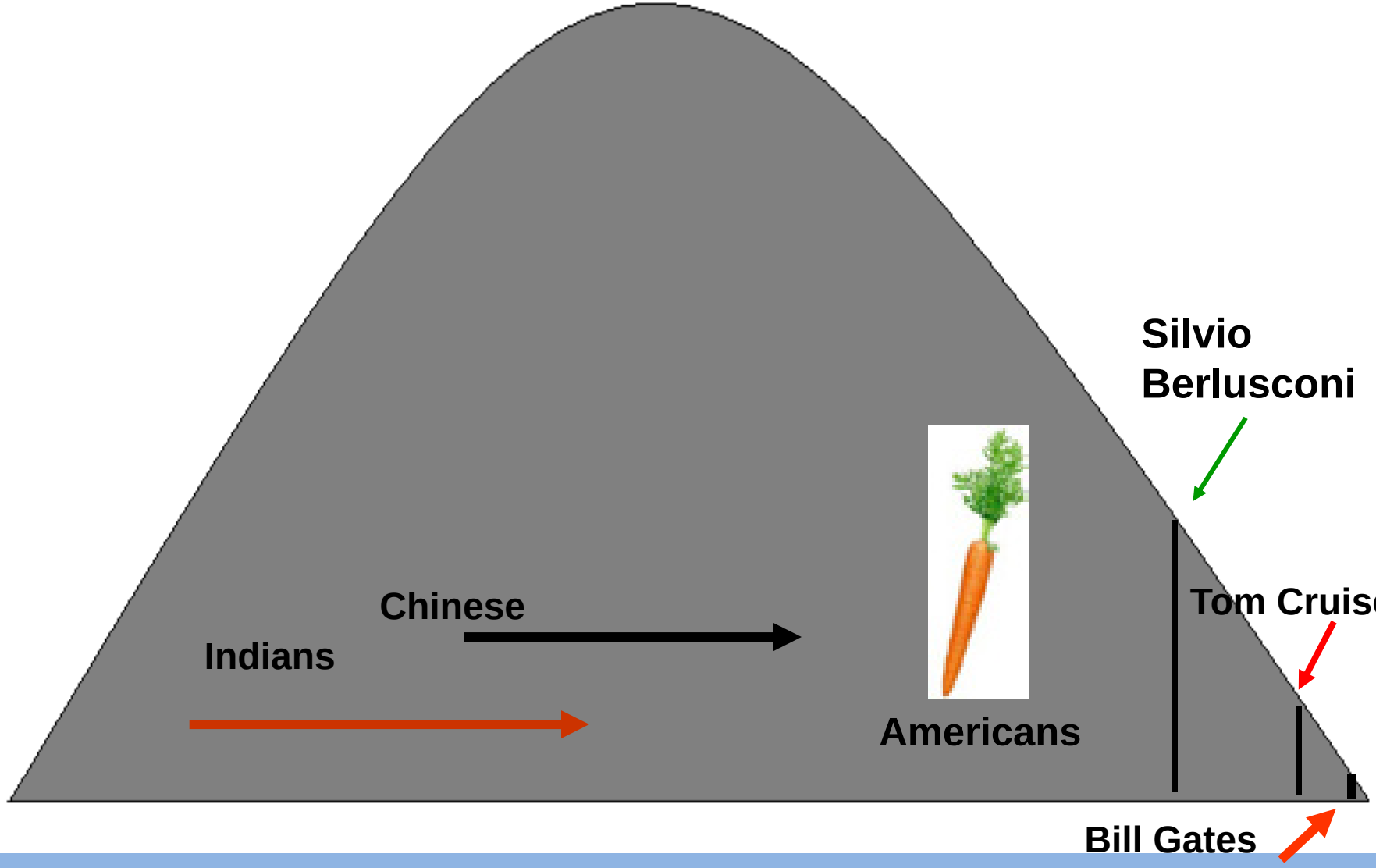


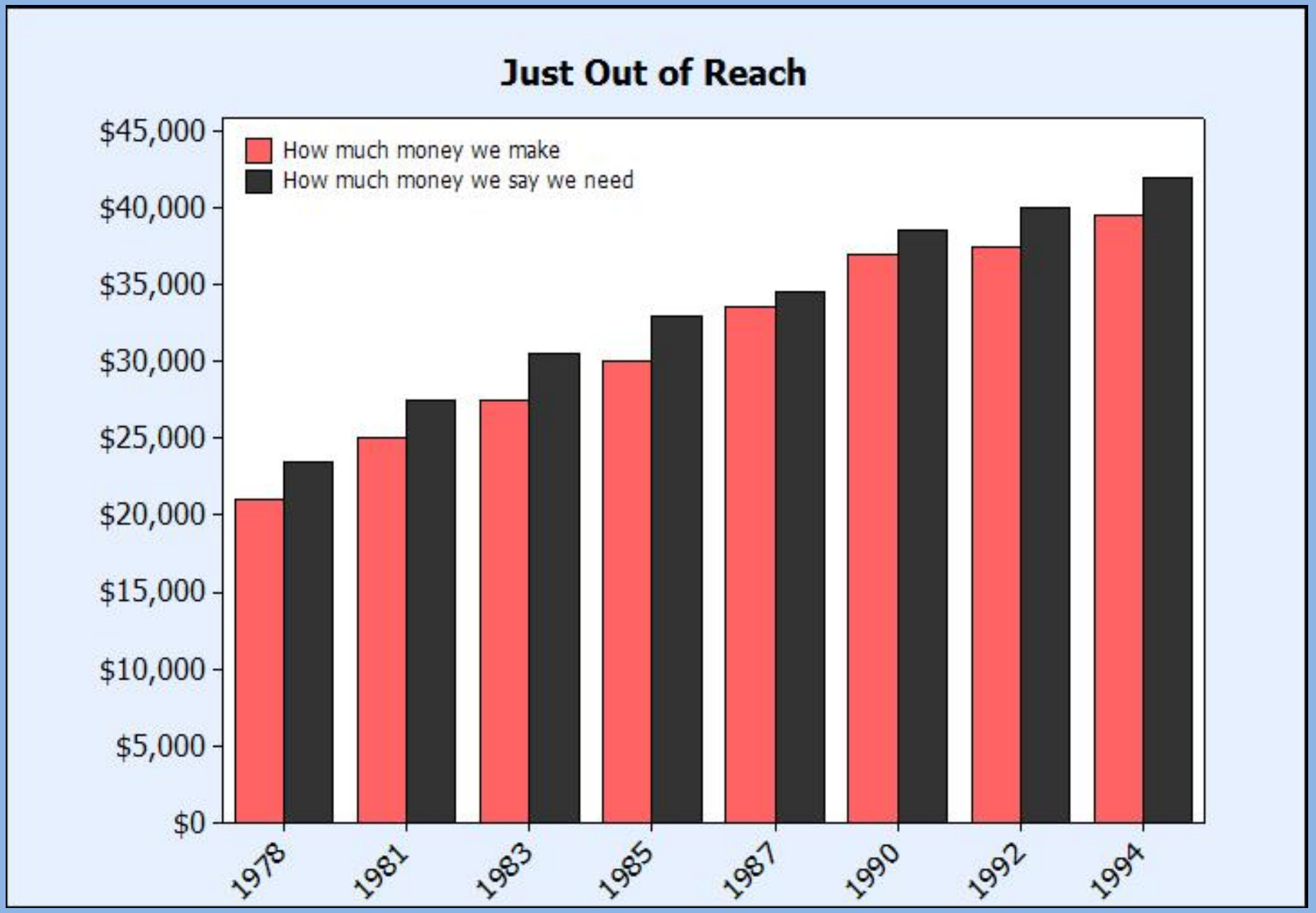
Fig. 1. Picture stimuli. Example of photographs of sports cars, limousines and small cars as used in the experiment.



THE ASPIRATION GAP

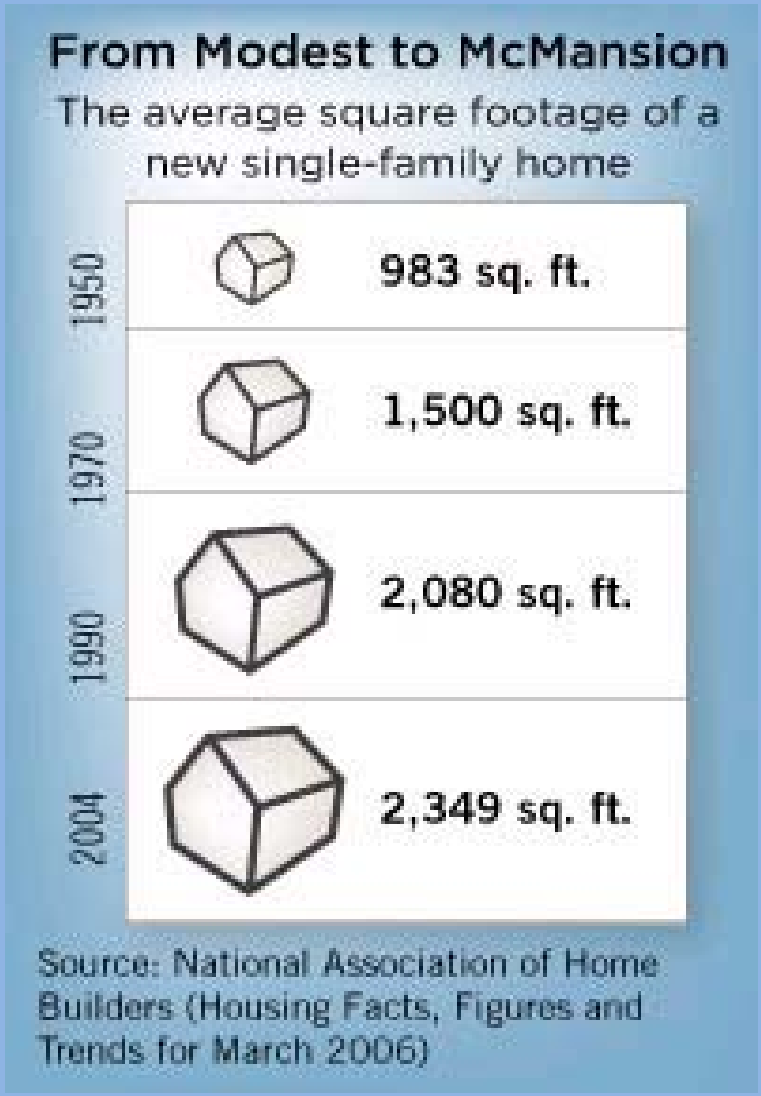
THE ASPIRATION GAP





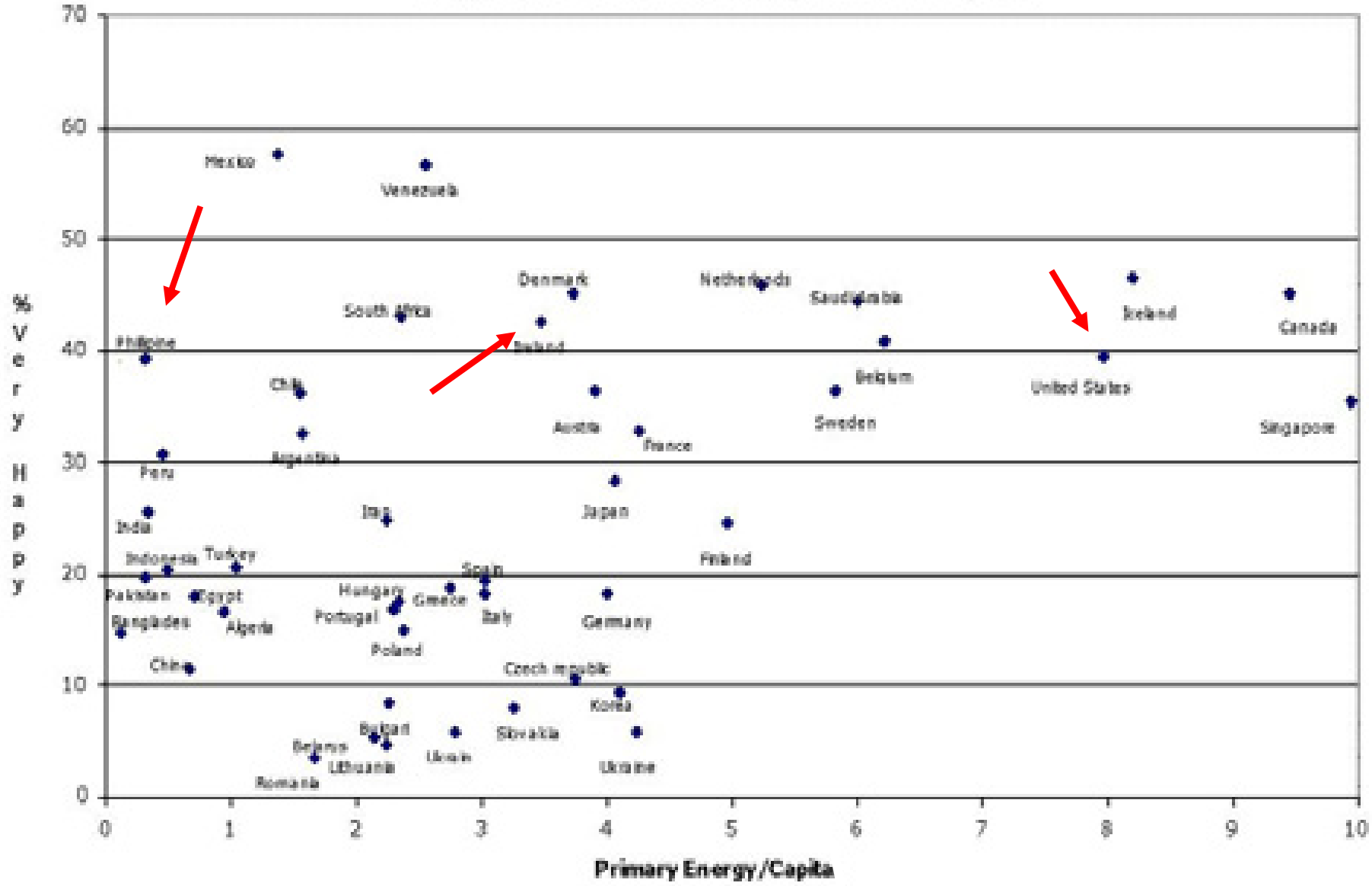
Source: Juliet Schor, The Overspent American: Upscaling, Downshifting, and the New Consumer

IS BIGGER BETTER?

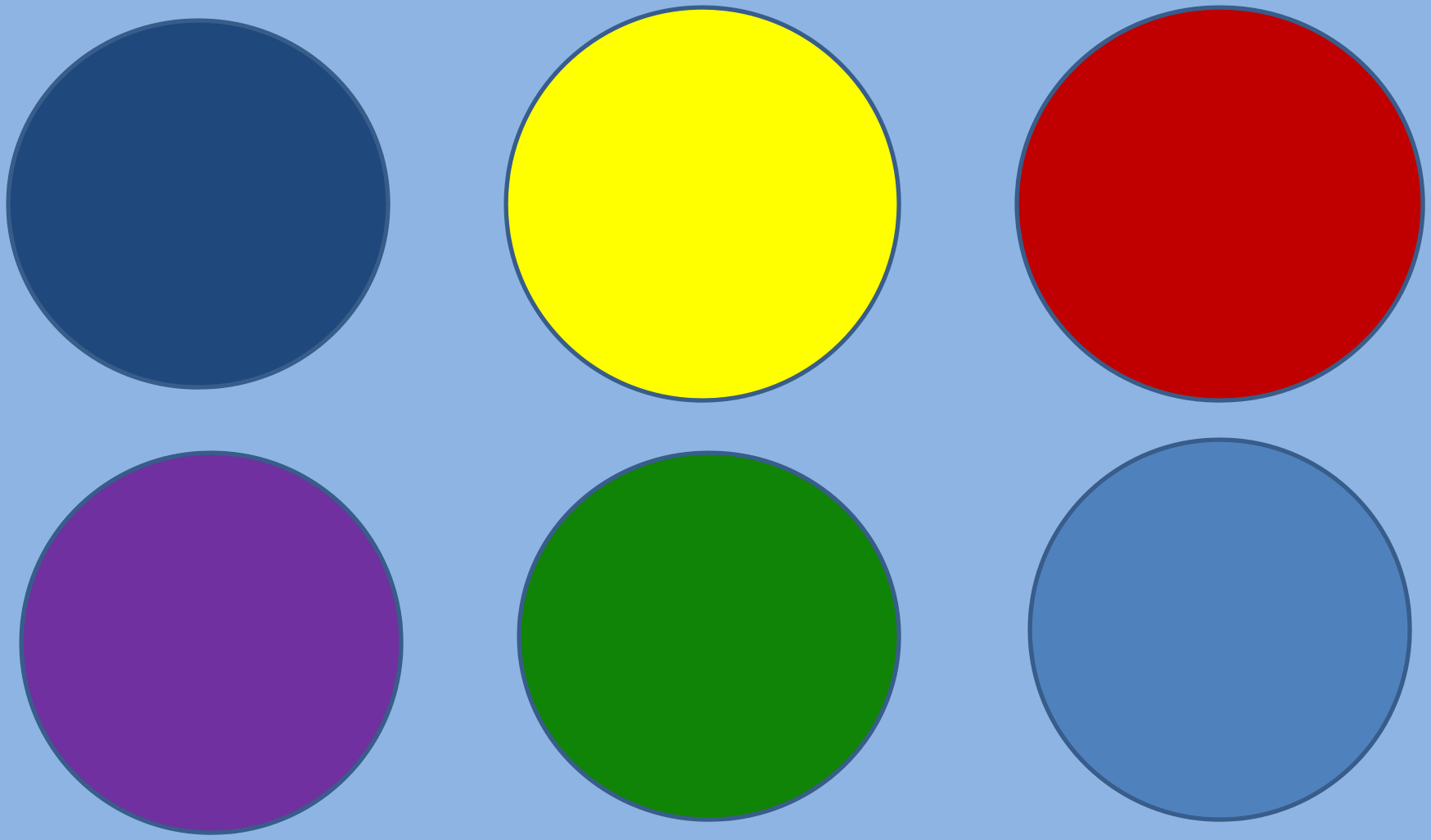


- Would you prefer a 4,000 sq ft house in a neighborhood of 6,000 sq ft houses?
- Or would you prefer a 3,000 sq ft house in a neighborhood of 2,000 sq ft houses?
- (Prof Robert Frank)

Energy/Capita vs. % Very Happy – (worldvaluesurvey.org)

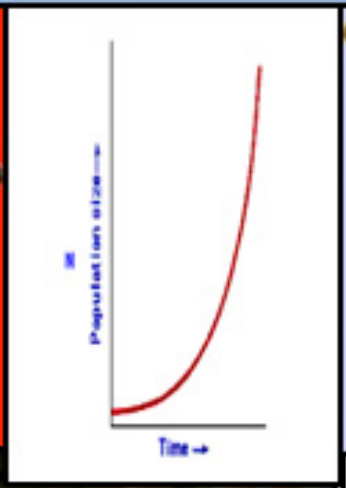


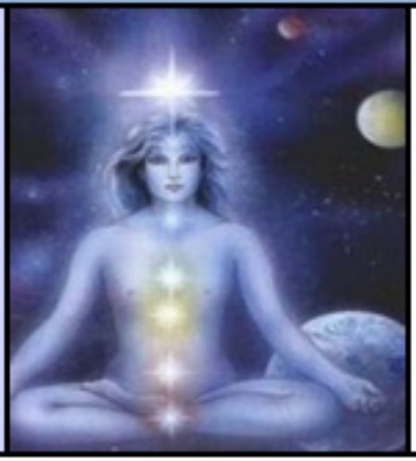
CONTROL/FREEDOM

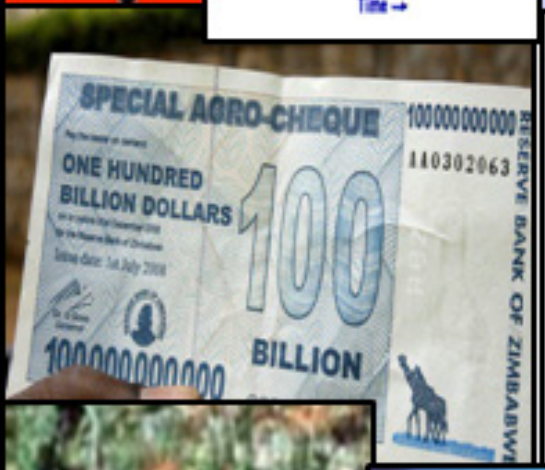


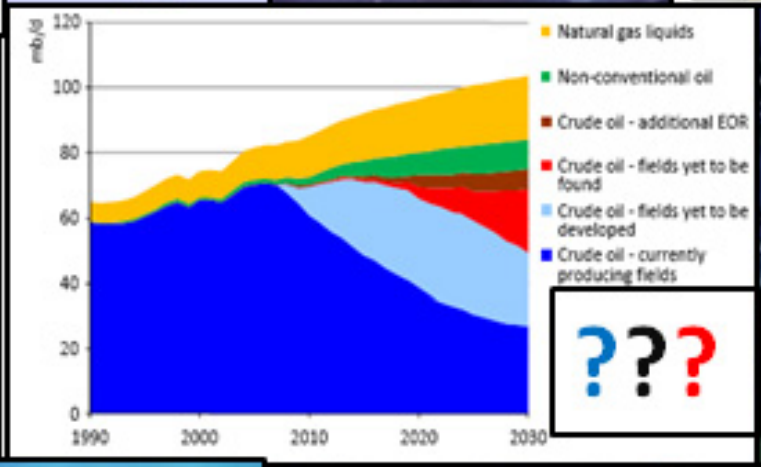
(Choice/volition reduces amount of stress hormone cortisol, etc.)

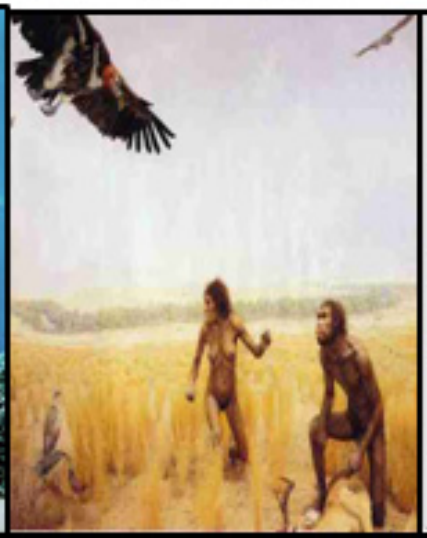
(Finally), Belief Systems



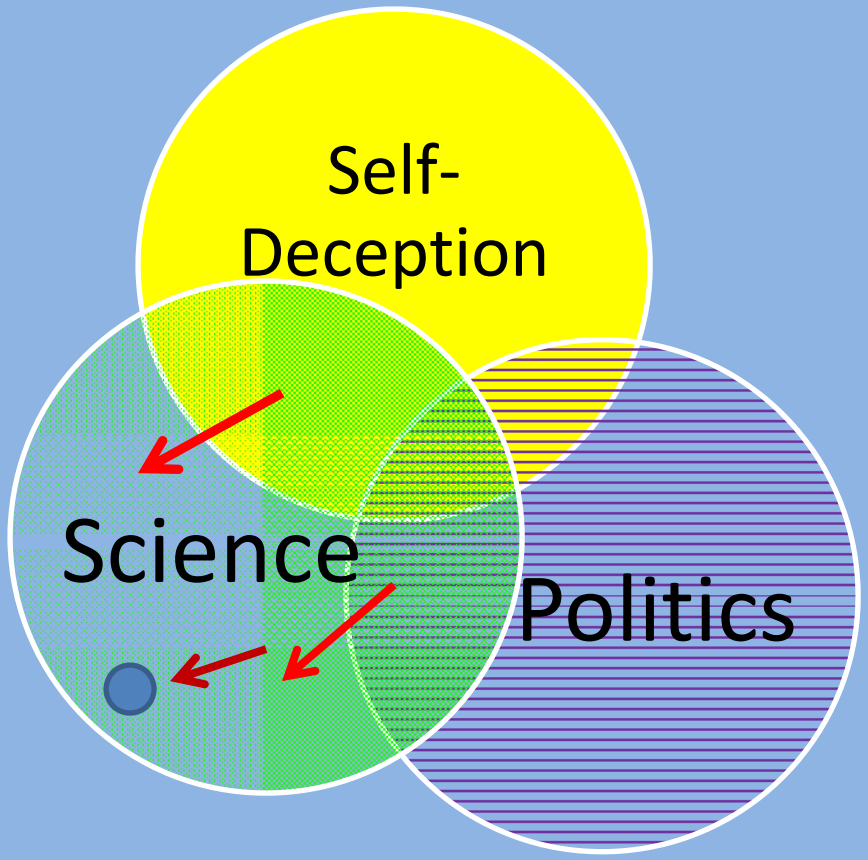








- Placebo effect
- Recency effect
- Availability cascade
- Authority figures
- Self-deception
- Etc.


Self-
Deception
Science
Politics

DEMAND SUMMARY

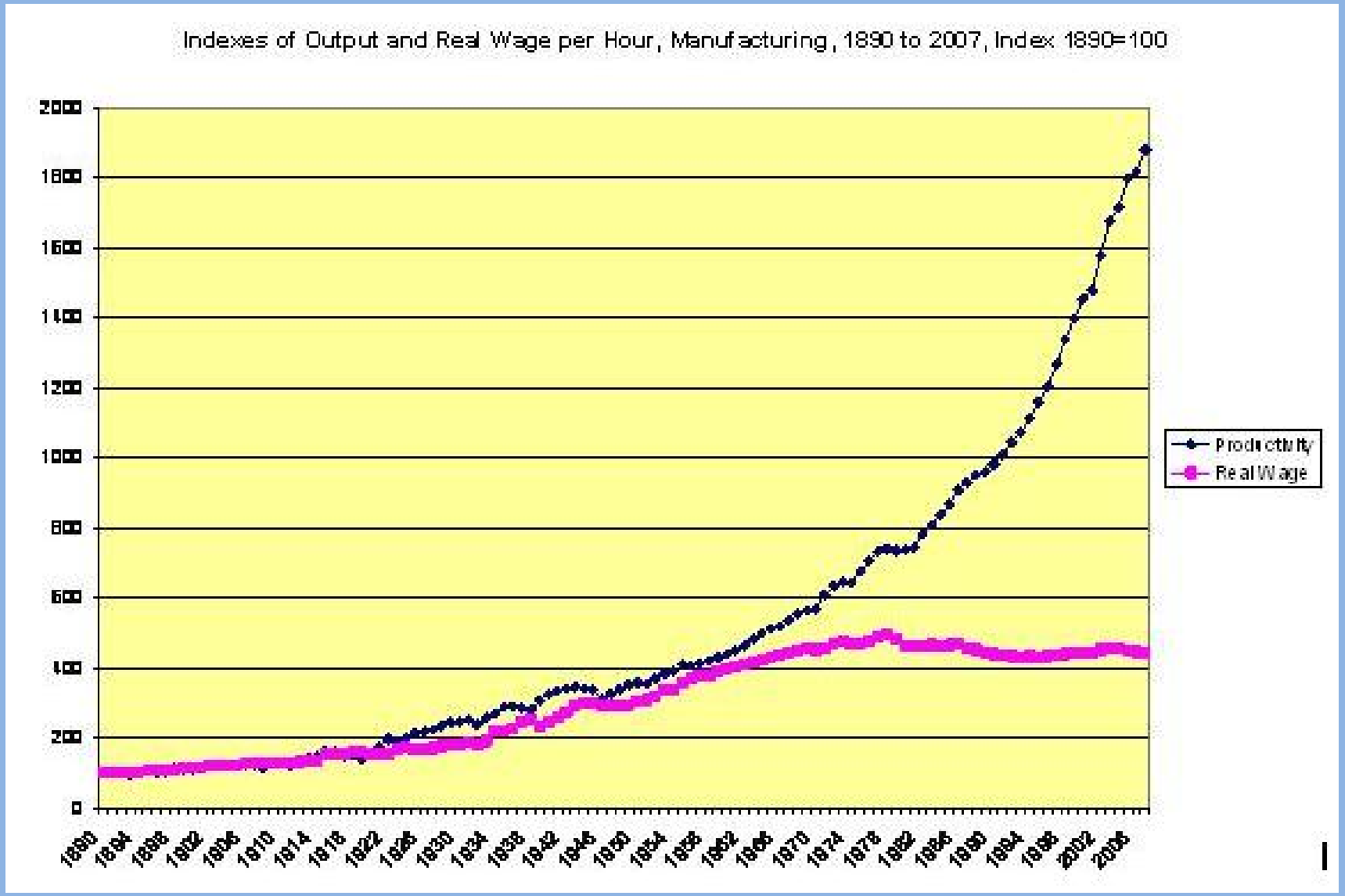
- **Our behaviors, some innate and some learned, are intrinsically based on pursuit of those brain chemicals that historically met with success…**
- **We are conditioned, via our ancestors and through culture to steeply value the present over the future**
- **Our evolutionary brain scaffolding gets hijacked by *novelty* items that are plentiful in the oil age**
- **We compete for status and resources based on environmental cues on what moves us up mating ladder (relative fitness)**

SYNTHESIS

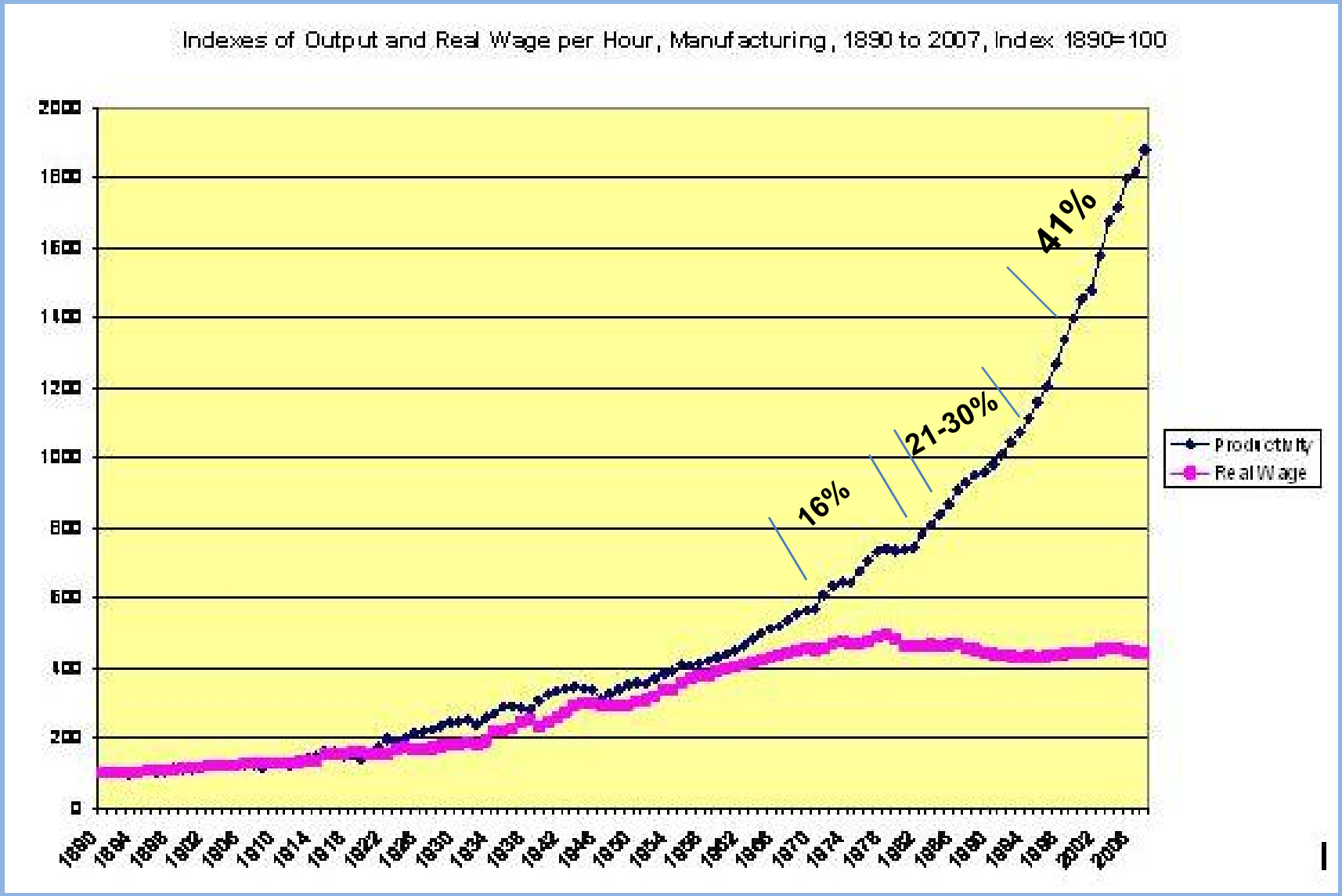
INGREDIENTS: Supply, Demand, Behavior, Diet, Equity, Economics….

Financial Capital Is Just A MARKER

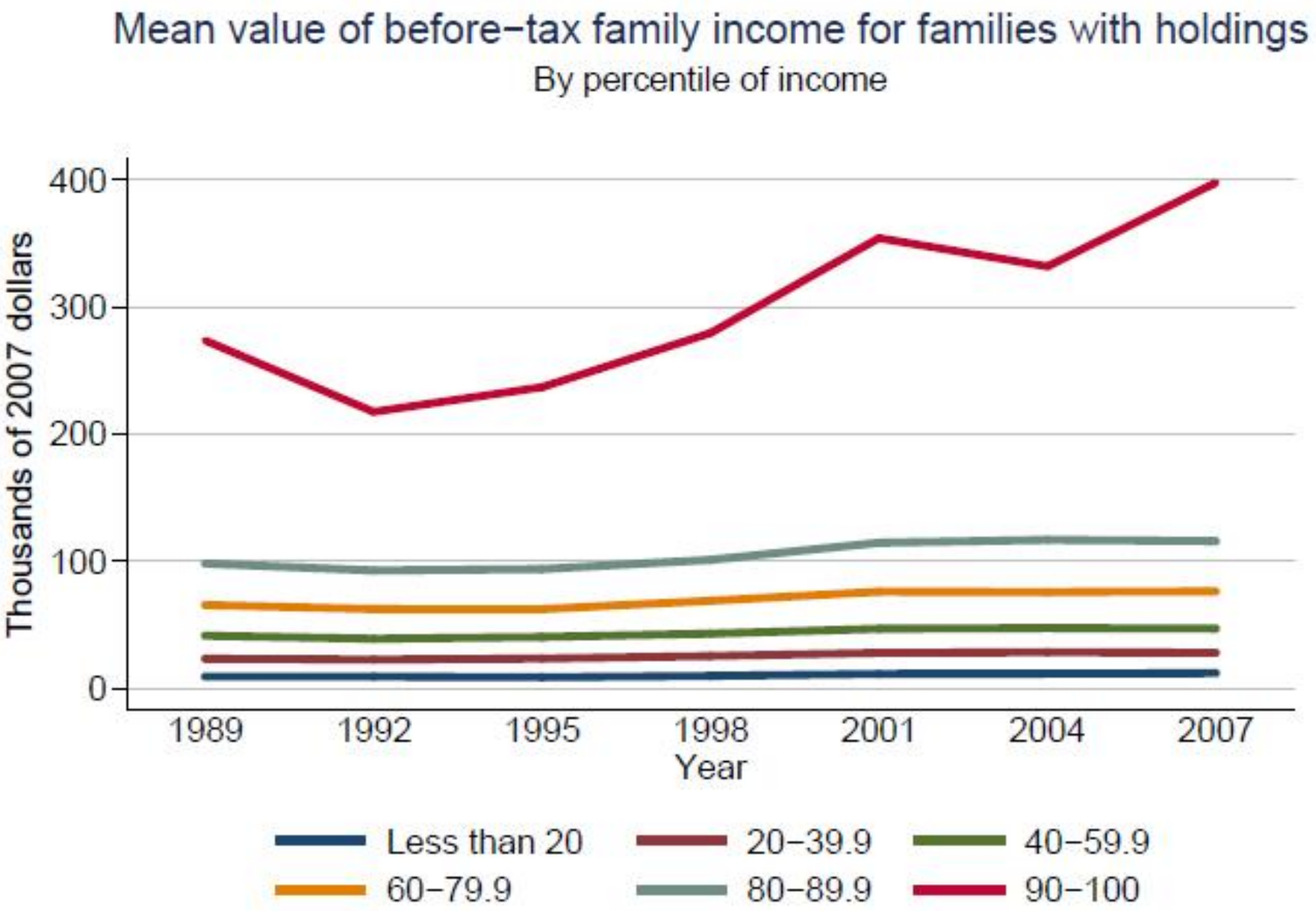
Real wages stagnant for 35 years after rising for 150 years…



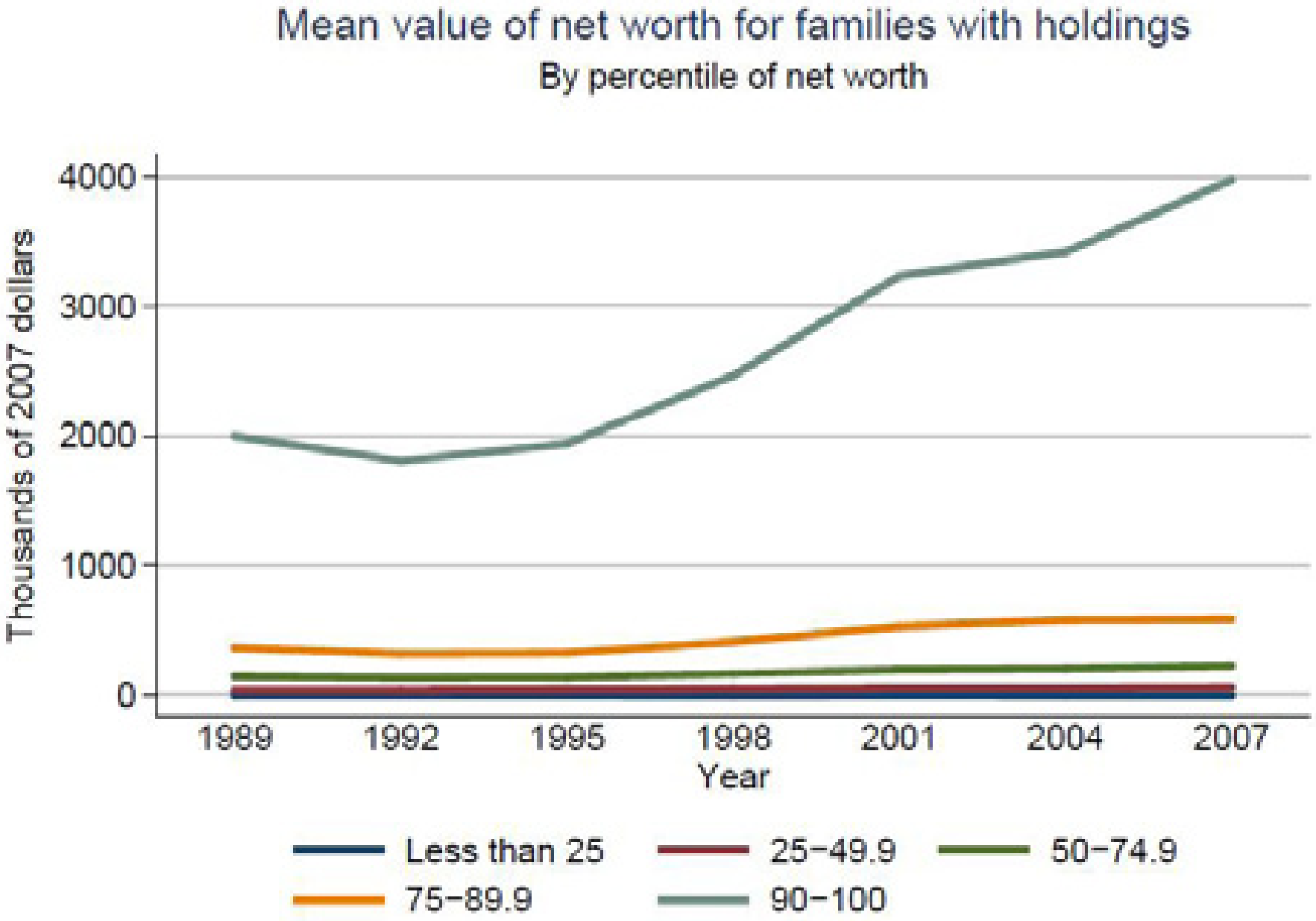
Financial sector ‘profits’ have increasing share of total profits



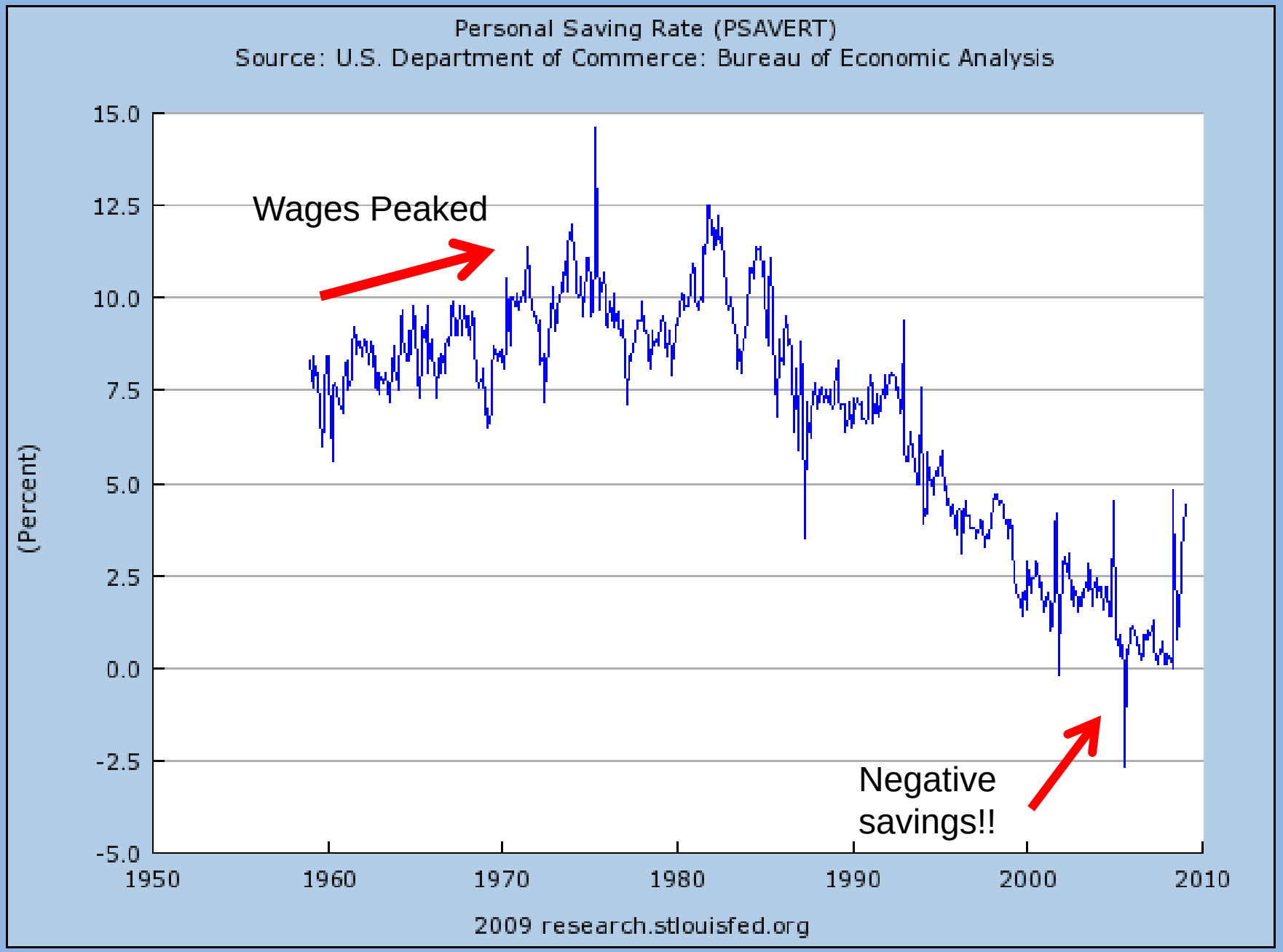
Source Richard Wolfe – Umass
David Brooks, NYTimes 4/2009



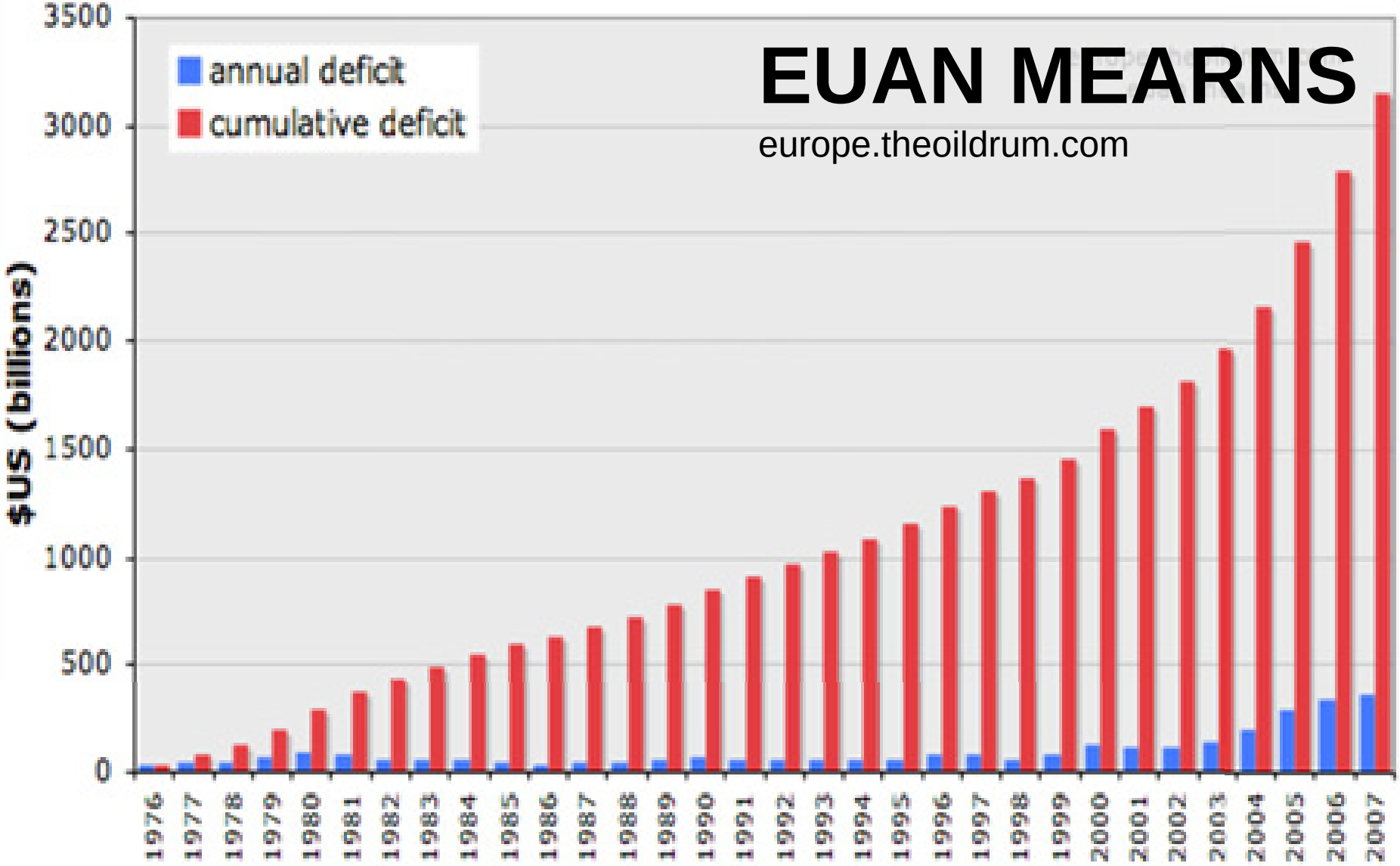
Source: Federal Reserve Standards Board



Source: Federal Reserve Standards Board


Personal Saving Rate (PSAVERT)
Source: U.S. Department of Commerce: Bureau of Economic Analysis
Wages Peaked
Negative savings!!
(Percent)
15.0
12.5
10.0
7.5
5.0
2.5
0.0
-2.5
-5.0
1950
1960
1970
1980
1990
2000
2010
2009 research.stlouisfed.org

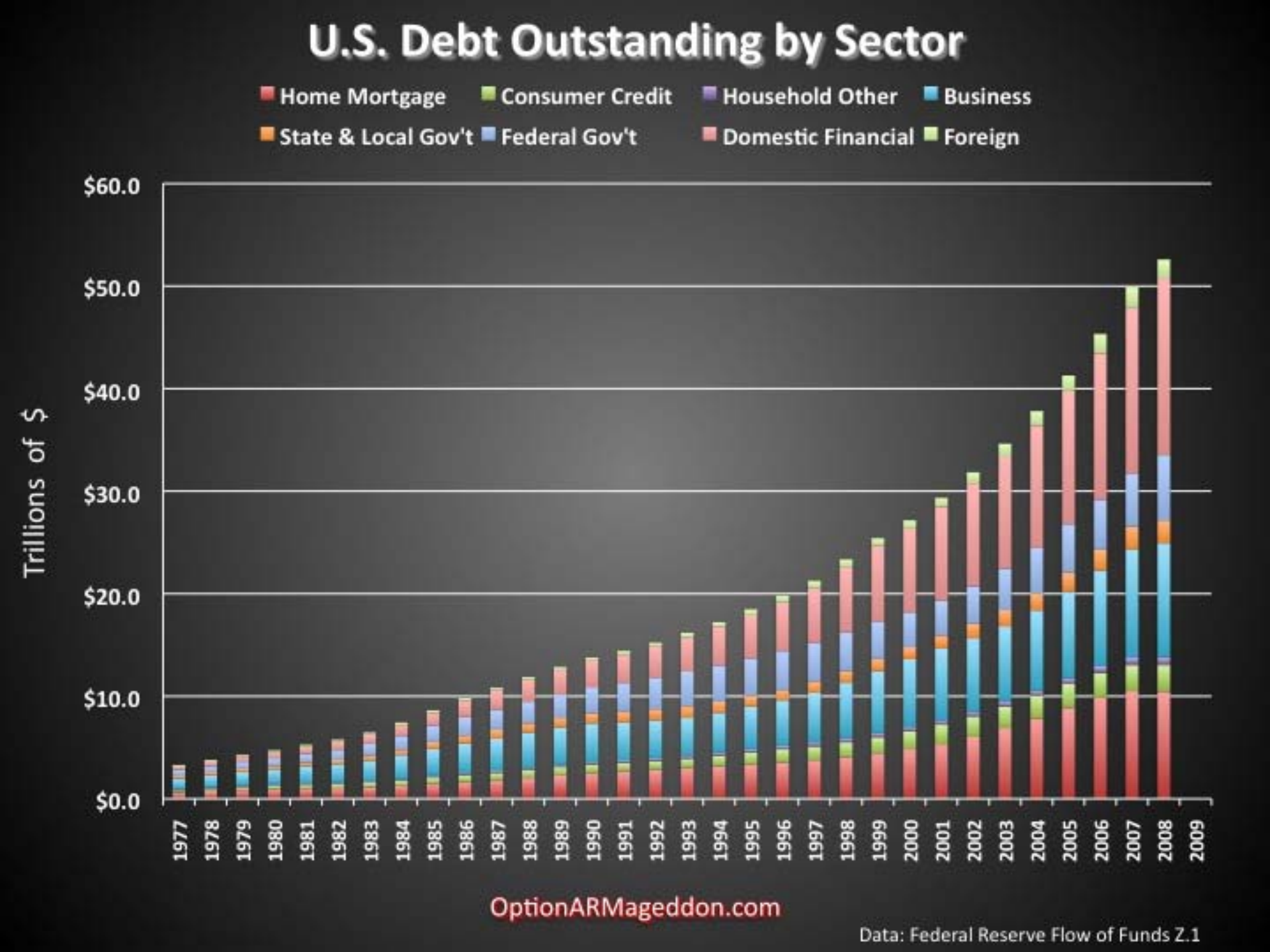
USA crude oil import costs



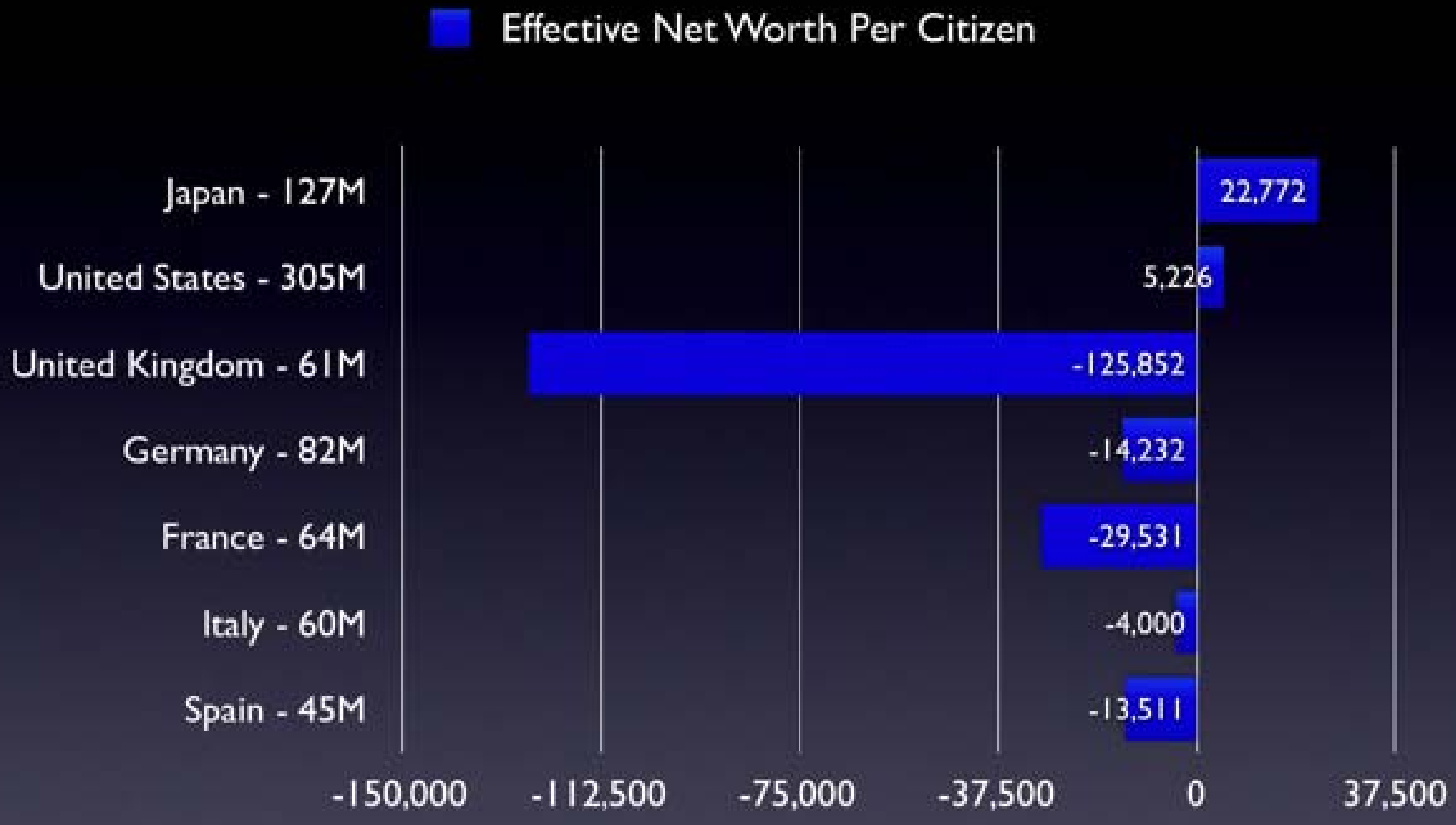
EUAN MEARNS

europe.theoildrum.com

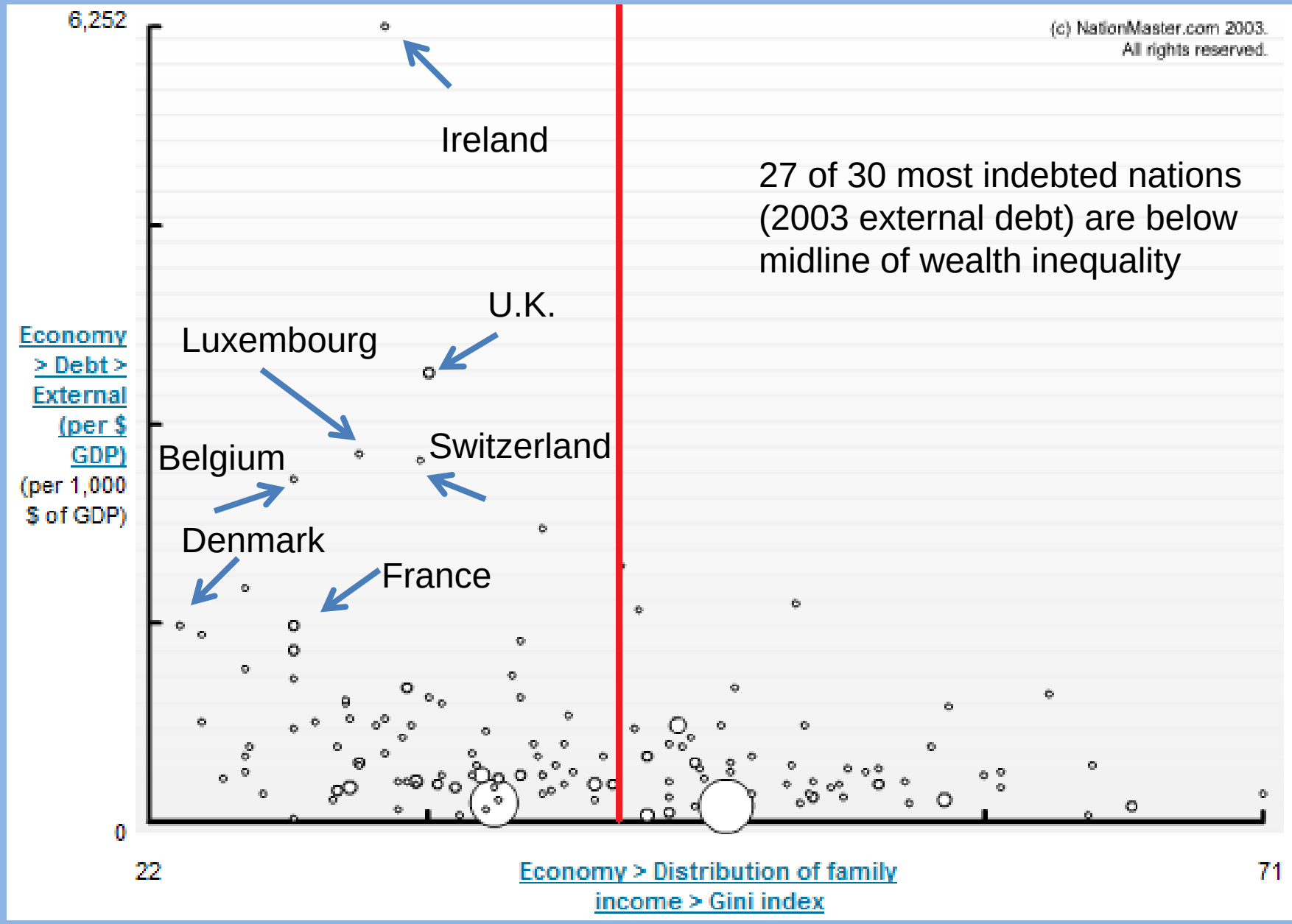
U.S. Debt Outstanding by Sector



Data: Federal Reserve Flow of Funds Z.1



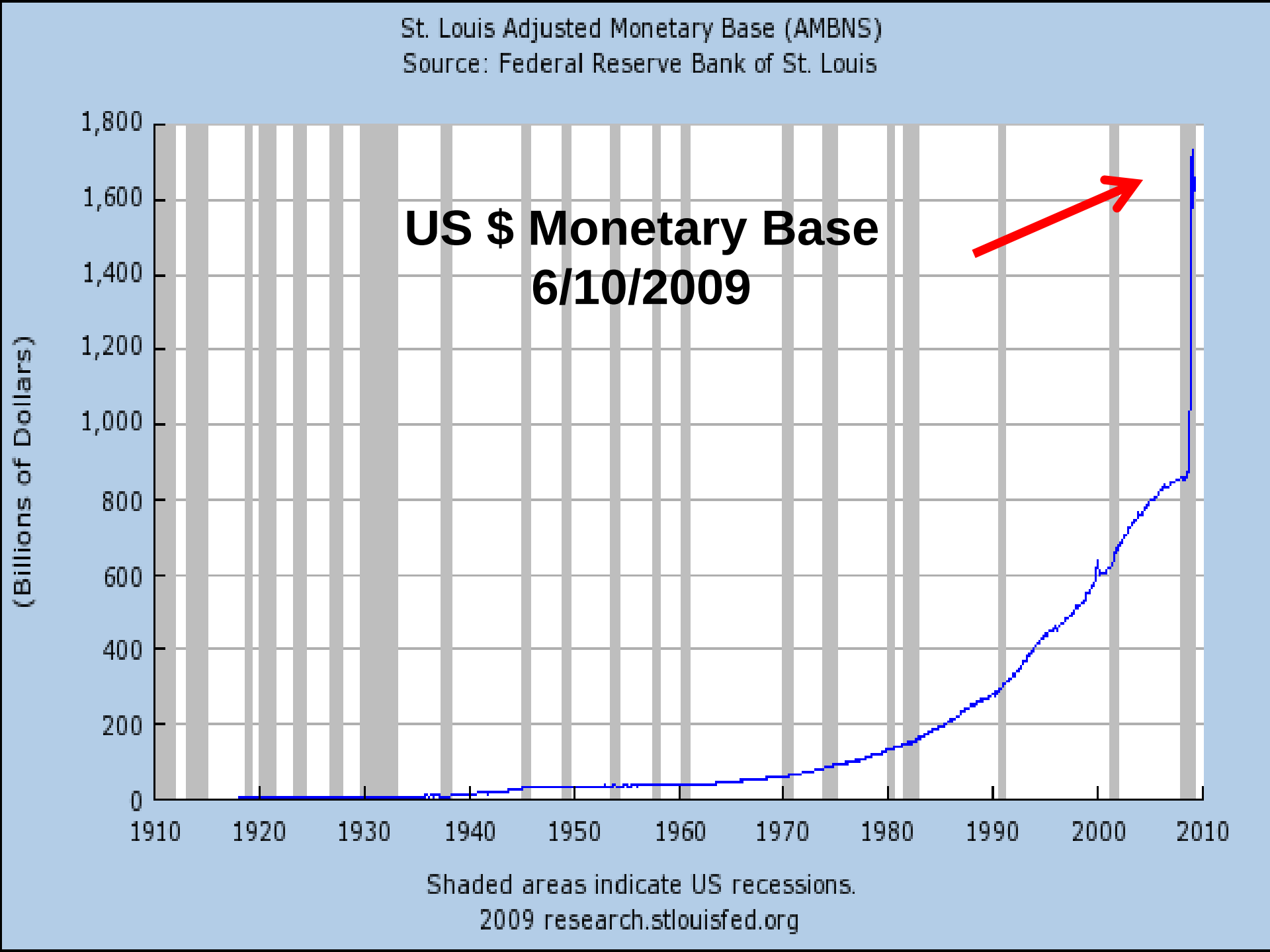
Source: 2007 International Monetary Fund


6,252
(c) NationMaster.com 2003.
All rights reserved.
Ireland
27 of 30 most indebted nations (2003 external debt) are below midline of wealth inequality
U.K.
Luxembourg
Switzerland
Belgium
Denmark
France
Economy > Debt > External (per $ GDP) (per 1,000 $ of GDP)
0
22
Economy > Distribution of family income > Gini index
71

Owner's Equity, % of Household Real Estate

OptionARMageddon.com

Data: Federal Reserve Flow of Funds Z.1

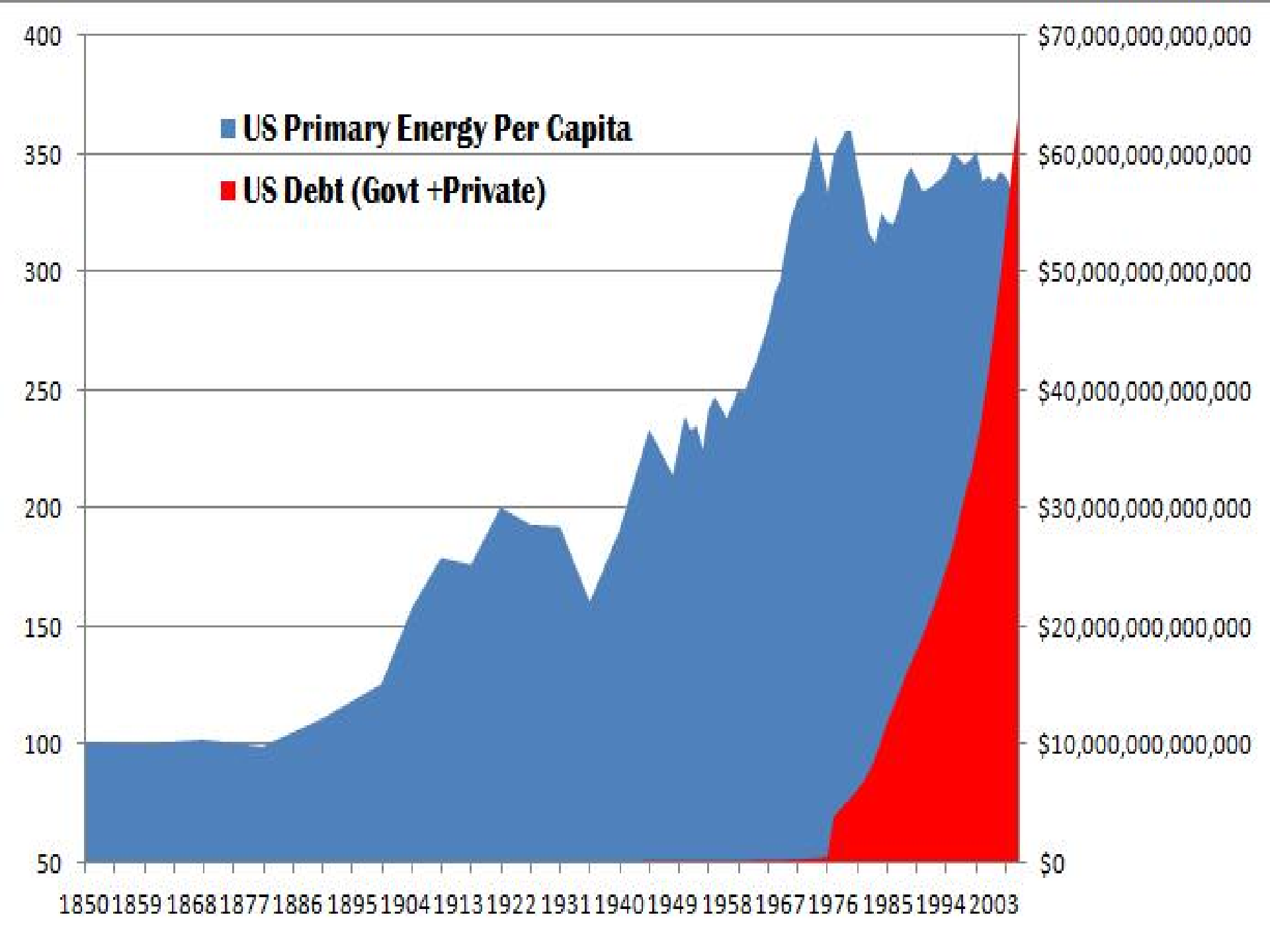

St. Louis Adjusted Monetary Base (AMBNS)
Source: Federal Reserve Bank of St. Louis
US $ Monetary Base
6/10/2009
(Billions of Dollars)
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010
Shaded areas indicate US recessions.
2009 research.stlouisfed.org

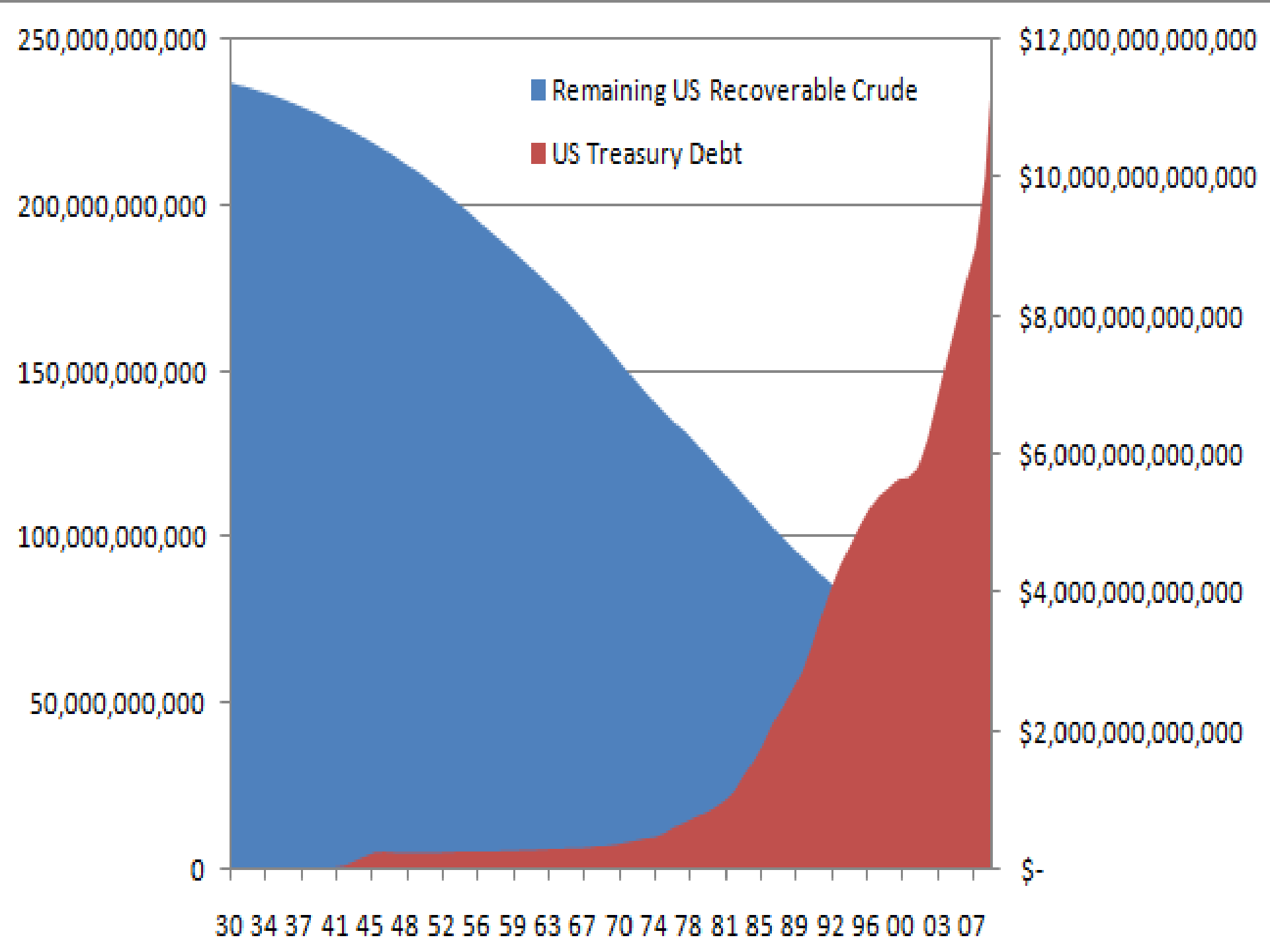
The Great Credit Contraction

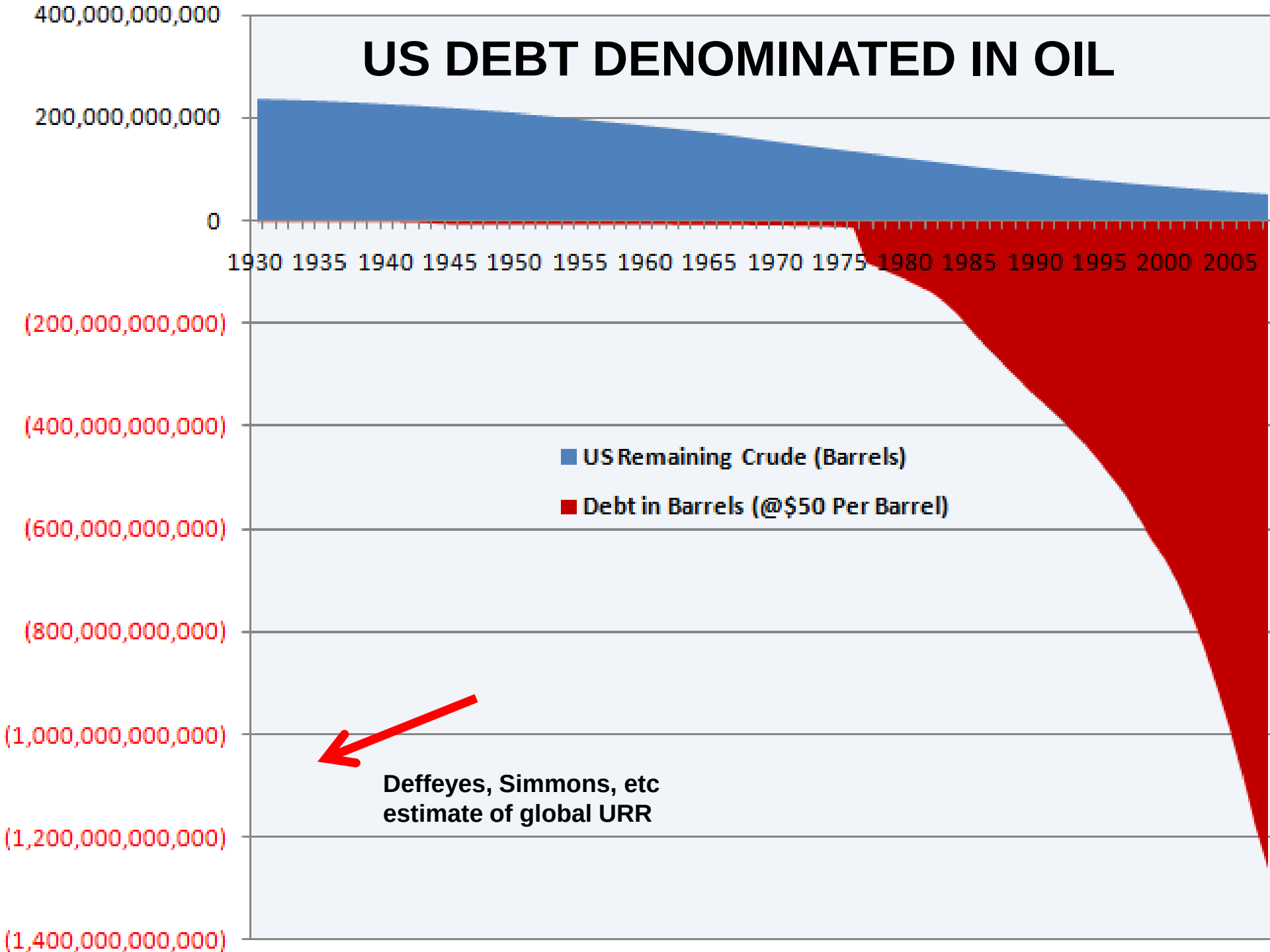
"The system does not collapse but evaporate."
Trace Mayer, J.D.

DERIVATIVES:	**$1,600T**
Shadow Derivatives	*$800T*
Reported Derivatives	*$683T*
Unfunded Gov't Liabilities	*$250T*
MISCELLANEOUS ASSETS:	**$125T**
Private Business	*$10T*
Commercial Real Estate	*$30T*
Residential Real Estate	*$80T*
Non-Monetary Commodities	*$4T*
SECURITIZED DEBT/STOCKS:	**$100T**
Corporate & MUNI Bonds	*$25T*
World Listed Stocks	*$51T*
U.S. Listed Stocks	*$15T*
BROAD CURRENCY ILLUSIONS:	**$65T**
World Treasury Bills/Govt Bonds	*$15.5T*
U.S. Debt/Treasury Bills	*$11T*
POWER CURRENCY ILLUSIONS:	**$4T**
Physical Notes (£, €, ¥, C$, A$, etc.)	*$2T*
FRN$ (physical paper notes)	*$800B*
POWER MONEY:	**150,000 tons**
Gold and Silver	*$2-4T*
WORLD GDP:	**$55T**

Exter's pyramid updated and adapted. All amounts estimated approximations.

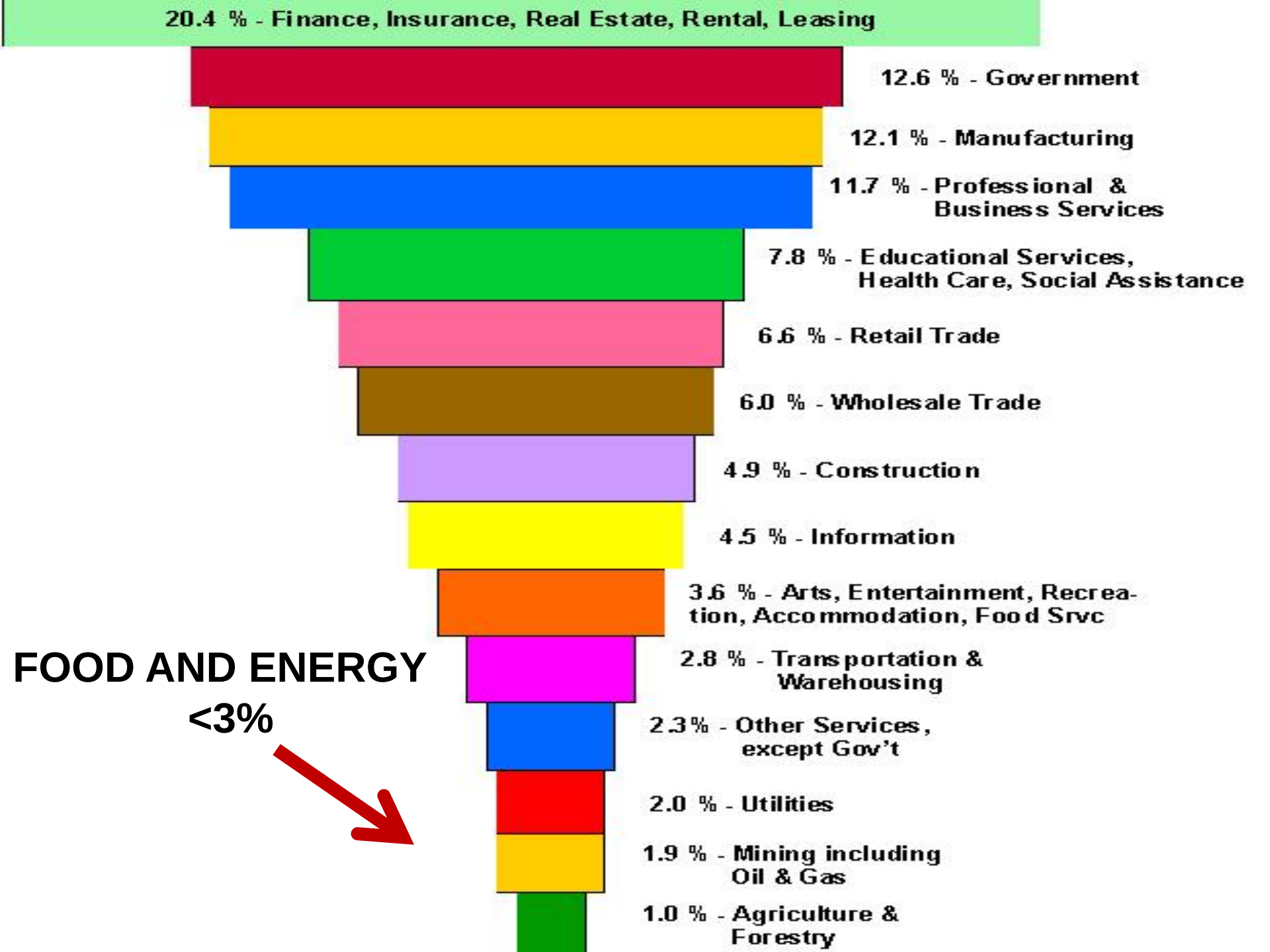

US Primary Energy Per Capita
US Debt (Govt +Private)
400
350
300
250
200
150
100
50
$70,000,000,000,000
$60,000,000,000,000
$50,000,000,000,000
$40,000,000,000,000
$30,000,000,000,000
$20,000,000,000,000
$10,000,000,000,000
$0
1850 1859 1868 1877 1886 1895 1904 1913 1922 1931 1940 1949 1958 1967 1976 1985 1994 2003

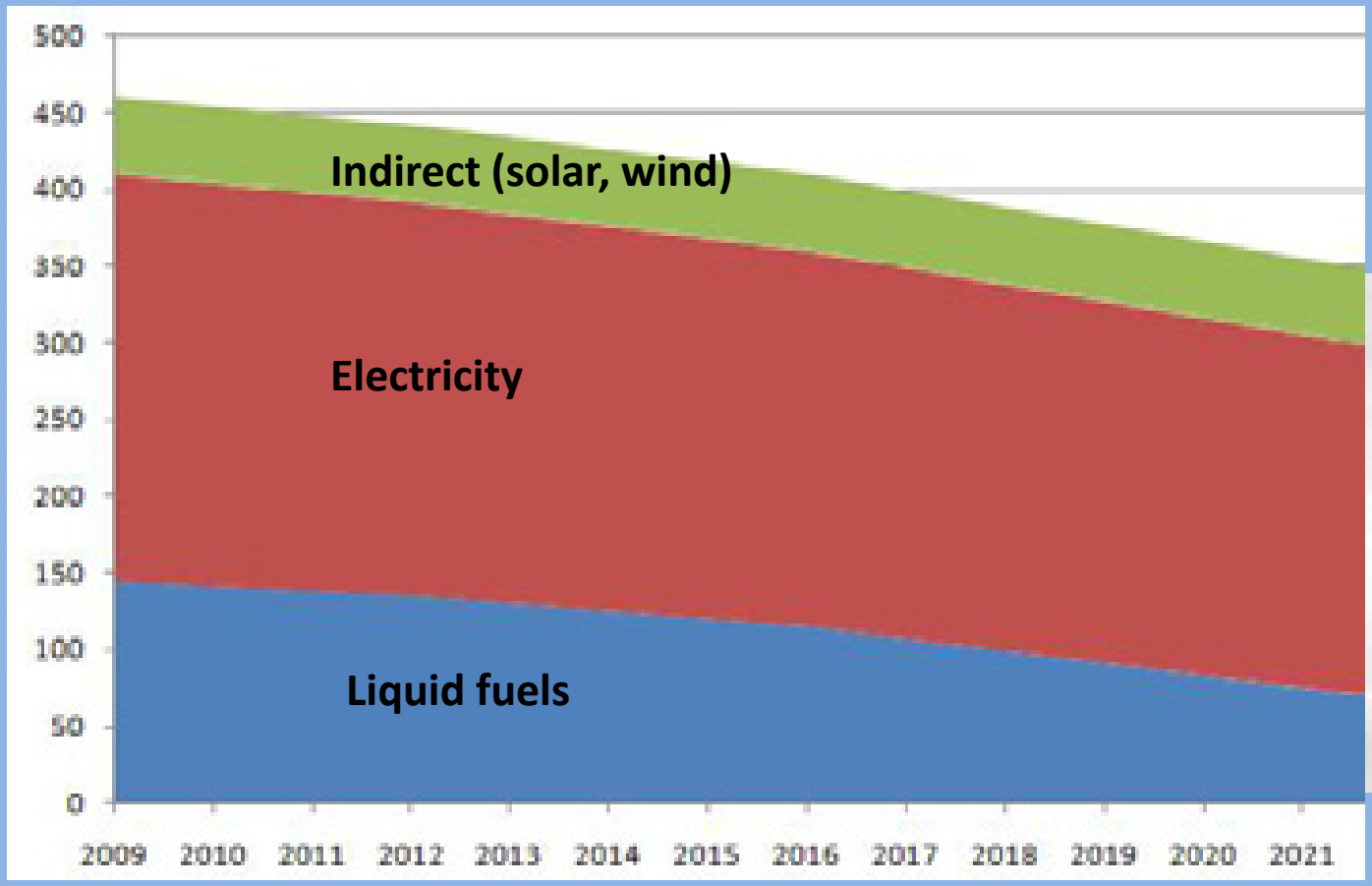

250,000,000,000
200,000,000,000
150,000,000,000
100,000,000,000
50,000,000,000
0
$12,000,000,000,000
$10,000,000,000,000
$8,000,000,000,000
$6,000,000,000,000
$4,000,000,000,000
$2,000,000,000,000
$-
Remaining US Recoverable Crude
US Treasury Debt
30 34 37 41 45 48 52 56 59 63 67 70 74 78 81 85 89 92 96 00 03 07

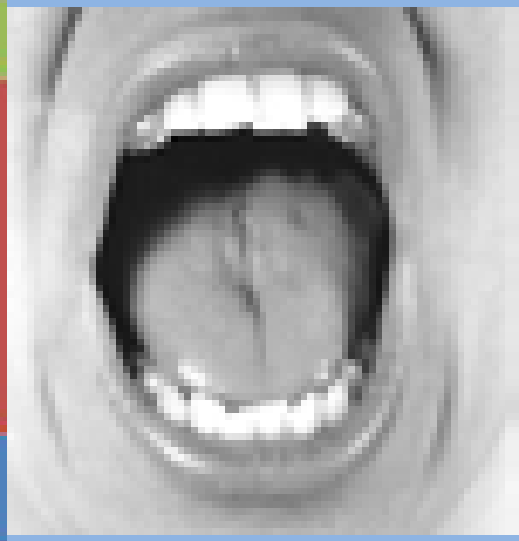

US DEBT DENOMINATED IN OIL
400,000,000,000
200,000,000,000
0
(200,000,000,000)
(400,000,000,000)
(600,000,000,000)
(800,000,000,000)
(1,000,000,000,000)
(1,200,000,000,000)
(1,400,000,000,000)
1930 1935 1940 1945 1950 1955 1960 1965 1970 1975 1980 1985 1990 1995 2000 2005
US Remaining Crude (Barrels)
Debt in Barrels (@$50 Per Barrel)
Deffeyes, Simmons, etc
estimate of global URR

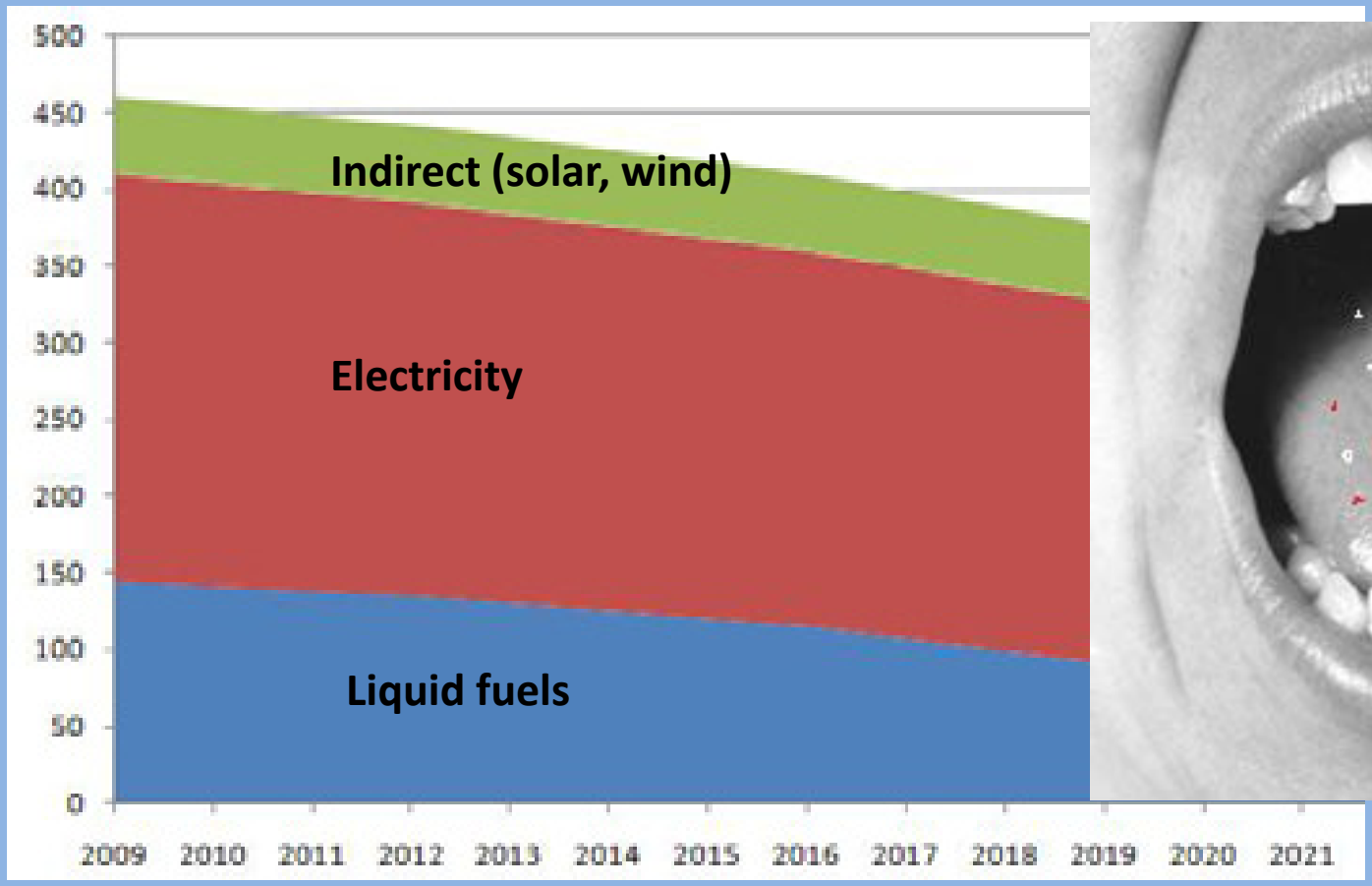
4/14/2009

“US ECONOMY MUST BE BUILT ON ROCK, NOT SAND” – President Obama


20.4 % - Finance, Insurance, Real Estate, Rental, Leasing
12.6 % - Government
12.1 % - Manufacturing
11.7 % - Professional & Business Services
7.8 % - Educational Services, Health Care, Social Assistance
6.6 % - Retail Trade
6.0 % - Wholesale Trade
4.9 % - Construction
4.5 % - Information
3.6 % - Arts, Entertainment, Recrea-tion, Accommodation, Food Srvc
2.8 % - Transportation & Warehousing
2.3% - Other Services, except Gov't
2.0 % - Utilities
1.9 % - Mining including Oil & Gas
1.0 % - Agriculture & Forestry
FOOD AND ENERGY
<3%


500
450
400
350
300
250
200
150
100
50
0
Indirect (solar, wind)
Electricity
Liquid fuels
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021




500
450
400
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300
250
200
150
100
50
0
Indirect (solar, wind)
Electricity
Liquid fuels
2009
2010
2011
2012
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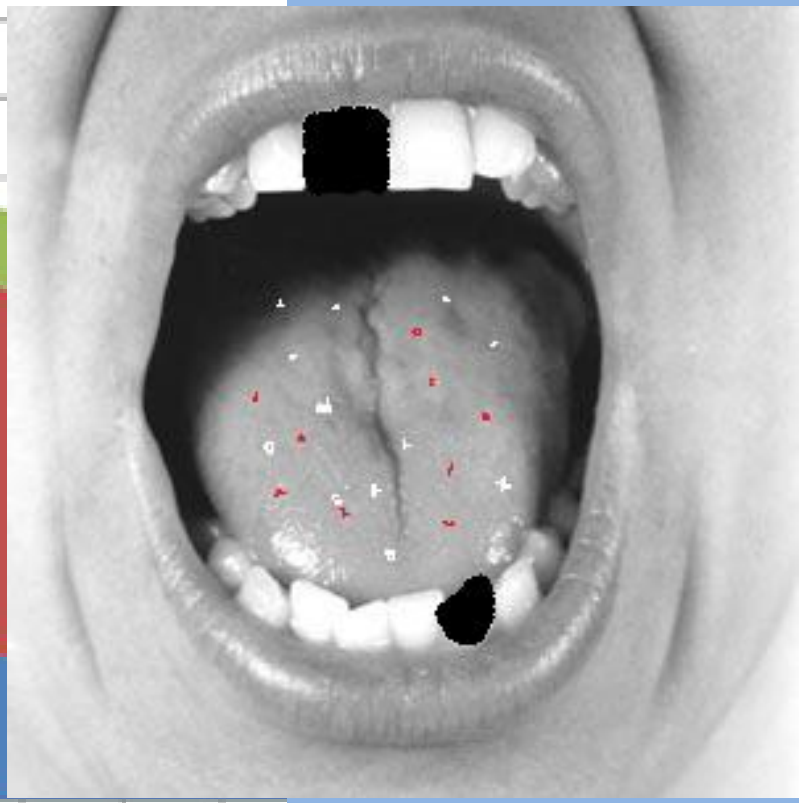
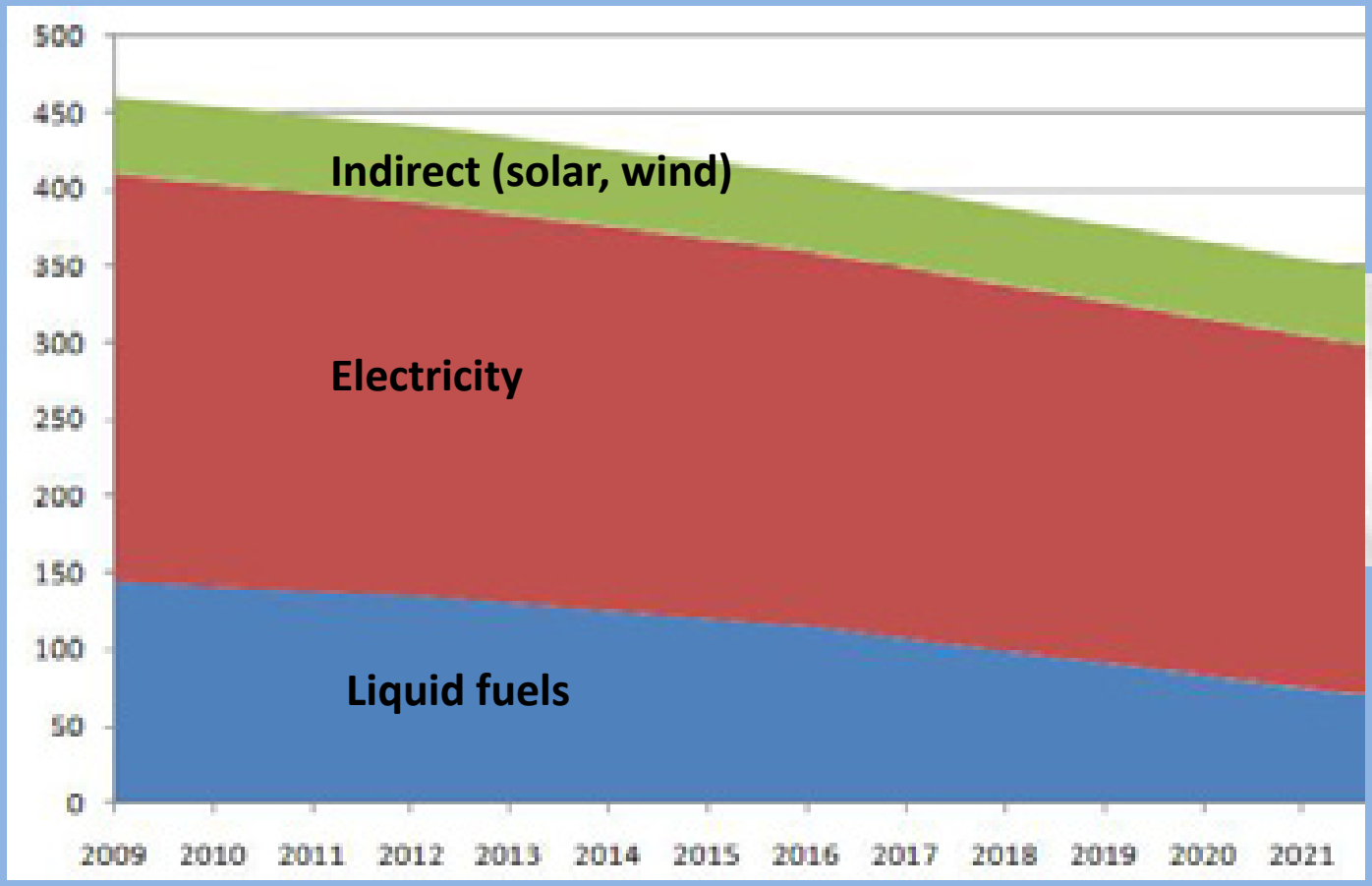
2019
2020
2021




500
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2009
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2017
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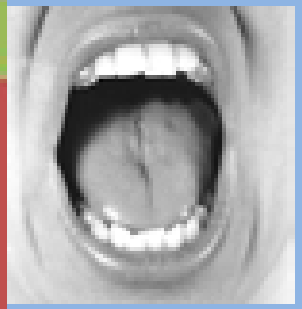
2019
2020
2021
Indirect (solar, wind)
Electricity
Liquid fuels

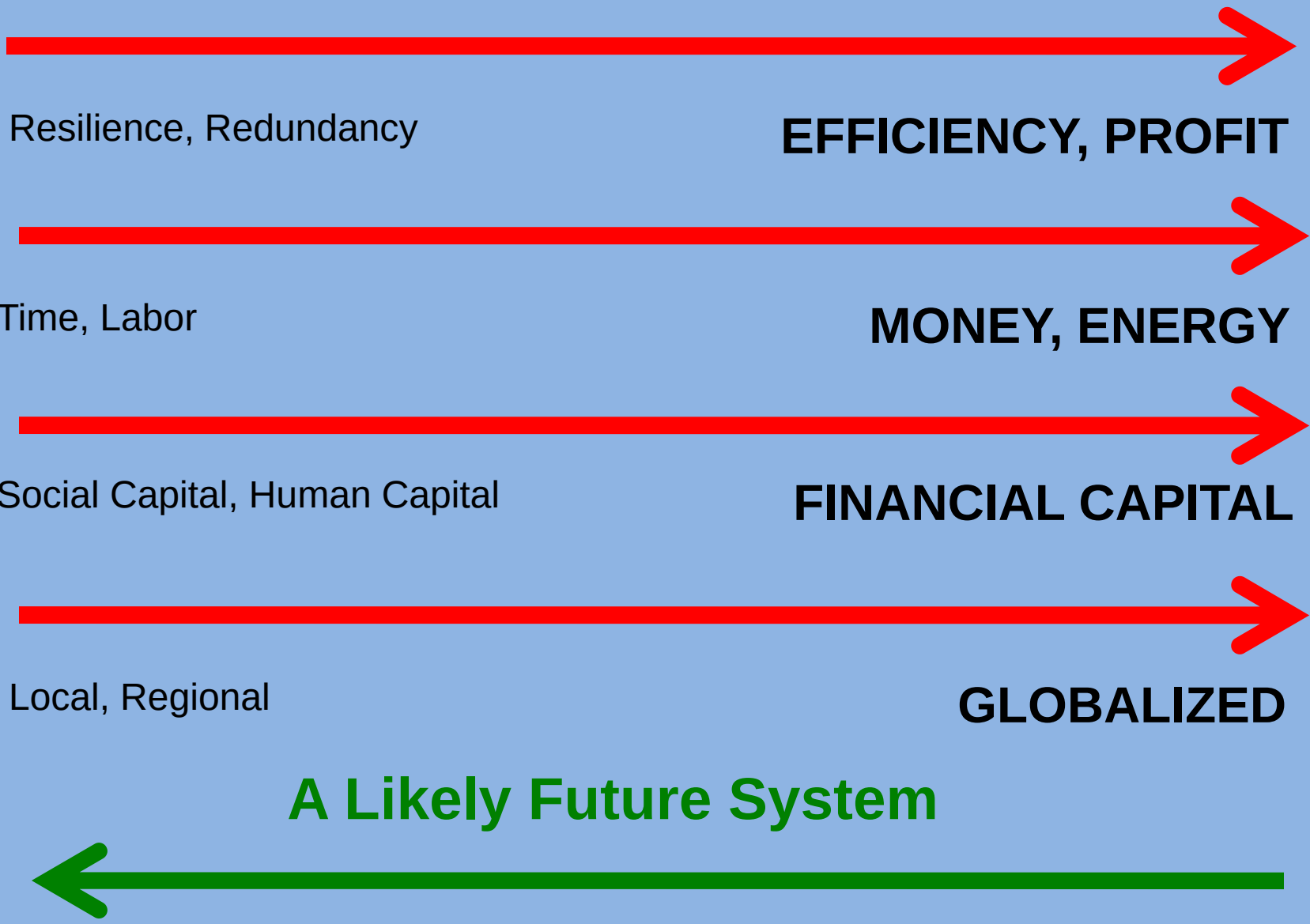


CONCLUSION

Some opinions/ temporary conclusions

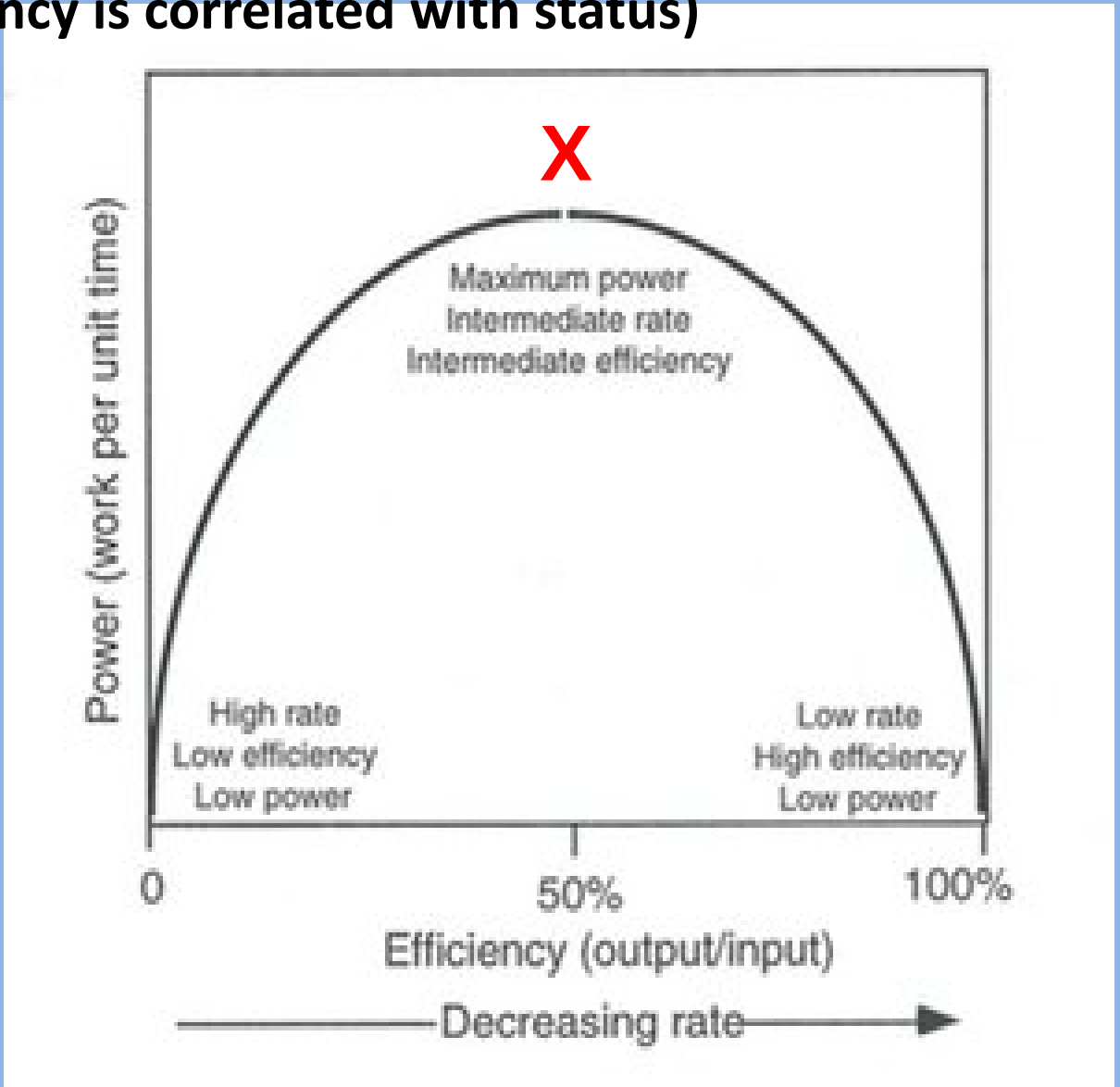
- Energy and natural resources are what we have to spend (not $)
- The decoupling between financial markers and real capital is extreme, and will likely mean economic slack well into future
- We hit social limits to growth before strict resource limits are reached. Solutions MUST include social equity/distribution
- Long term durability/resilience is not something that can or will be solved via market mechanism.
- Addiction/habituation/cognitive overload will make it difficult to just ‘use less’. We must ground/market behavioral change in selfish reasoning.
- Decisions optimized for next 10 years (or 20,30 etc.) have different implications for next 50, next 1,000,000 etc.
- **Ends** must be changed before **means** will be used effectively (efficiency and renewable energy buy us a short amt. of time)
- Above a certain minimum, we care about RELATIVE vs Absolute…

The Present Economic System



A Likely Future System

Hypothesis: the Maximum Power Principle is 'HIJACKED' in humans…instead of 'energy', we pursue those neurotransmitters that correlated with social status…(using resources, not efficiency is correlated with status)



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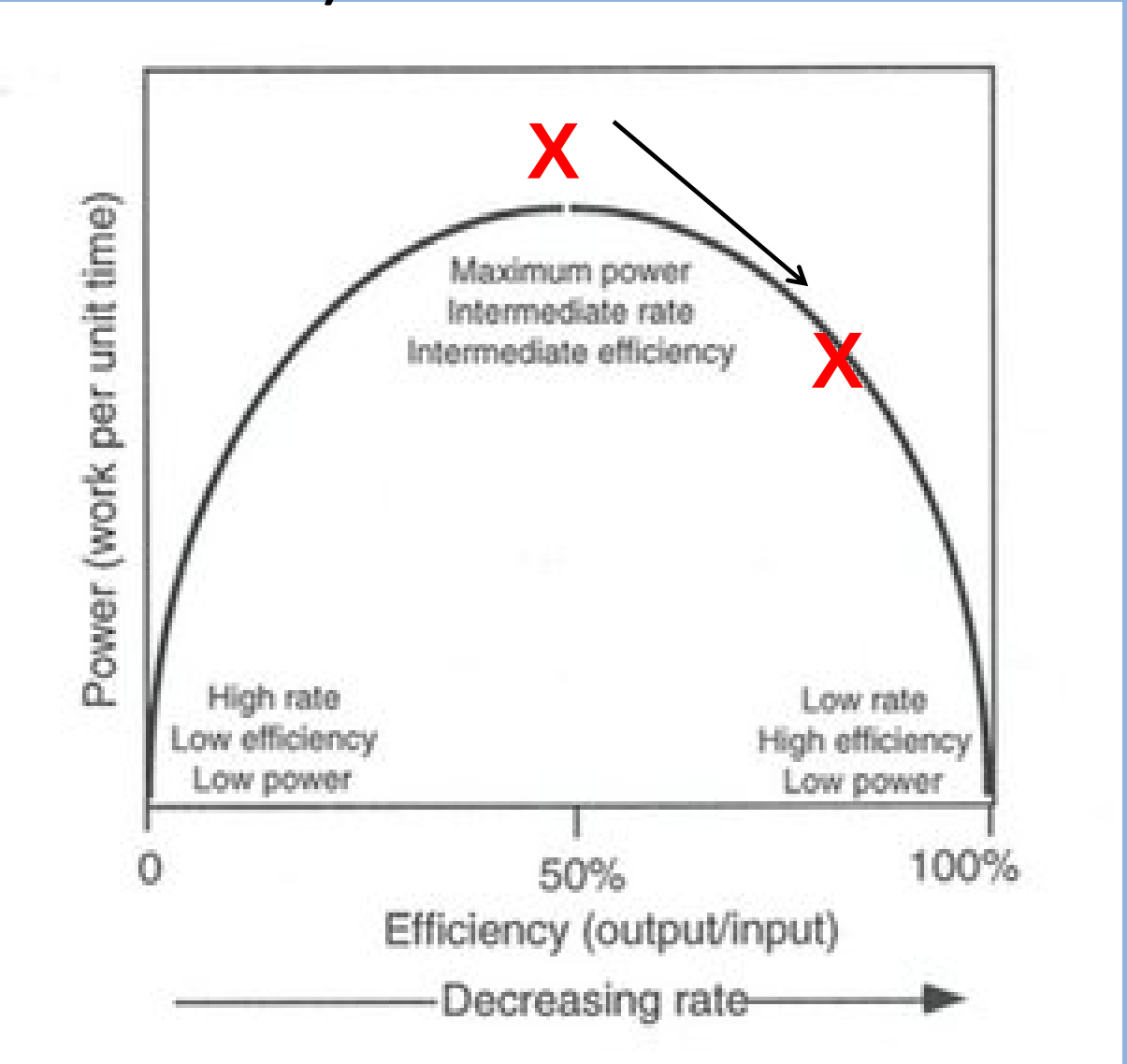
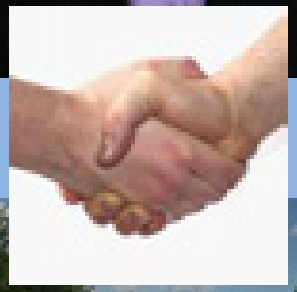


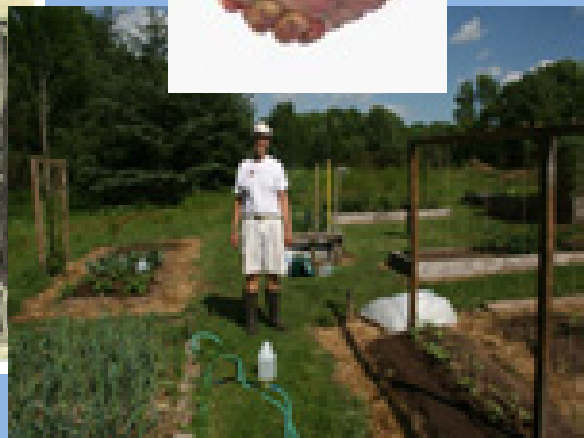

Economics


Mrs. Luis Alechandre
Duque Moreida de Sousa


We CAN change what we compete for via culture …
UGO BARDI
Silvio Berlusconi

Status – Past, Present and Future?





Ends Before Means…

1. Renewable energy
2. Conservation
3. Energy efficiency

4. Competing for something else

(Ends Before Mearns…)


Peak Oil. Bring it on…
the last sasquatch


The participants at
Alcatraz Retreat
Italy …June 2009