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# Techniques and Civilization

## Lewis Mumford

Ch. 7. Assimilation of the Machine  
Ch. 8. Orientation

■ Semih Eser

# Assimilation of the Machine

## New Cultural Values (p.321)

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- Tools - extensions of man's own organism -
  - no independent existence
  - in harmony with the environment
  - made man recognize the limits of his capacities
- Machines - semi-automatic operation -
  - an independent existence
  - external instruments for the conquest of the environment
  - created an illusion of invincibility with more power to use

# New Cultural Values

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- Did the machine lack cultural values?
  - “...the machine furthered a new mode of *living* ..” (p.323) -
    - **not recognized by the industrialists and engineers**
    - **misinterpreted by *Romantics***
  - Factualism, practicality, logic of materials and forces, cooperative thought and action, esthetic excellence of machine forms --> the more objective personality
    - “In projecting one side of the human personality into the concrete forms of the machine, we have created an independent environment that has reacted upon every other side of the personality.” (p.324)

# Transformations through Assimilation

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## ■ Relationship of man to nature

- from *conform and fear* to *command and control*
- disappearance of limits
- loss of proportionality

**“To the extent that men have escaped the control of nature they must submit to the control of society.” (p.280)**

## ■ Social relationships

- increase in mechanical power
- regularization of time
- multiplication of goods
- contraction of time and space
- increasing collective interdependence

# A Bump on the Road!

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“...Values, divorced from the current processes of life, remained the concern of those who reacted against the machine. Meanwhile, the current processes justified themselves **solely** in terms of **quantity** production and **cash** results. When the machine as a whole oversped and **purchasing power** failed to keep pace with dishonest **overcapitalization** and exorbitant **profits** - then the whole machine went suddenly into reverse, stripped its gears, and came to a standstill: a humiliating failure, a dire social loss.”  
(p.283)

- Reference to The Great Depression (1929)?

# The Esthetic Experience (p.333)

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- The Cubists transcended the anti-esthetic quality of the machine
  - Beauty could be produced, and had been produced through the machine.
  - Artists extracted from the organic environment abstract geometric symbols, or created mechanical equivalents of organic objects.

# Fernand Léger [French Cubist Painter, 1881-1955]



“human figures that looked like they had been turned in a lathe”

# Raymond Duchamp-Villon

[French Cubist Sculptor, 1876-1918]

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- Depiction of a horse as if it were a machine





# The Objective Personality (p.359)

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- What comes out of the mine?
  - coal, iron, gold - No!
  - The miner!
- Occupations affect personality-every type of work has been affected by the machine.
- Subjective conditioning of personality versus objective conditioning in the order of the machine.

# Path to the more profoundly human?

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“..our capacity to go beyond the machine rests upon our power to assimilate the machine. Until we have absorbed the lessons of objectivity, impersonality, neutrality, the lessons of the mechanical realm, we cannot go further in our development toward the more richly organic, the more profoundly human.”  
(p.363)

Wouldn't the machine culture have pervaded the society even more, then?

# Orientation

## The Dissolution of “The Machine”

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- “..the mechanical discipline and many of the primary inventions themselves were the result of deliberate effort to achieve a mechanical way of life: the motive in back of this was not technical efficiency but holiness, or power over other men..” (p.364)
- “Mechanical instruments of armament and offense, springing out of fear, have widened the grounds for fear among all the peoples of the world; and our insecurity against bestial, power-lusting men is too great a price to pay for relief from the insecurities of the natural environment. What is the use of conquering nature if we fall a prey to nature in the form of unbridled man? (p.366)

# Capitalism and the Machine

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- “In advancing too swiftly and heedlessly along the line of mechanical improvement we have failed to assimilate the machine and to co-ordinate it with human capacities and human needs.” (p.366)
- “We are\* now entering a phase of dissociation between capitalism and technics; and we begin to see with **Thorstein Veblen** that their respective interests, so far from being identical, are often at war, and that the human gains of technics have been forfeited by perversion in the interests of pecuniary economy” (p.366)

\*means “we must!”

# Business Enterprise

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**Thorstein Veblen**  
**(1857-1929)**

**The Theory of Business Enterprise  
by Thorstein Veblen, 1904.**

**The material framework of modern civilization is the industrial system, and the directing force which animates this framework is business enterprise. To a greater extent than any other known phase of culture, modern Christendom takes its complexion from its economic organization.**

**This modern economic organization is the "Capitalistic System" or "Modern Industrial System," so called. Its characteristic features, and at the same time the forces by virtue of which it dominates modern culture, are the machine process and investment for a profit.**

# Integration & Quackery

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- “The problem of integrating the machine in society is not merely a matter[..] of making social institutions keep in step with machine: the problem is equally one of altering the nature and the rhythm of the machine to fit the actual needs of the community.” (p.367)
- “But the belief that social dilemmas created by the machine can be solved merely by inventing more machines is today a sign of half-baked thinking which verges close to **quackery**.” (p.367)

# The Elements of Social Energetics

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- Economic Objectives (p.373)
  - Profit became the decisive factor in all industrial enterprise.
  - The service of the consumer and the support of the worker were entirely secondary.
  - Even during crisis and breakdown dividends continue to be paid to stock holders while the mass of workers are turned out to starve.

# Economic Objectives

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- Essentials of Economic Processes (p.375)

- Conversion - utilization of the environment as source of energy
  - Fire
  - Agriculture-organic conversion
  - Mechanical conversion of energy (waste!)
- Production and consumption- to sustain life
- Creation - recreation at higher levels of thought and culture

Short-circuit in a capitalist society



# Economic Objectives

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“The real significance of the machine, socially speaking, does not consist in the multiplication of goods or the multiplication of wants, real or illusory. Its significance lies in the gains of energy through increased conversion, efficient production, balanced consumption, and socialized creation.” (p.378)

# Energy Conversion

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“Apart from the doubtful possibility of harnessing inter-atomic energy, there is the much nearer one of utilizing the sun’s energy directly in sun-converters or of utilizing the difference in temperature between the lower depths and the surface of the tropical seas,[..] applying on a wide scale new types of wind turbine,[..], indeed once an efficient solar battery was available the wind alone would be sufficient, in all probability, to supply any reasonable needs for energy.” (p.380)

# Ownership

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“..Theoretically, however, such {monopolistic} economies of energy only lead to wider consumption[..], hence the necessity for making a socialized monopoly of all such raw materials and resources. The private monopoly of coal beds and oil wells is an intolerable anachronism - as intolerable as would be the monopoly of sun, air, running water. Here the objectives of a price economy and a social economy cannot be reconciled.” (p.380)

# Consumption

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“The maximum of machinery and organization, the maximum of comforts and luxuries, the maximum of consumption, do not necessarily mean a maximum of life-efficiency or life-expression. The mistake consists in thinking that comfort, safety, absence of physical disease, a plethora of goods are the greatest blessings of civilization, and in believing that as the increase the evils of life will dissolve and disappear. [...] and the notion that every other interest, art, friendship, love, parenthood, must be subordinated to the production of increasing amounts of comforts and luxuries is merely one of the superstitions of a money-bent utilitarian society.” (p.400)

# Work

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“Not work, not production for its own sake or for the sake of ulterior profit, but production for the sake of life and work as the normal expression of a disciplined life, are the marks of a rational economic society.”(p.410)

“..as social life becomes mature, the social unemployment of machines will become as marked as the present technological unemployment of men.” (p.426)

# Toward a Dynamic Equilibrium

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- 1) *Equilibrium in the environment* - the restoration of the balance between man and nature --sustainable energy/industrial ecology
- 2) *Equilibrium in industry and agriculture* -stop migration and urban sprawl
- 3) *Equilibrium in population* - population control

By social intelligence, social energy, and social good will.

*“It would be a gross mistake to seek wholly within the field of technics for an answer to all the problems that have been raised by technics.” (p.434)*

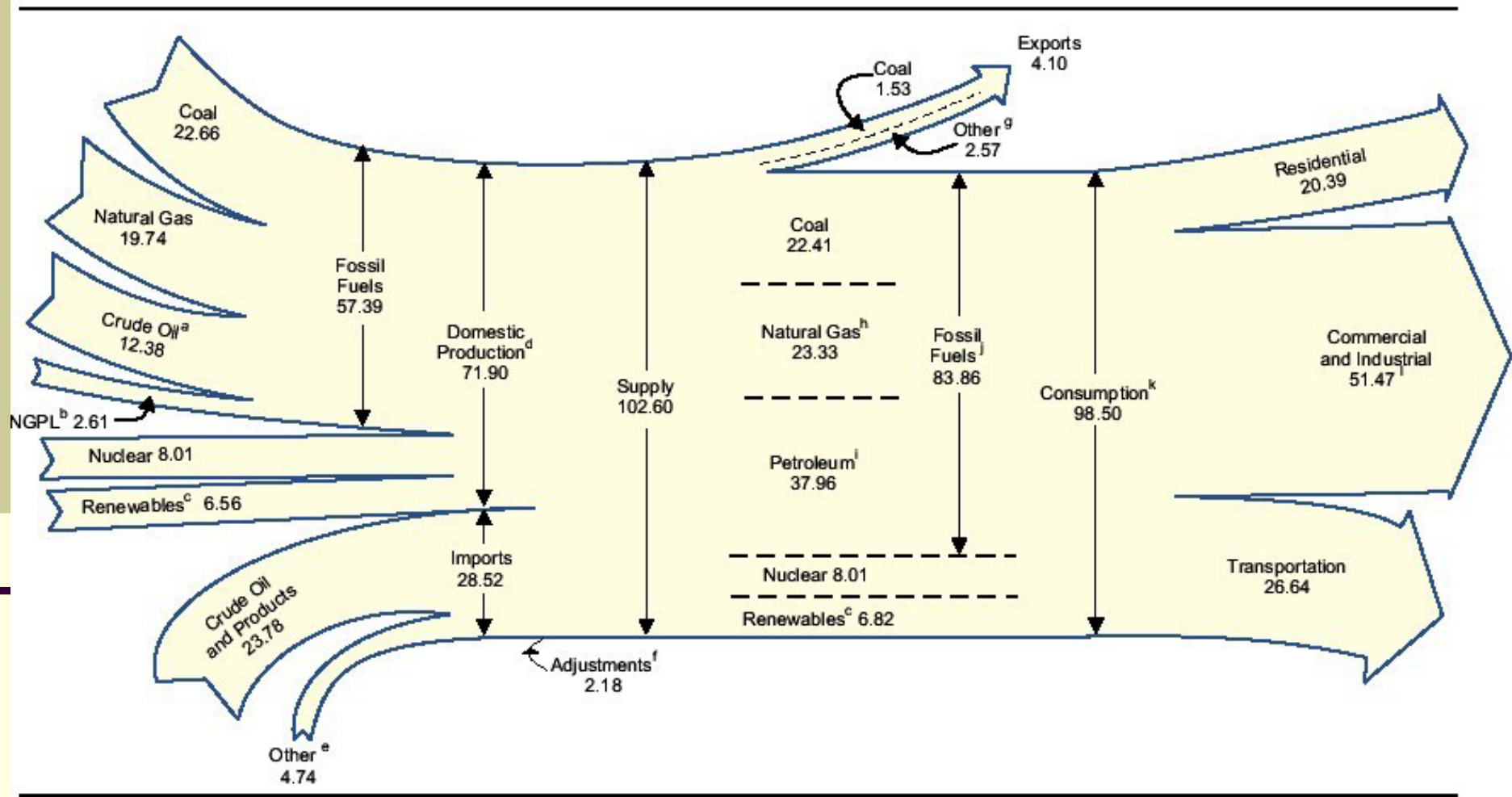
# Consuming Power

David E. Nye

- Ch. 7. The High Energy Economy
- Ch. 8. Energy Crisis and Transition
- Ch. 9. Choices

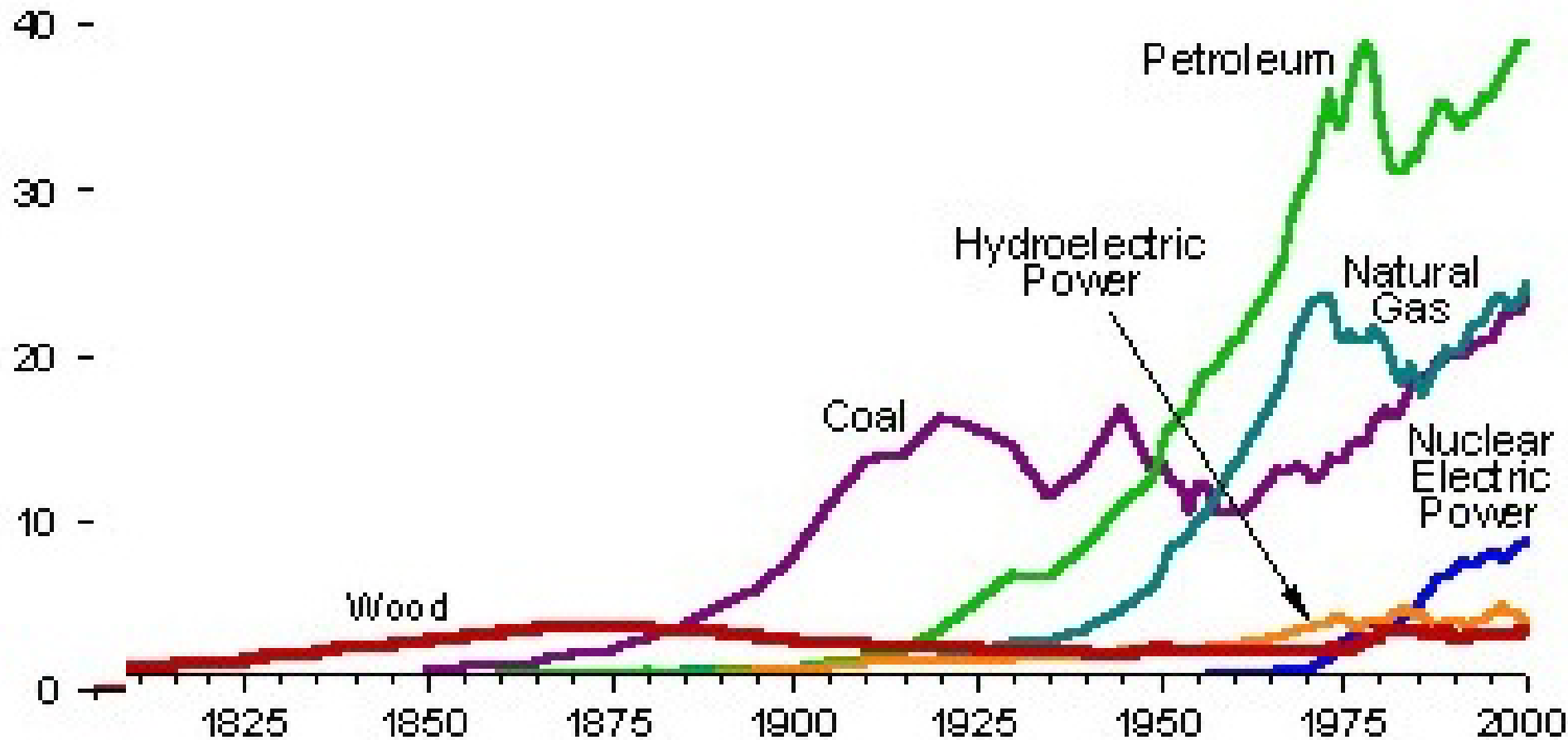
■ Jonathan Mathews

# Cheap, Abundant, Energy!





# U.S. Energy Source (Quadrillion Btu)



# Impact “Down on Farm”

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Source: US Fish & Wildlife

- Man, horse & plow: 8 miles per acre.
- 1 tractor = 8-11 horses (plowing)
- “book farming” - Penn State!
- 1910 1,000 gasoline tractors



By 1932, 1-million tractors were in use!

1918 all time high for mules & horses on farms

Tractor less work in upkeep/maintenance (p190)

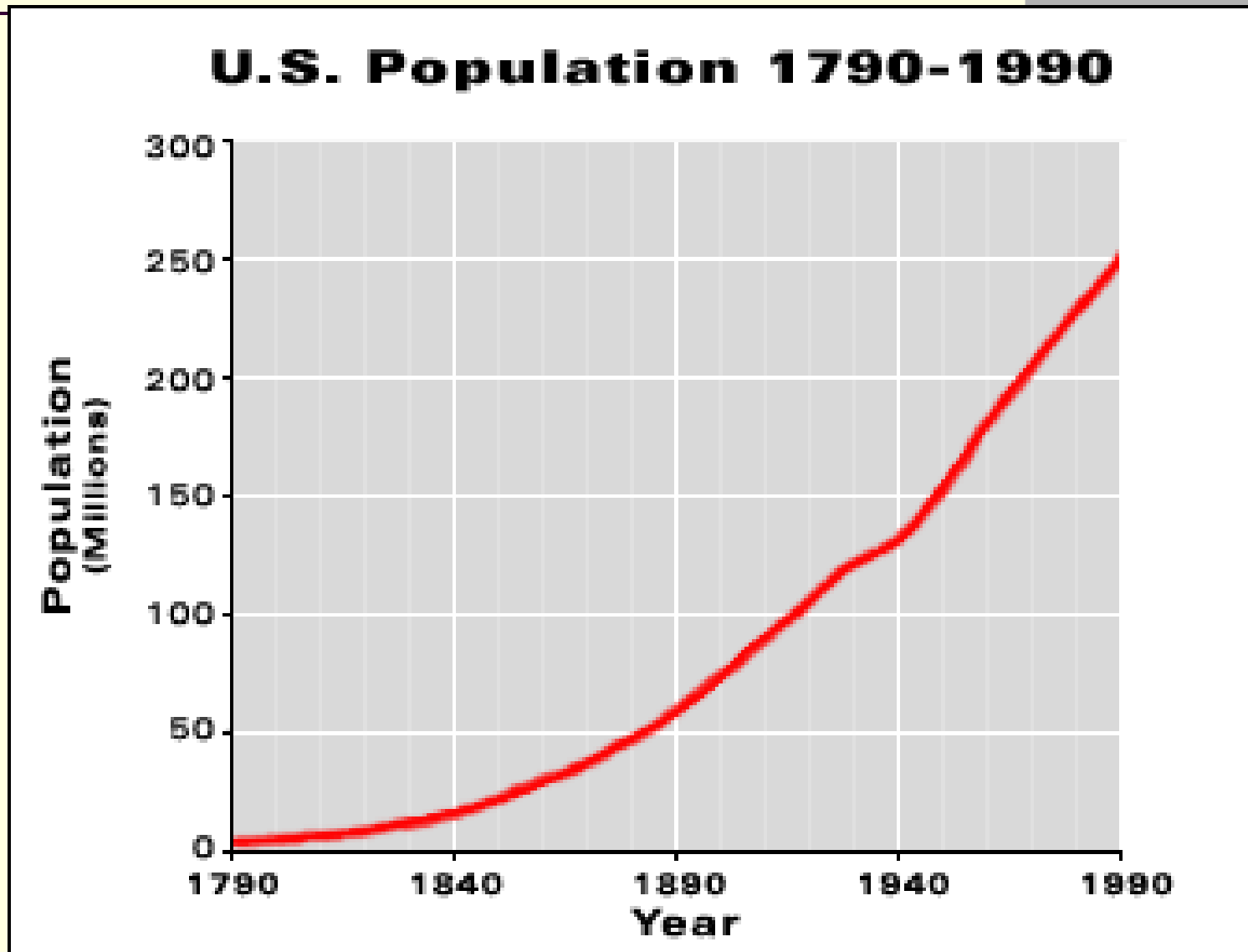
In 1923 4.74 horsepower per farm: animal, gasoline, steam, electric & windmill

# More, More, More, with Less, Less, Less — Animal or Man Power

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- Use of a tractor saved 30-days over horses.
- 85% reduction in wheat cultivation, plowing...
- 65 % reduction in corn cultivation, plowing...
- Cotton still person power intensive: 86 person hours per acre per year vs.. 6.3 corn, 1.4 wheat! (Civil war, North South differences?)
- Time off? NO, More land! More produce!
- Less farmland for horses (25% of all farmland)
- High post WWI prices vs. Dust Bowl, Depression Prices!

# U.S. Population



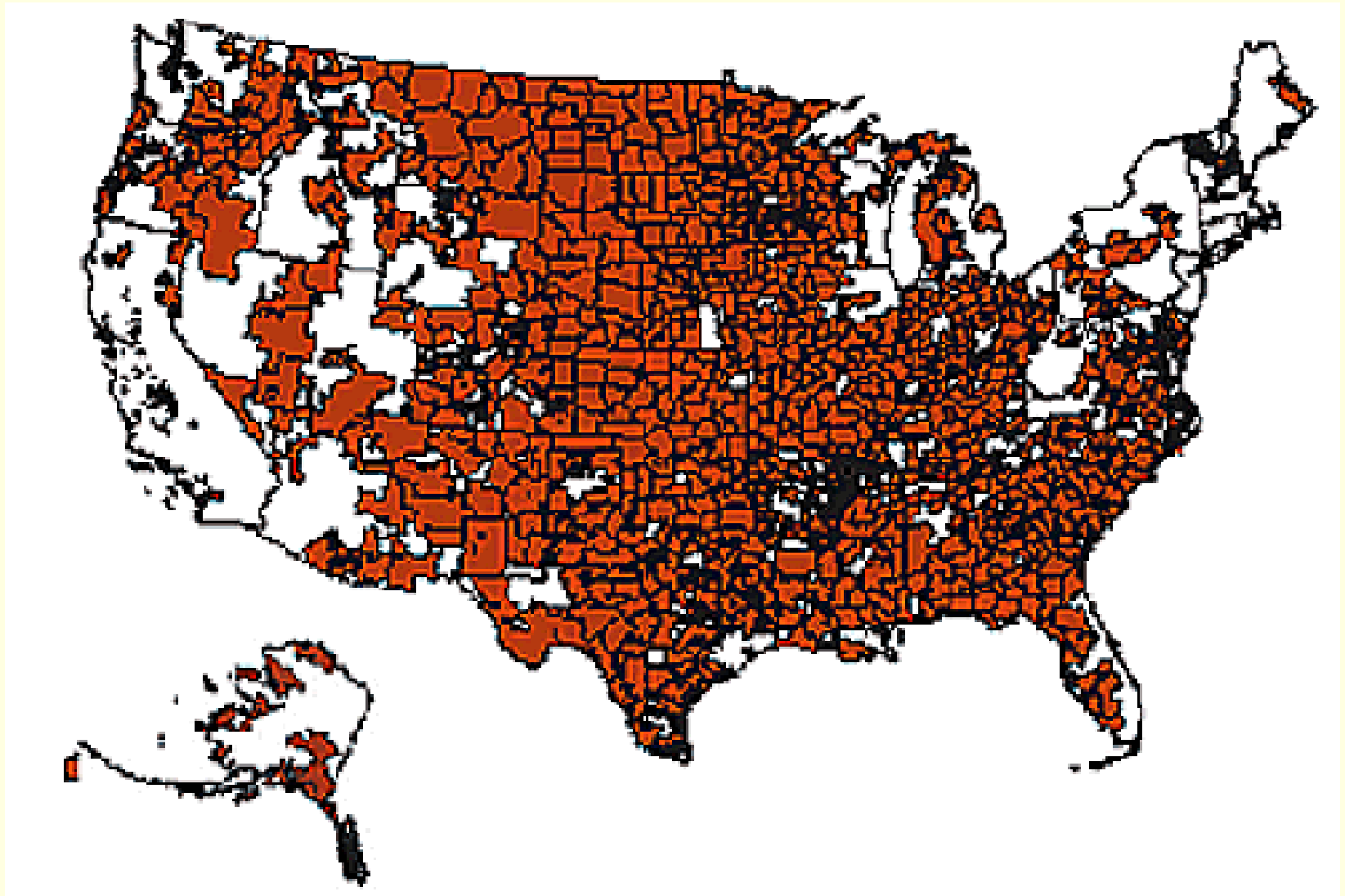
# City vs. Countryside

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- Lower Lifespan
- Public Transport & private automobile
- Electricity (central)
- Preserved food (tins, refrigerator)
- World market (food)
- Higher lifespan
- Private automobile
- Electricity (cooperative)
- Fresh food
- Local

# Rural Electric Cooperatives

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# North America at Night

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# “Boom” of WWII

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- Frozen food, rationing, refrigerators.
- 1970 food production & consumption(?) required 17% of US energy use.
- New machinery
- Hybrid grains
- Fertilizers (chemical)
- Pesticides (DDT)
- Oversupply & Low prices
- Average farm 460 acres in 1989
- PA farm energy use 67% petroleum, 27% natural gas
- Conglomerate Farms (now?)



# Suburban Pleasantry (Nightmare!)

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- Electricity / automobile enabled
- 1930 dispersed farmsteads, fairly compact cities fringed with suburban growth
- Fueled by Federal Policy (FHA 10% down, mortgage interest write-off!)
- Exodus (city centers)
- Now urban sprawl!
- Garage curse



# Open Plan Housing & Malls

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- Candle, gas light produced soot—dark wallpaper and many rooms (minimize drafts)
- Electricity facilitated open plan, brighter color schemes.
- Automobiles, facilitated malls!



# From Rows to Malls

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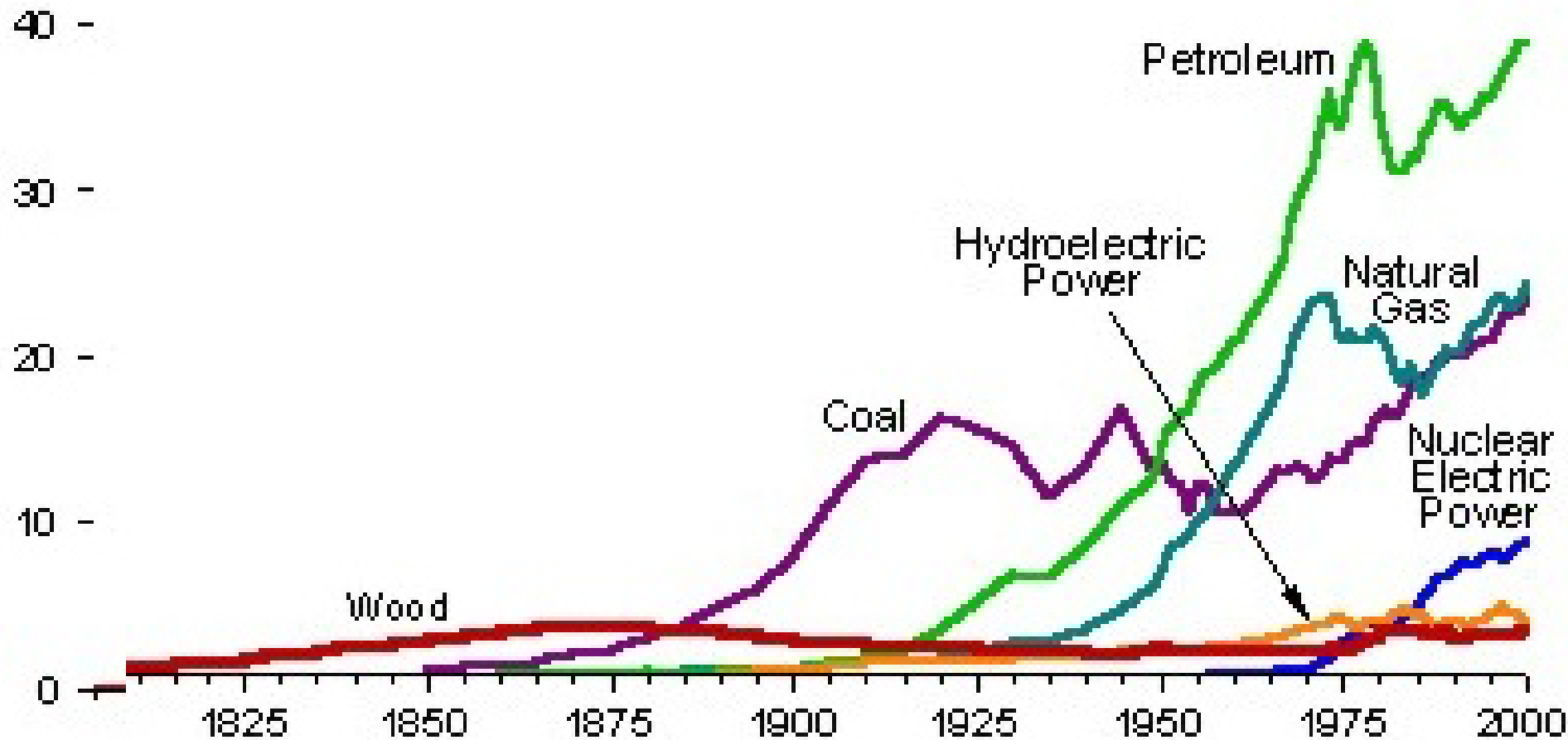
# King Coal Move Over

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- Coal dominance after 1920 was lost to: electricity, natural gas, & oil.
- Supply issues
- Strikes
- Emerging Markets
- Cost & ash!
- Not a quantity reduction though!

# U.S. Energy Source (Quadrillion Btu)



# Switch to “Natural” Gas

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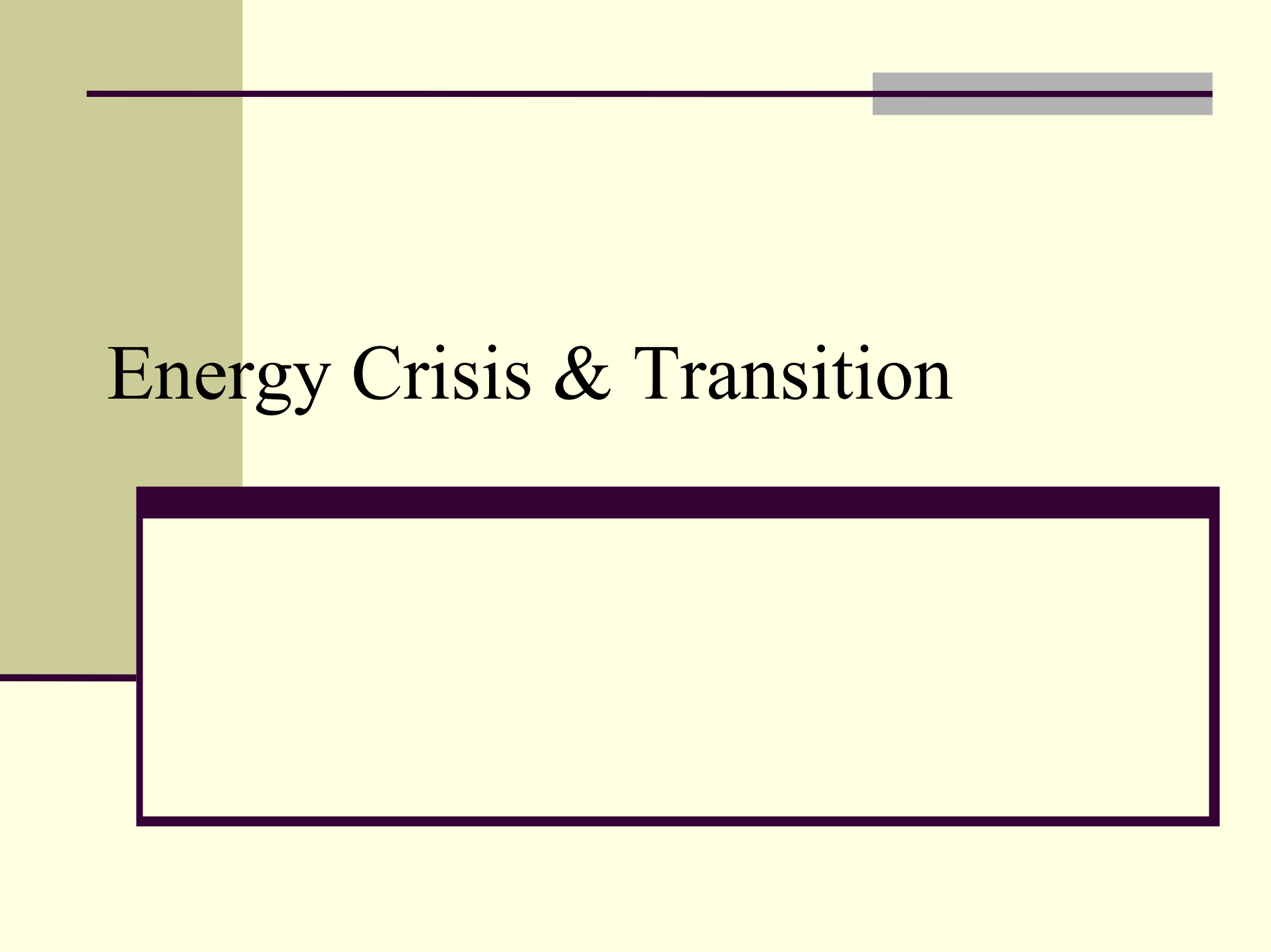
- $C + H_2O \text{ -----} \rightarrow CO + H_2$
- Coal supplied “Town” or “Manufactured” gas
- Lighting
- Natural Gas: heating, cooking, and electricity generation
- Steel pipelines, high pressure



# What did Power Provide?

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- Transportation
- Heat / cooling (comfort)
- Leisure Time
- Television
- Mass production / affordable goods (services?)
- Labor saving devices (washer, dryer)
- Loss of labor (international labor)
- Technology (data) driven economy?

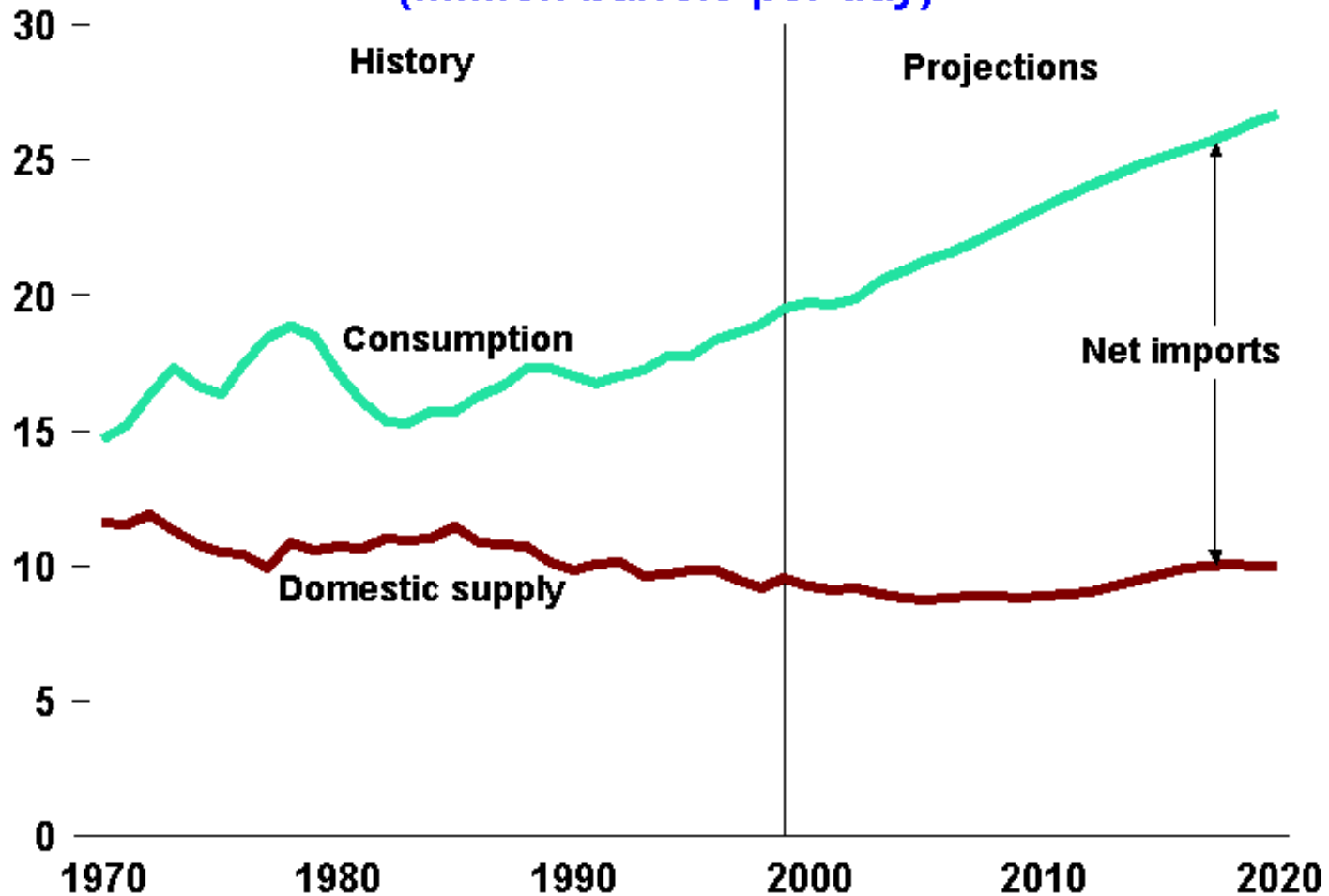


# Energy Crisis & Transition

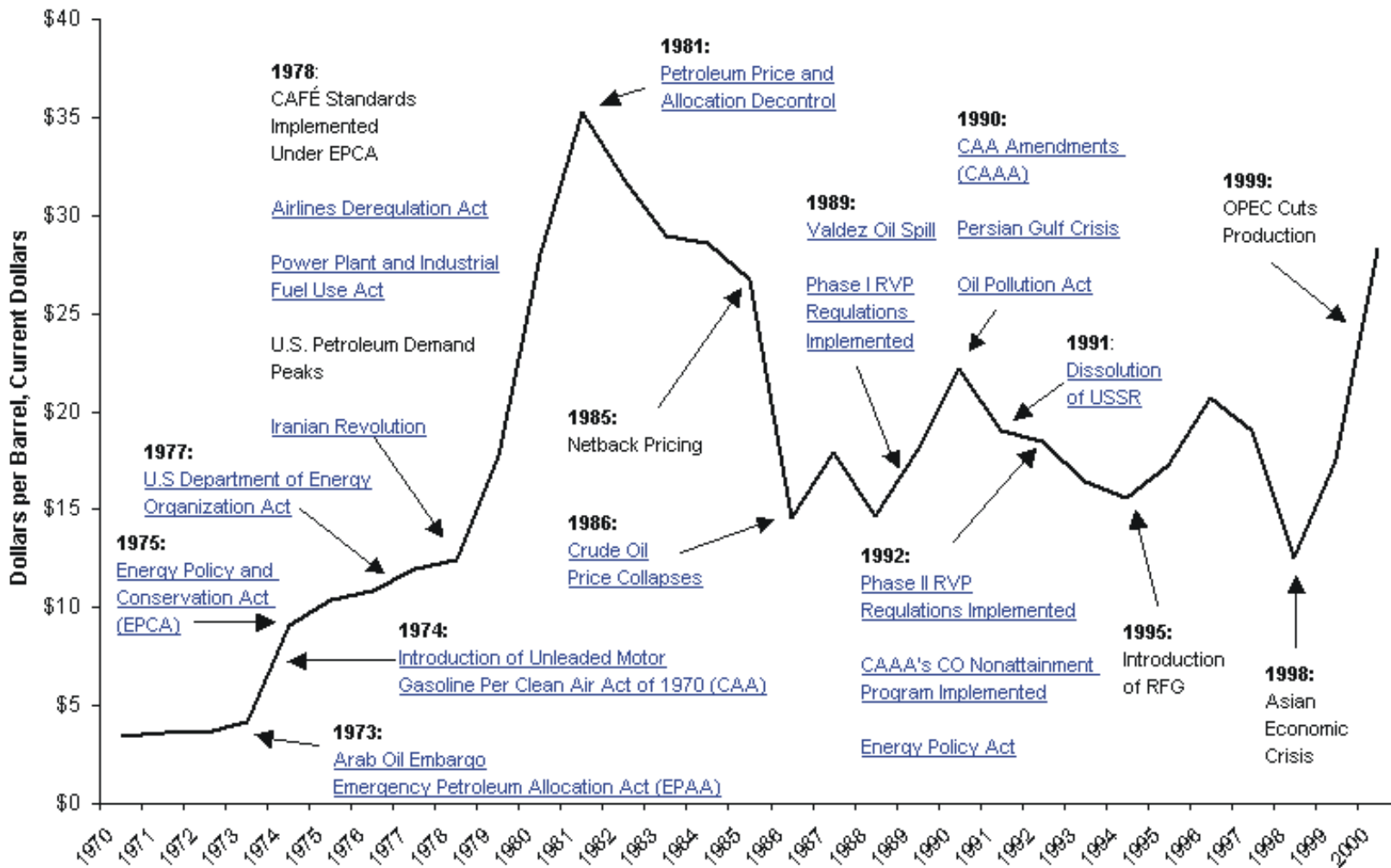


# Arab Oil Embargo

**Petroleum Supply, Consumption, and Imports, 1970-2020  
(million barrels per day)**



## Critical Petroleum-Related Events and U.S. Refiner Acquisition Cost, 1970 - 2000



# Why Energy Crisis, not Oil Crisis?

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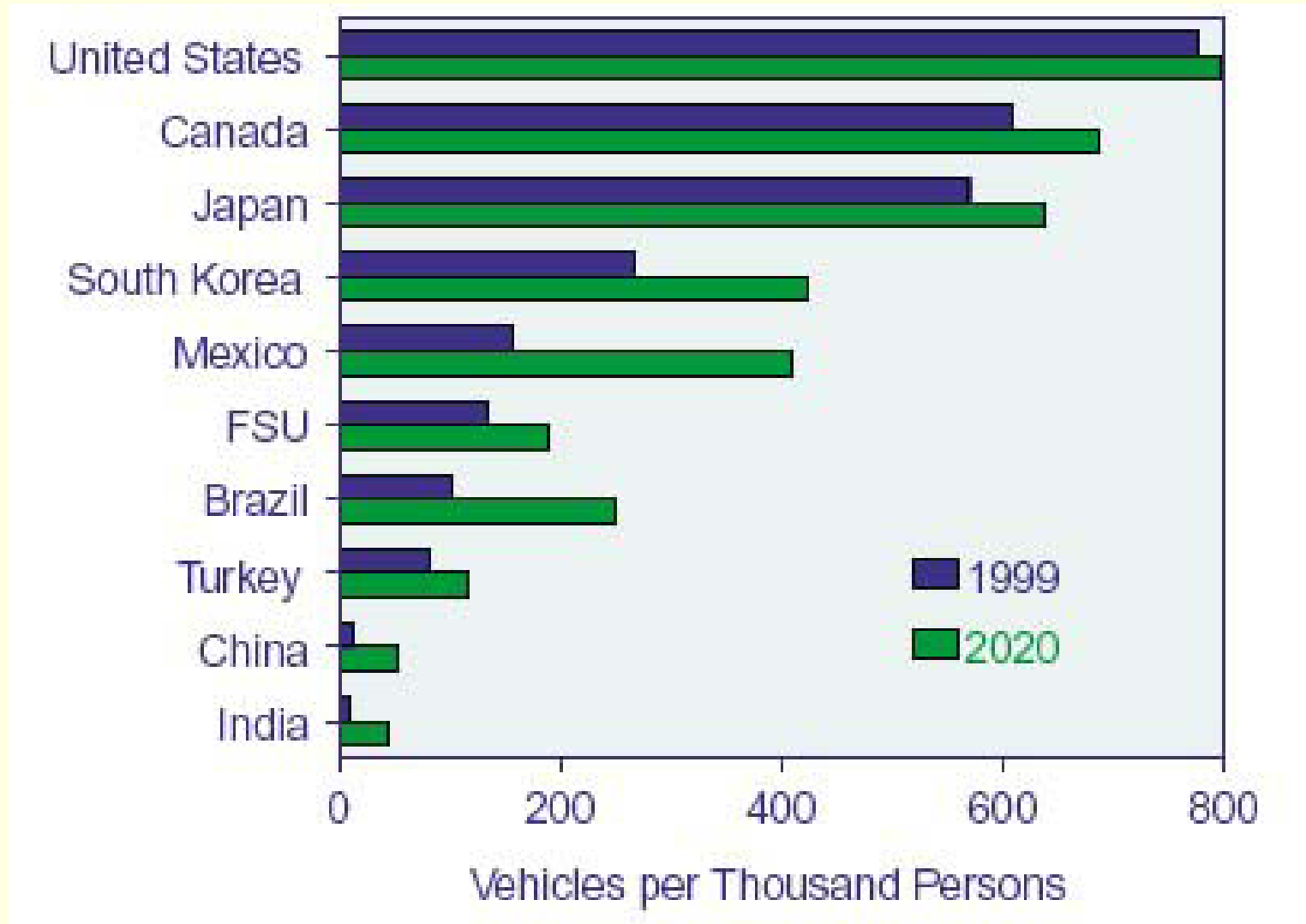
- Oil Refining capacity at max.
- Prices of oil impacts natural gas
- Increases in oil cost affect the economy
- Fuel oil for electricity generation
- Transportation costs
- Domestic energy declining
- Inefficient use of energy (cheap)

# Impact

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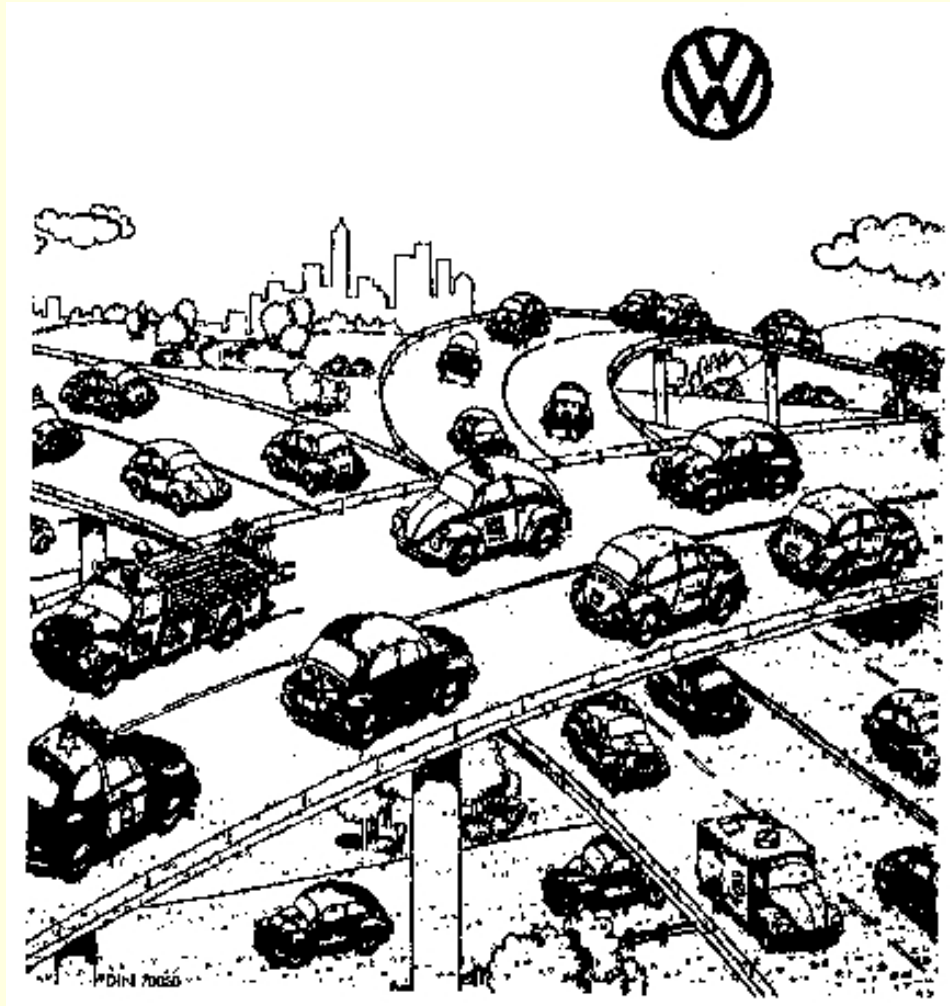
- Alaskan Oil
- Nuclear Energy
- IEA
- Speed Limits
- Increased Domestic Production
- Change in oil suppliers (changes in refineries)
- More Coal derived electricity
- SPR

# Automobiles per 1,000 people



# Efficiency—”Give Peace a Chance?”

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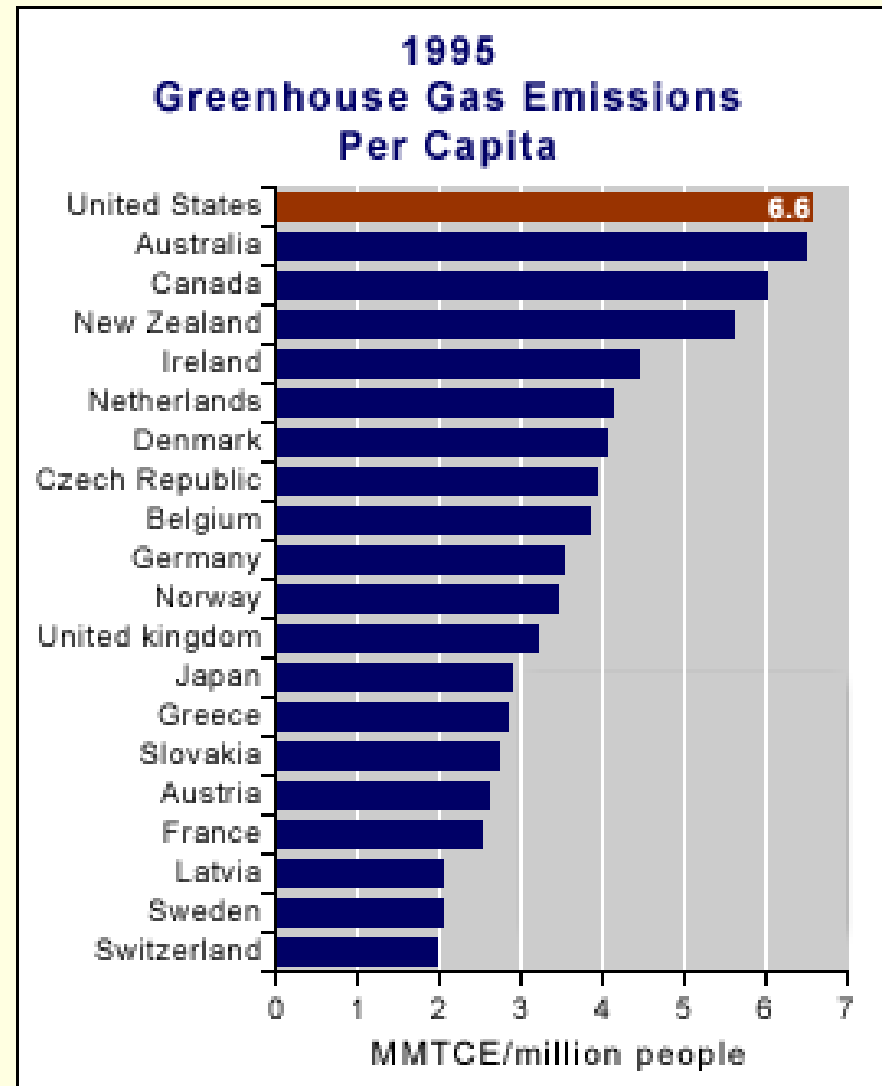




# Choices

# 5 % & 25%

- 6 billion people worldwide!
- 279,000,000 people in the US
- 5% of the world population
- 25 % of the world energy use!





# Over Consumption: Supersize(ing) of America

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