

WILL WE RUN OUT OF ENERGY?



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T **HE PERILS OF PREDICTION**

In 1865, economist William Stanley Jevons wrote a book warning that the coal supply that had helped make the United Kingdom an economic power was rapidly depleting.¹⁰⁵

David White, Chief Geologist for the U.S. Geological Survey, said in 1919, “the peak of [American oil] production will soon be passed—possibly within three years.”¹⁰⁶

In a 1968 bestseller, author Paul Ehrlich proclaimed, “The battle to feed humanity is over. In the 1970s and 1980s hundreds of millions of people will starve to death in spite of any crash programs embarked upon now.”¹⁰⁷

The Limits to Growth, published in 1972 by the Club of Rome, calculated that given then current trends, the world could be out of petroleum by 1992 and natural gas by 1993.¹⁰⁸

Two years later, Ehrlich and his wife, Anne, stated, “we can be reasonably sure . . . that within the next quarter of a century mankind will be looking elsewhere than in oil wells for its main source of energy.”¹⁰⁹ Their Malthusianism was also captured in the equation, $I = PAT$, where negative environmental *impact* was directly proportional to increasing *population, affluence, and technology*.¹¹⁰

¹⁰⁵William Stanley Jevons, *The Coal Question*.

¹⁰⁶Quoted in Edward Porter, *Reinventing Energy: Making the Right Choices* (Washington: American Petroleum Institute, 1995), p. 17.

¹⁰⁷Paul Ehrlich, *The Population Bomb* (New York: Ballantine Books, 1968), p. xi.

¹⁰⁸Dennis Meadows and Donella Meadows, *The Limits to Growth* (New York: Universe Books, 1972), p. 193.

¹⁰⁹Paul Ehrlich and Anne Ehrlich, *The End of Affluence* (Rivercity, MA: Rivercity Press, 1974), p. 49.

¹¹⁰Paul Ehrlich, Anne Ehrlich, and John Holdren, *Human Ecology: Problems and Solutions* (San Francisco: W. H. Freeman Company, 1973), chapter 7.

In 1979, James Schlesinger, the first Secretary of the U.S. Department of Energy and a Ph.D. economist, stated, "The energy future is bleak and is likely to grow bleaker in the decade ahead."¹¹¹ He was not staking out a radical position, but instead was merely repeating the conventional wisdom of the day.

Not only were policy makers convinced that oil was running out, but many top executives in the petroleum industry accepted it as well. In fact, in the late 1970s and early 1980s some major oil companies began shifting resources out of the oil business. Exxon purchased Reliant Electric, a manufacturing firm, and started up an office equipment company; Gulf Oil Company opened a uranium mine in northwestern New Mexico; ARCO bought Anaconda, a large mining concern; SOHIO purchased Kennecott, another mining company; and Mobil bought the Montgomery Ward retail chain.¹¹²

Since hydrocarbon production began, many smart people have made thousands of pessimistic predictions—each just as alarming and each just as wrong. Not only has the world's known supply of coal and hydrocarbons failed to disappear, it has actually grown—substantially! The proof of this lies in the fact that, despite temporary price spikes such as those experienced in 2004, finding costs and selling prices have declined over the long run. If fuel were becoming scarcer, its cost would be increasing.¹¹³

In addition to comparing inflation-adjusted prices over time, changes in scarcity can be measured by comparing the amount of labor time that an average worker needs to expend to earn the income to purchase a particular item. Major forms of energy have grown substantially cheaper measured in *work-time pricing* as seen in the figure on the following page.

So what happened? How could all of these people's predictions have been so mistaken? First, let's look at how they came up with their numbers. Most simply took the amount of *known recoverable reserves* of a particular resource and divided it by the amount that was being used each year. The result of the division was the number of years left, or *reserve years*. For example, suppose that a nation's geologists have located 200 million tons of coal, and that the country is using coal at a rate of ten million tons per year. They should expect to run out of coal in twenty years. How could there be problems with such a simple calculation?

The first problem is with the word "known" in the phrase "known recoverable reserves." What is known is constantly changing. People are continually searching for and finding more resources.

Exploration is expensive. It takes a lot of people, equipment, and time to find oil, coal, natural gas, and so on. Because exploration is so costly, it does

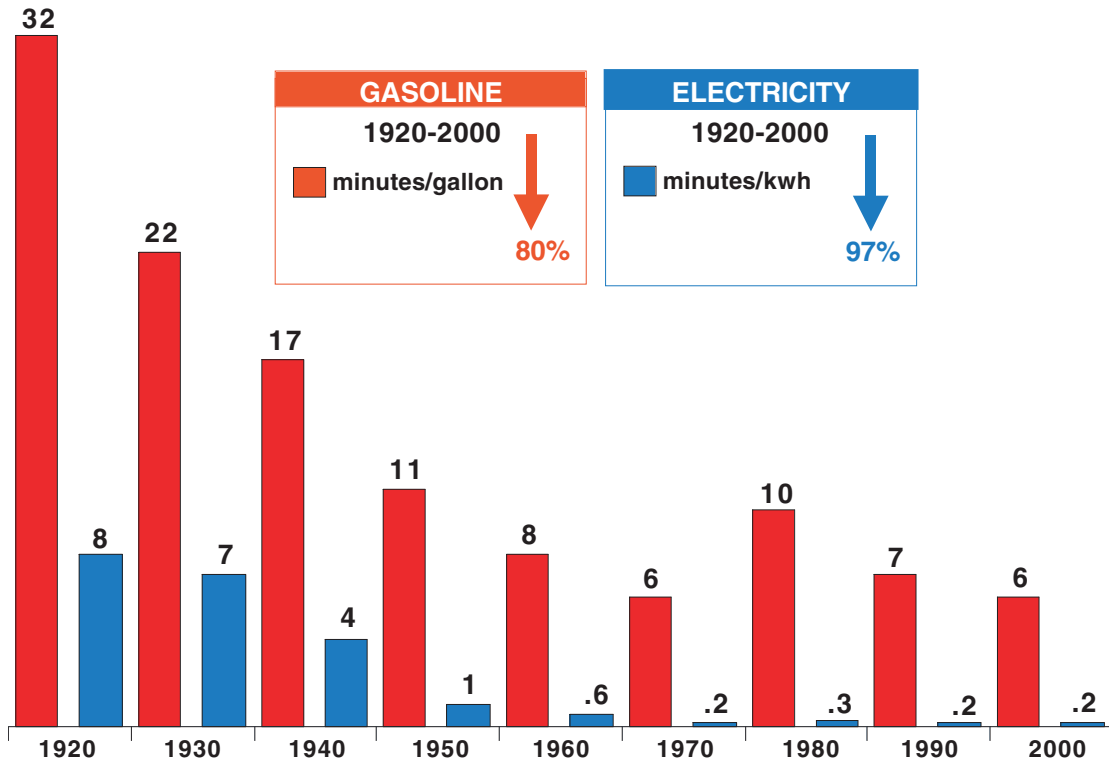
¹¹¹Quoted in Mark Mills, *Getting It Wrong: Energy Forecasts and the End-of-Technology Mindset*, Competitive Enterprise Institute, 1999, p. 12.

¹¹²Joel Darmstadter, Hans Landsberg, Herbert Morton, and Michael Coda, *Energy Today and Tomorrow: Living with Uncertainty* (Englewood Cliffs, NJ: Prentice-Hall, 1983), p. 13.

¹¹³Also see the graph on p. 50 on inflation-adjusted gasoline prices.

DECLINING WORK-TIME PRICE OF U.S. ENERGIES

Energy cost in terms of work time is the best measure of affordability. Today, the average laborer can buy a week's worth of gasoline and electricity for about 90 minutes of work. The same amount of energy cost a full workday in the 1920s. *Source: Myths of Rich & Poor* by Michael Cox. Copyright 1999 by Michael Cox and Richard Alm. Reprinted by permission of Basic Books, a member of Perseus Books, L.L.C.



not make much sense to look for resources that will not be needed for two or three hundred years. That is why the known reserves of so many resources often seem to fall in the range of fifteen to twenty years regardless of how many years have passed or how much of the resources have already been produced.

The next problem is with the word “recoverable.” What is really meant by this word is *economically* recoverable. No one is going to spend, say, \$100 to dig up a ton of coal if he can get only \$50 for it. Suppose, though, that the price goes up to \$150 per ton. Suddenly, that coal becomes worth mining. When prices change, the amount of reserves that can be recovered economically also changes. In addition, as the timeline (*Appendix A*) indicates, people often come up with better and more efficient ways of doing things. Suppose that someone invents a less expensive way to mine coal so that it now costs only \$25 per ton to dig. Even without a price increase, the coal is now worth producing.



U.S. Coast Guard

Finally, there is another problem with the simple “number-of-years-left” formula—the annual consumption rate. When conditions change, people’s actions change. If in the future natural gas became harder to find and produce, its price would rise, and the higher cost would encourage people to use energy more efficiently or simply use less altogether. Instead of keeping their homes so warm in the winter, maybe they would start wearing a sweater around the house. Or perhaps they would find substitutes for gas, such as petroleum from oil shale or tar sands. As these resources wane, fuel can be made from plant matter such as algae, seeds, and vegetable oils.

It is a mistake to confuse a *resource* with the *service* it provides. People want their homes to be warm and comfortable, but they do not really care whether it is done by burning coal or by splitting atoms. They want to be able to make a phone call; whether the call goes over thousands of tons of copper wire, is sent over a strand of fiber optics, or is beamed through the air by microwave is of no concern.

“Perhaps the very concept of exhaustible reserves ought to be discarded as wrong or irrelevant. Not much of the resources we know today will ever be used because better ones will be found. Or the need itself may disappear before the resource.”¹¹⁴

M. A. Adelman

¹¹⁴M. A. Adelman, “My Education in Mineral (Especially Oil) Economics,” *Annual Review of Energy and the Environment*, vol. 22 (1997), p. 26.

THE ULTIMATE RESOURCE

What is left out of the “number-of-years-left” equation is *human ingenuity*. People discover new and better methods of finding resources. They learn ways to conserve, and they find substitutes. Often people even find uses for substances that, before, no one ever thought of as resources. If energy is the *master resource*, then creative and knowledgeable people are the *ultimate resource*.¹¹⁵ Economists like Julian Simon argue that as long as people are free to use their minds and to act upon their ideas, the world will never run out of energy. Resources spring from knowledge, not the ground.¹¹⁶

A common mistake that many make is to project current trends into the future as if they will continue forever. The absurdity of making such assumptions can be demonstrated by a simple example. Suppose that a ten-pound baby doubles her weight in her first year of life. What reasonable person would become concerned by the fact that, if the child’s growth continued at the same rate (i.e., doubling every year), by age 10 she would weigh more than 5,000 pounds? Obviously, children do not keep growing at the same rate and the rate of change declines without any intervening catastrophe.

This is a far-fetched example, but consider the following actual occurrence. At the turn of the century, engineers warned that if demand for electrical power in the Chicago metropolitan area continued growing at then current rates, the city’s entire inner loop would be covered by power plants within a few years. In fact, the rate of growth *increased*, but Chicago was “saved” by a technological breakthrough. Reciprocating steam engines (which had been powering the city’s generators) were replaced by turbines with much higher power-to-size ratios.¹¹⁷

When Malthus looked at people, he saw mouths that must be fed and forgot the minds behind the mouths.¹¹⁸

“The evidence suggests that over the past century, new technology driven by free market forces has overcome the geophysical scarcity of nonrenewable natural resources. Increased reliance on markets during the closing decades of the twentieth century is cause for optimism that these trends will continue in the twenty-first.”¹¹⁹

Stephen Brown and Daniel Wolk

¹¹⁵Julian Simon named his book, *The Ultimate Resource*, to make exactly this point.

¹¹⁶Erich Zimmermann, *World Resources and Industries* (New York: Harper & Brothers, 1951), p. 10.

¹¹⁷Forrest McDonald, *Insull*, p. 98.

¹¹⁸Paraphrased from Peter Huber, *Hard Green* (New York: Basic Books, 1999), p. 10.

¹¹⁹Stephen Brown and Daniel Wolk, “Natural Resource Scarcity and Technological Change,” *Federal Reserve Bank of Dallas—Economic and Financial Review*, 1st Quarter, 2000, p. 9.

DISSENTING VOICES

Pessimists like Paul and Anne Ehrlich admit that advances in exploration technology and fuel efficiency have stretched world fossil fuel supplies far more than they had predicted. However, they argue that no matter how long supplies last, there must eventually be a point at which they can no longer be economically extracted. Regardless of the number of years remaining, whether 1,000, 2,000, or 10,000, to the best of our knowledge the supply is still finite.

In 1956, Geologist M. King Hubbert introduced an influential model that accurately predicted that oil production in the United States would begin a permanent decline around 1970.¹²⁰ His model, a bell curve, illustrated the rise, peaking, and decline in production over time. Another prediction, that global oil production would peak in 2000 proved premature, as did his forecasts of declining American and global natural gas production.

To delay the exhaustion of our fuel reserves, the Ehrlichs and others recommend imposing taxes on the use of carbon-based fuels. By raising their price, the higher taxes would discourage their use and encourage switching to alternatives. It is also argued that government could use the taxes to fund energy research.¹²¹

In the past, other societies have actually faced the exhaustion of their fuel supplies. "In an attempt to maintain supplies of wood fuel, [the ancient Egyptians] extended their empire further and further south. . . into the jungles of Africa."¹²² Some historians believe that they overextended themselves, leading to a decline in their power.

Similarly, in the sixteenth century, England's forests, which had long supplied wood for fuel as well as for building materials, were being rapidly depleted. Fortunately for the English, they found a substitute—coal. But coal required more technology to find and procure than did wood.

So when will the world's supply of fossil fuels be depleted? And when it is, will we have the technology to provide adequate substitutes?

The following table shows the world's proved and probable carbon-based fuel reserves as of 2002.

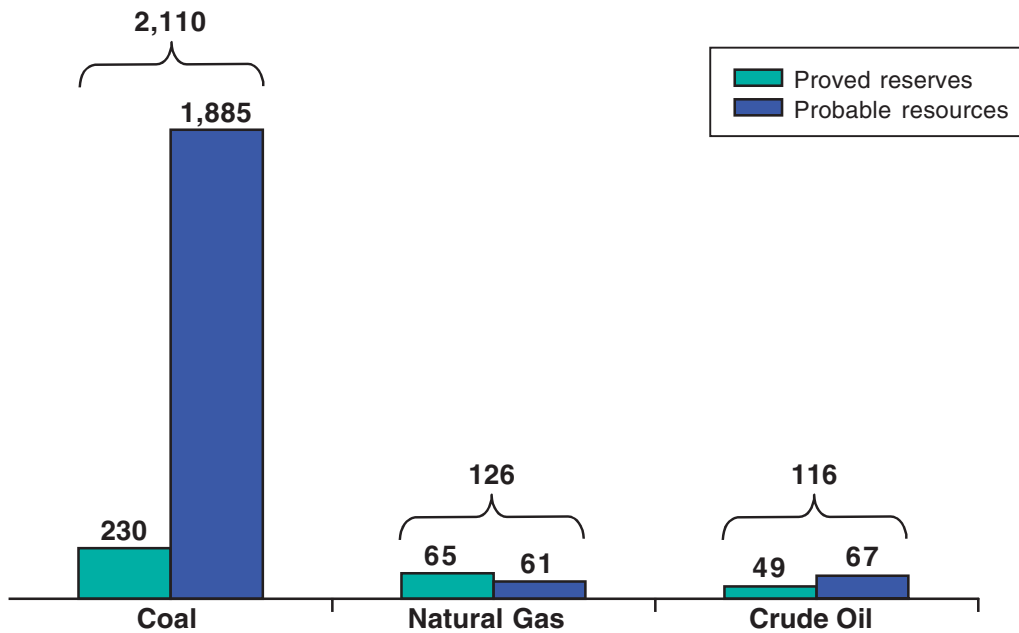
¹²⁰M. King Hubbert, "Nuclear Energy and Fossil Fuels," *Drilling and Production Practice* (Washington: American Petroleum Institute, 1956), pp. 16–18.

¹²¹Paul Ehrlich and Anne Ehrlich, *Betrayal of Science and Reason*, p. 96.

¹²²Edward Cassedy and Peter Grossman, *Introduction to Energy*, p. 6.

WORLD CARBON-BASED ENERGY SUPPLIES (YEAR-END 2002 ESTIMATE IN YEARS OF CURRENT CONSUMPTION)

Comparing proved reserves and probable resources, the world supply of coal is several times greater than that of oil and gas combined (on an energy equivalent basis). *Source:* See Appendix F.



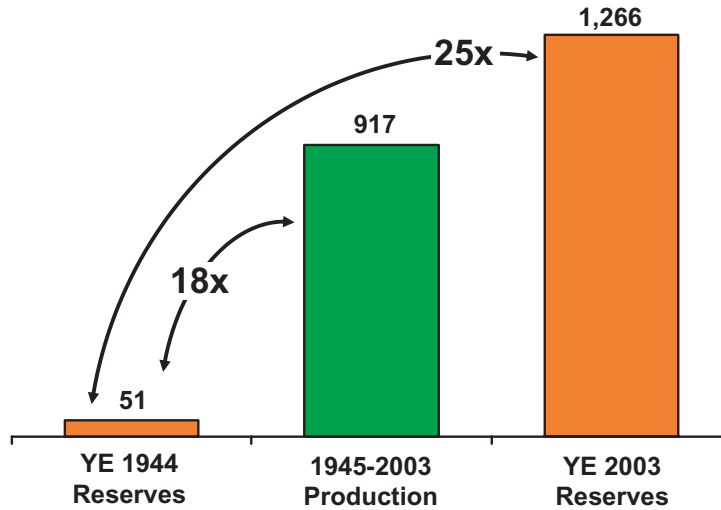
The term *proved reserves* refer to those resources that have been discovered and are currently economically recoverable, while *probable reserves* (sometimes called *resources*) include those additional amounts that can be expected to be recoverable under realistic price and technology changes. The estimates of years left in the chart are based on current consumption rates.

Hundreds of years of probable coal and hydrocarbon reserves remain at current consumption rates, though these rates will accelerate as China, India, and other poor nations industrialize. However, as people in these countries become freer, their know-how and financial capital can be expected to help make energy more plentiful and useful, not less.

Even in a worst-case scenario, resources would not disappear overnight. Instead, they gradually become harder and more expensive to find and produce. People would have time to develop the technology necessary to deal with the growing scarcity whether on the demand-side (increasing conservation) or

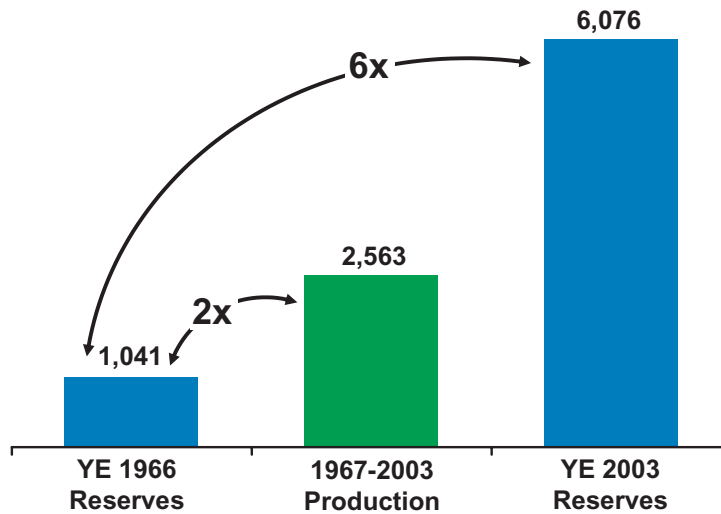
WORLD CRUDE OIL (BILLION BARRELS—PROVED RESERVES)

By the end of 1944, crude oil proved reserves were 51 billion barrels worldwide. After 58 years of production, reserves had grown to 1,266 billion barrels. In the United States over approximately the same period, 143 billion barrels of oil were produced while proved reserves increased from 20 billion to 23 billion barrels.¹²³ *Source:* See Appendix F.



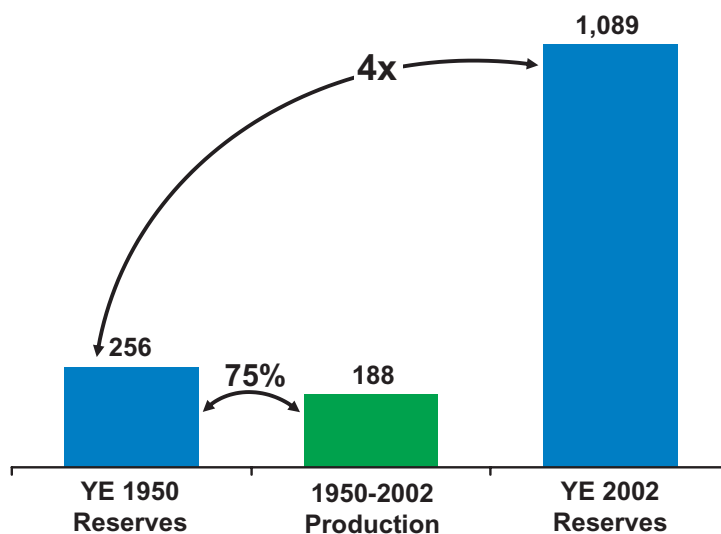
WORLD NATURAL GAS (TRILLION CUBIC FEET—PROVED RESERVES)

Even though 2,563 trillion cubic feet of natural gas were produced worldwide between 1967 and 2003, proved reserves increased six times—from 1,041 trillion cubic feet to 6,076 trillion. *Source:* See Appendix F.



¹²³Robert Bradley, Jr., *Julian Simon and the Triumph of Energy Sustainability* (Washington: American Legislative Exchange Council, 2000), p. 33.

WORLD COAL (BILLION SHORT TONS—PROVED RESERVES)
 From 1950 to 2002, world proved coal reserves increased more than fourfold from 256 to 1,089 billion short tons.¹²⁴ Source: See Appendix F.



supply side (developing substitutes). Changing price signals are key to these adjustments. In fact, energy transitions over the centuries have been, with few exceptions, “remarkably orderly.”¹²⁵

For example, when an oil well is first drilled, natural reservoir pressure is usually enough to force the oil through the well all the way up to the surface.¹²⁶ Once this pressure is depleted, other means of forcing the oil up the well bore are needed. Often pumps are used to pull the oil to the surface. Natural reservoir pressure together with pumps might recover a quarter of the original oil in place (OOIP).

Next, water can be injected into surrounding wells to push the oil towards production wells. *Waterflooding* will produce another five or ten percent of the OOIP. After that, steam or CO₂ injection might be employed. Typically, little more than a third of a field’s OOIP is ever recovered. “The remainder stays

¹²⁴A short ton is 2,000 pounds (907.19 kg) as opposed to a long ton, which is 2,240 pounds (1016.05 kg). A metric ton is 1000 kg or 2,105 pounds. In this book, the word “ton” will mean short ton unless otherwise noted.

¹²⁵Vaclav Smil, “Perils of Long-Range Energy Forecasting: Reflections on Looking Far Ahead,” *Technological Forecasting and Economic Change*, vol. 65 (2000), p. 257. Smil refers to the historical research done by Cesare Marchetti (at fn. 37, p. 264).

¹²⁶The terms “reservoir” and “pools of oil” are very misleading. People who hear them generally think of huge underground caverns filled with oil. In reality, there are no such caverns. Instead, the oil is contained in the pores, or “vugs,” of porous rock. The more porous, or “vugular,” the rock, the more readily the oil can flow towards the well bore.



PhotoDisc

behind as a potential target for new technology and/or future improvements in market conditions [i.e., higher prices].¹²⁷

Ultimately, oil can be mined from shallow fields. Tunnels are dug under the reservoir and holes are drilled up through the tunnel roofs into the reservoir itself. Gravity does the rest. Such mining techniques can recover more than 90 percent of a reservoir's oil. However, *oil mining* is very expensive and currently, at least, is rarely done.

Each successive recovery method is more difficult and more costly. But higher prices spur improvements in the short-to-medium term, and technological change drives down finding costs over the longer term. Offshore oil production is probably the best example of this.

As traditional crude oil reservoirs are depleted, other sources of oil will be tapped. For example, the United States has tremendous reserves of oil shale in the western United States. Globally, it is estimated that there is more than 200 times more oil in oil shale than in conventional petroleum reservoirs!¹²⁸ Extraction of petroleum from oil shale is expensive, but it will become cheaper as technology progresses.

Breakthroughs in technology have made possible the refining of thick tar or bitumen. Venezuela boasts perhaps a trillion barrels of the so-called "fourth fossil fuel"—an amount equal to the world's total proved reserves of crude oil. Another one-to-two trillion barrels of heavy oil is contained in the Athabasca oil sands of northern Alberta in Canada, several hundred billion barrels of which are now categorized as proved reserves or probable resources.¹²⁹

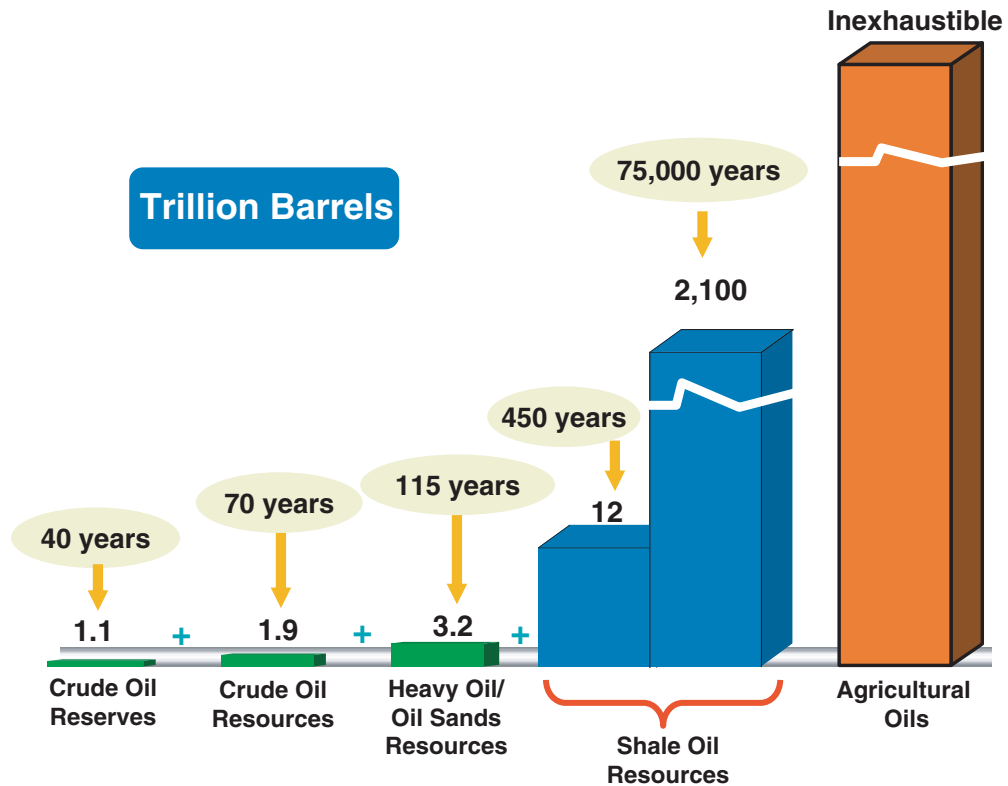
¹²⁷Edward Porter, *Are We Running Out of Oil?*, p. 8.

¹²⁸Bjørn Lomborg, *The Skeptical Environmentalist*, p. 128.

¹²⁹Estimate of the Alberta Energy and Utilities Board at http://www.eub.gov.ab.ca/bbs/products/newsletter/2003-06/feature_01.htm.

ESTIMATED GLOBAL OIL SUPPLIES

At year-2000 consumption rates, the world has many thousands of years of crude oil and crude oil substitutes (heavy oil, oil sands, and oil shale) remaining. These figures do not even take into account other carbon-based fuels such as coal and natural gas. Note that reserves in this context means proved reserves, and resources means probable future reserves. *Source: U.S. Energy Information Administration International Energy Outlook 2002, p. 32, and the U.S. Energy Information Administration International Energy Outlook 2001, p. 47.*



If a resource “depletes,” market signals change. Higher prices check consumption, and substitutes, which were previously uneconomical, are put into service.

As fossil fuel reserves are consumed, people will switch to synthetic oil and perhaps other sources of energy that we cannot even imagine today.

“As Sheik Yamani, Saudi Arabia’s former oil minister and a founding architect of OPEC, has pointed out: ‘the Stone Age came to an end not for a lack

of stones, and the oil age will end, but not for a lack of oil.' We stopped using stone because bronze and iron were superior materials, and likewise we will stop using oil, when other energy technologies provide superior benefits.”¹³⁰

Bjørn Lomborg, Danish professor of statistics

Remaining carbon-based deposits can satisfy the world's energy needs for hundreds or thousands of years. Long before that fuel is expended, technology will advance beyond anything we can possibly comprehend today. The progress in just the last century has been astounding, and the pace of change is accelerating. Worrying what people in the future will do for energy is a bit like a 19th century Arab stockpiling camel dung for the fuel needs of his 20th century descendants.

The table on the next page shows that humanity has a long tradition of overcoming shortages and leaving itself better off in the process. In fact, without the stimulus provided by need, much of the technology that we take for granted today might never have been created.

While M. King Hubbert was premature, perhaps by centuries, in his prediction that global petroleum production would peak in 2000, he got one thing right, eventually oil production will start to decline. But this will only happen when a cheaper, or otherwise better, source of energy is found.

No doubt the production of stone tools also followed a rising, then falling curve as people gradually shifted to bronze, and later to iron, implements. No doubt the graph of whale oil production followed a similar path.

Energy depletionists concentrate on current sources of energy and their inevitable decline. As a result, they see a bleak future for the world. Expansionists, by contrast, are less interested in any particular resource than in the service that it provides. Their view of the future is brighter because they choose to focus not on limited resources, but on the limitless human mind.

“*The main fuel to speed our progress is our stock of knowledge, and the brake is our lack of imagination. The ultimate resource is people—skilled, spirited, and hopeful people, who will exert their wills and imaginations for their own benefit, and so, inevitably, for the benefit of us all.*”¹³¹

Julian Simon

¹³⁰Bjørn Lomborg, *The Skeptical Environmentalist*, p. 120.

¹³¹Julian Simon, *The Ultimate Resource*, p. 348.

MAJOR RESOURCE SHIFTS IN HUMAN HISTORY

8,000 B.C.	Climatic changes and immigration in areas of the Near East make naturally occurring food scarce. As a result, people begin the shift from living as hunter-gatherers to living as farmers. ¹³²
1,000 B.C.	Because of a shortage of tin, the Greeks switch from bronze (an alloy of tin and copper) to iron. ¹³³
300 B.C.	Mayans living in the village of Kokeal (in what is now northern Belize) recycle flint tools because of a scarcity of local flint deposits. ¹³⁴
625 A.D.	Greeks switch from hull-first ship construction to frame-first construction in response to a timber shortage. The new technique not only saves large amounts of wood but time and labor as well. ¹³⁵
1550	The English start using coal as their primary fuel because a timber shortage has sharply increased wood prices. ¹³⁶
1860	The Petroleum Age begins in the United States. Though "rock oil" has been known for millennia, it has not been extensively used as a source of fuel until a scarcity of sperm whales drives up the price of whale oil.
1896	A timber shortage and rising wood prices cause the railroad industry, one of the largest timber consumers in the United States, to begin using wood more efficiently and to employ wood preservatives. In addition, the railroads find wood substitutes and begin to build bridges out of iron and concrete and rail cars out of steel. ¹³⁷ Later, in the 1920s, the railroad network stops growing in the United States altogether as people switch to automobiles as their favored mode of transportation. ¹³⁸
1941	The outbreak of World War II cuts off natural rubber supplies from the United States. America begins using recycled rubber and synthetics such as neoprene (created by DuPont in 1931), Butyl (invented by Standard Oil in 1936), and Ameripol (Goodrich, 1940). ¹³⁹

Pessimism is a grim master; it carries with it the seeds of failure. New challenges should be met with excitement and confidence, confidence born not of naiveté but of a history filled with obstacles faced and overcome. Our resources are limited only by our imaginations and by the freedom, knowledge, and drive needed to turn dreams into reality.

¹³²Charles Maurice and Charles Smithson, *The Doomsday Myth: 10,000 Years of Economic Crises* (Stanford, CA: Hoover Institution Press, 1984), pp. 113–15.

¹³³*Ibid.*, p. 105.

¹³⁴*Ibid.*, pp. 107–109.

¹³⁵*Ibid.*, p. 97.

¹³⁶*Ibid.*, p. 78.

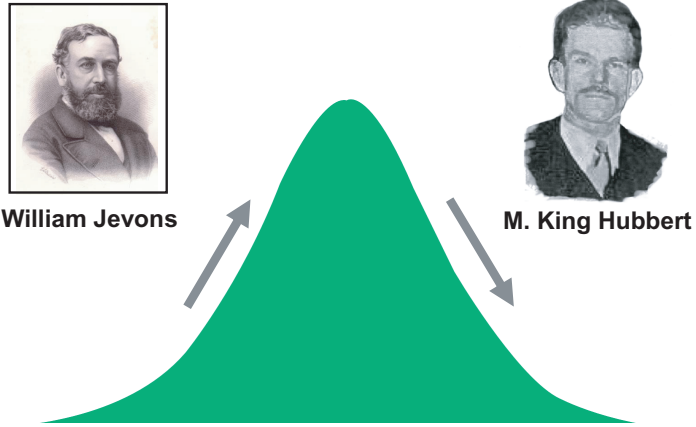
¹³⁷*Ibid.*, pp. 54–55.

¹³⁸J. R. McNeill, *Something New Under the Sun*, p. 310.

¹³⁹Maurice and Smithson, *The Doomsday Myth*, pp. 40–42.

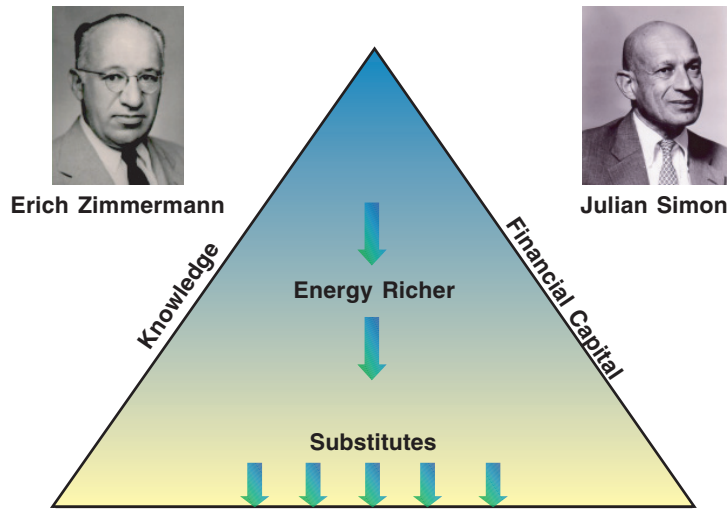
ENERGY DEPLETIONISTS

The traditional view of natural resource production, first formulated in the 1860s by English economist William Stanley Jevons and almost a century later by geologist M. King Hubbert, is that energy production will follow a bell curve—rising, peaking, and declining as reserves deplete.



ENERGY EXPANSIONISTS

Optimists like Erich Zimmermann and Julian Simon reject the pessimist's bell curve. Instead, they see an *energy pyramid*—expanding energy production as people use knowledge and capital to develop existing resources and discover new ones. Portrait of Erich Zimmermann courtesy of Center for American History, UT-Austin. Portrait of Julian Simon courtesy of Rita Simon.



People concerned about the impact of economic growth on finite resources are not the only doomsayers. Domestic oil producers and other industry allies also have promoted scary stories as part of an effort to win greater drilling incentives and more government research and development subsidies. Their message has been that without greater federal support for R&D, we could be faced with another 1970s-style energy crisis.

In 1995, an industry-led Department of Energy task force on research and development concluded, "There is growing evidence of a brewing 'R&D' crisis in the United States—the result of cutbacks and refocusing in the private-sector R&D and a reduction in federal R&D." The report warned, "The loss of our 'inventiveness'—that is, our store of human and intellectual capital—would change America's future."¹⁴⁰

¹⁴⁰Secretary of Energy Advisory Board, *Energy R&D: Shaping our Nation's Future in a Competitive World* (Washington: U.S. Department of Energy, 1995), p. 3.

Yet Daniel Yergin, the leader of the task force, testified before Congress eight years later that “a technological revolution is changing the economics and capabilities of the oil industry. . . . What technology does is lower the costs and expand the horizons. And it keeps pushing the day of shortage and depletion into the future.”¹⁴¹

What did the DOE do between 1995 and 2003 to change a looming R&D crisis into a “technological revolution?” Not much. Industrial technology continued to advance through a tangle of government incentives and disincentives much as it had before.

CREATING ONE CRISIS. . .

While high resource prices can be painful in the short-term, they are really symptoms of deeper problems. They serve as warnings of shortages, and, at the same time, provide incentives for overcoming those shortages. Using price controls to solve the problem of rising prices is like trying to cure a child’s fever by adjusting the thermometer.

By eliminating the feedback that free-market prices provide, price controls can quickly create shortages where none existed before or make existing shortages worse. To understand how this can happen, consider a commodity like apples. Right now there is no shortage of apples; we can go to any grocery store and buy more than we could possibly eat in a month. Suppose, though, that the president of the United States were to announce that from now on, apples will cost only a penny apiece. Within a day or two, they would disappear from the stores.

Why? Well, at one cent each, the demand for apples would skyrocket. Who could resist a bargain like that? On the other hand, at that price who could afford to grow and harvest apples, much less transport them to stores? Forcing prices below their natural market levels encourages consumption and discourages production. The inevitable result is a shortage.¹⁴²

This sort of thing has happened repeatedly in the United States with energy production. For example, to help finance both World Wars, the federal government inflated the money supply.¹⁴³ This resulted in rapidly rising prices as the number of dollars increased faster than did the production of goods and services that the dollars could purchase. The government responded with price controls. By keeping the price of fuel below its market-clearing price, these controls encouraged consumption and discouraged production—the

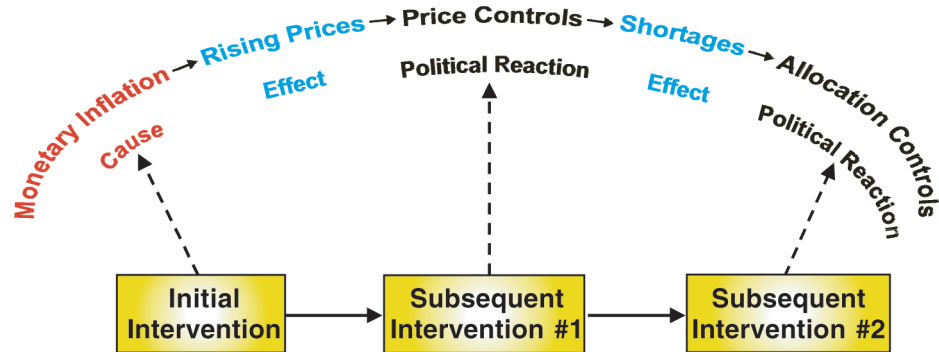
¹⁴¹Daniel Yergin, quoted in Neela Banerjee, “Oil’s Pressure Point,” *New York Times*, April 3, 2003, p. 3–1.

¹⁴²Conversely, a surplus (or oversupply) can be caused by artificially setting the price too high, as the federal government does for some farm products. High prices discourage consumption and encourage production. The result is often government warehouses bulging with unsold goods. Such overproduction means that resources were wasted (and pollution generated) to produce products that no one wants.

¹⁴³Inflation is a general rise in prices virtually always caused by a government printing too much money or expanding credit (and with it, debt—the flip side of credit) excessively.

DYNAMICS OF INTERVENTIONISM

Government intervention into the economy often is a *cumulative process*. The most common scenario in energy has been triggered by monetary inflation (the *initial intervention*) causing prices to rise. This is followed by *subsequent intervention*: price controls to address inflation, and allocation controls to address the shortage created by price regulation.



precise opposite of what was needed. In each case, a boom in oil production and a drop in prices followed post-war decontrol, thus clearly revealing the self-defeating nature of the government’s intervention.

To help finance the war in Vietnam and the War on Poverty, President Lyndon Johnson again inflated America’s currency. Johnson’s successor, Richard Nixon, tried to treat the symptoms of inflation by imposing wage and price controls in 1971. These controls, coming during the driving season and before winter, locked in seasonally high gasoline prices and low fuel-oil prices.

As a result, refiners were encouraged to continue gasoline production at the expense of fuel-oil yields. With the coming of cold weather, heating oil supplies became tight. The federal government, along with some state governments, readied, and in some cases implemented allocation plans for fuels in short supply (butane, propane, natural gas, and fuel oil). In August 1973, the newly created Office of Energy Policy unveiled an allocation plan to be used in the event that fuel oil shortages occurred during the coming winter.¹⁴⁴

On October 6, 1973, Egypt and Syria attacked Israel on Yom Kippur, a Jewish holy day. After 16 days of fighting, the war ended in a truce. Because the United States and the Netherlands had supported Israel during the brief fight, Arab oil producers declared an embargo against both countries (that is, they refused to sell them oil).

¹⁴⁴Robert Bradley, Jr., *The Mirage of Oil Protection* (Lanham, MD: University Press of America, 1989), p. 133.

However, because of the way in which world petroleum markets work, oil exports still flowed to the two countries, and the embargo itself had little effect. What did have an impact, though, was that the Arabs also cut their oil production, dropping total world production by almost 5 percent.

The embargo lasted only about six months, and, other than a brief rise in prices, there should have been little inconvenience for American consumers. Unfortunately, President Nixon's price limits put oil companies in a bind. Even though the amount they had to pay for crude oil on the world market was going up, they could not legally pass their costs on to their customers.¹⁴⁵ Consumers, who would have been encouraged to conserve had the prices they paid at the pump been allowed to rise, saw no need to use less. At the same time, because oil companies were getting so little on the sale of their products, they had no incentive to produce more.

To correct this imbalance, the government revised its regulations to allow higher prices for imported oil and for "new oil" (i.e., oil produced from newly drilled domestic wells). The intention was to encourage companies to increase production and alleviate the supply problem.

As there were no physical differences between "old" and "new" oil, some companies illegally sold "old" oil as "new" so that they could charge more for it. A legal way of *gaming* the system was for two companies to sell oil back and forth to jack up the price (a practice known as "daisy chaining"). The government responded by requiring that for a sale to be legal, the oil had to be physically moved to ensure that the sale provided added value.

The government also tried to ease the shortage by rationing gasoline and dictating the amounts of fuel sent to each part of the country (shortfalls caused by price controls almost always trigger allocation controls). Some areas ended up with more gasoline than they needed, others far less. In fact, even though world supplies had dropped by less than 5 percent, some regions saw their supply levels fall as much as 25 percent below normal.

The predictable result of all this was the Energy Crisis, complete with gasoline shortages and long lines at service stations in many cities around the country.

¹⁴⁵A few service station owners did charge higher prices *illegally*, however. Some of these owners were arrested and fined for price gouging. And yet, who was hurt by this crime? Their customers had the option of waiting in line to buy gas at the controlled price, or paying more with no wait. Some chose to exchange additional money for time. Should they have been allowed that choice? Other consumers found a way to exchange money for time legally. They hired surrogates to wait in the long gas lines for them. Clearly, though, this is a very inefficient and expensive way to get a fill-up.

Under free market pricing, product allocation is handled automatically. Suppose, for example, gasoline demand rises more quickly in Los Angeles than in New York City, causing prices to go up in L.A. Oil companies, seeing an opportunity to increase profits, will shift gasoline to the West Coast. As supplies increase, prices will fall until the companies have no more incentive to send additional gasoline to the area.

An economically rational allocation of goods and services is impossible without market prices to signal relative scarcity or abundance.

Lines at American gas stations reappeared in 1979 after the Iranian revolution triggered a second oil embargo. As M. A. Adelman stated in testimony before Congress, “The gasoline shortage was very small, perhaps 3 percent. Absent price control, there would have been a price increase, less than what actually occurred. But given price control, there had to be allocation: product by product, week by week, place by place. There was pressure on refiners to turn out more heating oil, then more gasoline, then more heating oil again. . . . Scattered shortages led to hoarding and panic buying and worse shortages yet—and those gasoline lines. No other consuming country cooked up this kind of purgatory for itself.”¹⁴⁶

Such shortages and misallocations were not fully resolved until 1981, by which time price controls on crude oil and various petroleum products had been lifted.

During the Iran-Iraq war, which lasted from 1980 to 1988, world production was cut by much more and for a much longer time than during either of the two oil embargoes (see the figure on the following page). By then, however, price controls had been largely removed, and there were neither fuel oil shortages nor lines at gasoline stations.

In hindsight, the confusing swirl of regulations that the government spewed out during the 1970s oil crisis gave consumers the worst of both worlds—higher prices and shortages. Like a pebble dropped in a pond, each government action rippled through the economy in ever-widening circles, yielding unforeseen consequences and creating demands for additional government intrusion.

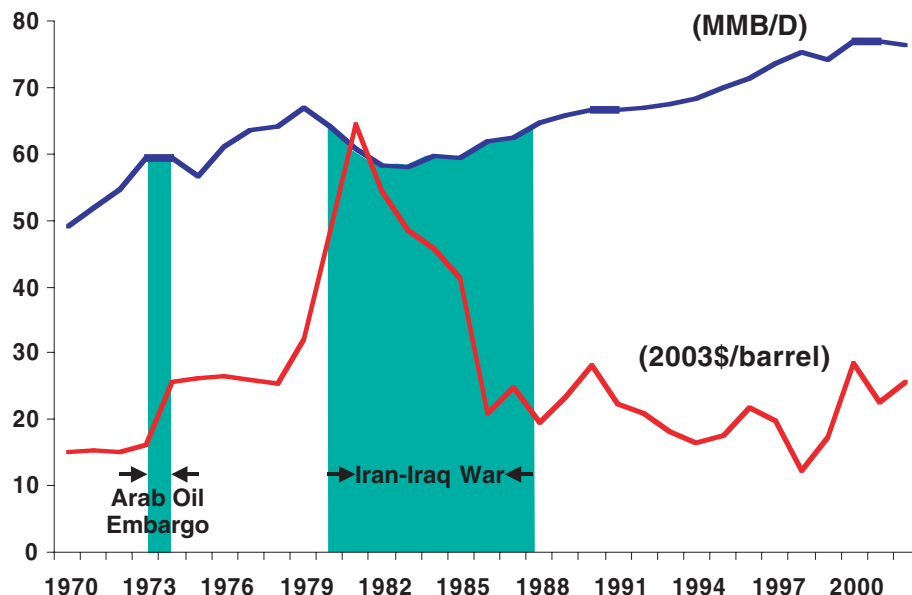
. . . AFTER ANOTHER

More recently, the state of California faced its own energy crisis, caused by a series of “acts of God,” coupled with price controls. In 1996, the state deregulated (or rather re-regulated) the electrical power industry in such a way that wholesale electricity prices (prices at which power companies buy electricity for resale

¹⁴⁶M. A. Adelman, *Limiting Oil Imports*, hearing before the subcommittee on energy regulation, U.S. Senate, 96th Cong, 1st Sess. (Washington: Government Printing Office, 1980), p. 95.

WORLD CRUDE OIL OUTPUT & INFLATION-ADJUSTED PRICES: 1970-2003

As this graph illustrates, the drop in world oil production (shown in million barrels per day) that occurred as a result of the Iran-Iraq war was deeper and longer than the drop caused by the Arab Oil Embargo. Yet the impact on American consumers was much smaller. The difference was that price and allocation controls had been lifted before the war. *Source:* See Appendix F.



to customers) were free to rise or fall with changing market conditions, while retail rates (prices consumers pay) remained capped under state control.

Under the new regulations producers sold their electricity to a centralized state-managed power exchange at a price set by the spot market on the previous day.^{147,148} Utilities purchased their power from this exchange for resale to the public.

¹⁴⁷Under the rules, sales were made through a “reverse Dutch auction” in which all buyers pay the last price accepted during each day’s trading. At the time that this scheme was established, power generation capacity was plentiful, and there was a *buyers’ market* (that is, market conditions favored buyers). Under such conditions, a reverse Dutch auction tends to drive prices down. In a *sellers’ market* when supplies are tight, however, this scheme drives prices up.

¹⁴⁸Despite reports to the contrary, utilities were not *required* to purchase power from the Exchange at spot market prices, and *could* enter into long-term purchasing contracts with suppliers. However, any such contracts would be subject to prudence reviews whereby the California Public Utilities Commission (CPUC) could decide years after the fact that the utility had paid too much for its power. Should this happen, the utility could be required to pay back the difference between the price it paid and the price the CPUC decided it should have paid. Under such circumstances, utilities generally refused to enter into long-term contracts.

As long as plenty of power generation capacity was available, the new system worked fairly well. But in 2000, a lot of things suddenly went wrong. During that year, California had an unusually hot summer followed by an unusually cold winter. In addition, a three-year dry spell had drawn down water reservoir levels and reduced regional hydroelectric power generation by some 20 percent. Transmission line capacity problems and power plant maintenance put even more strain on the system.

On top of all this, the availability of some power plants was reduced because of environmental restrictions. During the hot summer, the plants had used up their allotted air emission allowances, and the cost of the additional allowances needed to enable their continued operation was prohibitively high.¹⁴⁹

According to the California Energy Commission, 11 relatively small plants with a combined generating capacity of 1,206 megawatts came on line in California during the 1990s. Still, statewide generating capacity fell by 1.7 percent between 1990 and 1999, while demand rose by 11.3 percent during the same period.¹⁵⁰

There are no coal plants in California. Nearly half of the state's electricity, and all of its peak capacity, are generated from natural gas. Therefore, the increase in demand for electric power caused by the weather, coupled with the loss of hydroelectric power, triggered a jump in demand for natural gas. While the state's four major pipelines were adequate under normal circumstances, they lacked enough spare capacity to handle all the gas that the market needed under such extreme conditions.

As a result, natural gas prices shot up and the cost of generating electricity rose with them. Unfortunately for the state's utilities, they were not allowed to pass those costs onto their customers, and they quickly went billions of dollars into debt.

In September 2000, California attempted to control rising prices by imposing a cap of \$250 per megawatt-hour (MWh) for electricity sold to the state power exchange. According to Jerry Taylor, "Since wholesale prices ranged between \$150–\$1,000 per MWh depending on the time of day, generators responded by dramatically curtailing their sales to the California exchange."¹⁵¹

Demand quickly outstripped supply. Rolling blackouts affecting more than 675,000 homes, were used to ration power (that is, electricity was pur-

¹⁴⁹U.S. Energy Information Administration, *International Energy Outlook 2001* (Washington: Department of Energy, 2001), p. 127.

¹⁵⁰U.S. Energy Information Administration, *Annual Energy Outlook 2001* (Washington: Department of Energy, 2001), p. 30.

¹⁵¹Jerry Taylor, "Did Deregulation Kill California?," *Ideas on Liberty*, June 2001, p. 47.

posely cut off from one area for a few hours, then power was restored and another area cut off, and so on).¹⁵²

Although the California Public Utilities Commission (CPUC) approved small price increases in January 2001 and larger ones a few months later, they chose to leave retail price controls in place. Instead, the state paid the difference (or at least some of the difference) between wholesale and retail prices with tax dollars. In the first half of 2001 alone, the state spent more than \$8 billion for electricity.¹⁵³ So, in the end, Californians as *taxpayers* paid what Californians as *consumers* did not. They got the worst of both worlds: high prices *and* blackouts.

Struggling to find a way out, California Governor Gray Davis considered placing the power plants under state control. He and state officials even threatened to jail power-company executives who charged what the state called “excessive” prices. The most likely result of such threats is to scare off investors who might consider building power plants in California in the future. Will anyone really want to spend lots of money to build a power plant if their only reward could be the loss of their investment or even their freedom?

“Whenever there is a shortage of bread, the first thing people do is burn down the bakeries.”

Ortega y Gasset, Spanish philosopher

Although generators outside the state picked up the slack (more than 20 percent of California’s power came from outside its borders), actions by the state and federal governments made it economically risky to sell power to California.

The federal government ordered power companies in neighboring states to continue to sell power to California’s utility companies even though there was no guarantee that these nearly bankrupt utilities would be able to pay them back. This ruling hurt consumers in those states in two ways. First, it raised their electricity rates. Second, it increased the financial risk of running power plants in bordering states, and will probably make utilities think twice before building new facilities there.

Still, Governor Davis demanded further intervention by the federal government. Among other things, he wanted the Federal Energy Regulatory Commission (FERC) to cap power generator’s profits at five percent of the cost of production. Under such a scheme, the companies could actually make more money by running up their costs and being as inefficient as possible!

¹⁵²U.S. Energy Information Administration, *International Energy Outlook 2001* (Washington: Department of Energy, 2001), p. 127.

¹⁵³Rebecca Smith and Richard Schmitt, “Electricity Price Controls in West Are Set,” *The Wall Street Journal*, June 19, 2001, p. A2.

Governor Davis also asked that price controls be imposed on the entire western region of the United States. If controls were to be effective, it was argued, they had to be applied to a large area to keep producers from diverting power away from California and toward uncontrolled states. In the face of rising political pressure to “do something,” FERC gave in and on June 18, 2001, placed caps on regional wholesale energy prices. The order, which remained in effect until September 30, 2002, covered the area west of Kansas comprising almost 65 million people and nearly half of the continental United States.¹⁵⁴

Within two weeks of the ruling, Las Vegas, Nevada, experienced blackouts. This was due to a clause in FERC’s regulation stating that in the event of a power emergency, producers could charge Californians 10 percent more for electricity than they could consumers in other states. When July temperatures soared over 110°F in Nevada and eastern California, power producers sent their electricity where it could command the most dollars, and Las Vegas went without.

In another effort to head off rolling blackouts, the California Public Utilities Commission established the *Optional Binding Mandatory Curtailment Program*. Companies that signed up under the program agreed to cut their power consumption by as much as 15 percent within 15 minutes of a request by the CPUC. In return, the companies would be exempt from any rolling blackouts necessitated by severe power shortages. Power usage over the targeted level would be billed at \$6,000 per kilowatt-hour.

The problem lay in determining the baseline from which the 15 percent reduction was calculated. It was defined as a firm’s average consumption during the 10 working days before a request for power curtailment. A number of companies that signed up for the plan immediately started using as much power as they could to make it easy for them to meet their targeted reductions. In the end, the program probably made blackouts more, rather than less, likely.¹⁵⁵

California’s complex regulations allowed people to game the system in other ways as well. For example, suppliers were allowed to charge higher prices for imported electricity than for power generated within the state’s borders. Some companies took advantage of these rules by selling electricity generated in California to out-of-state affiliates and then reselling the same power back to Californians as “out-of-state” power.

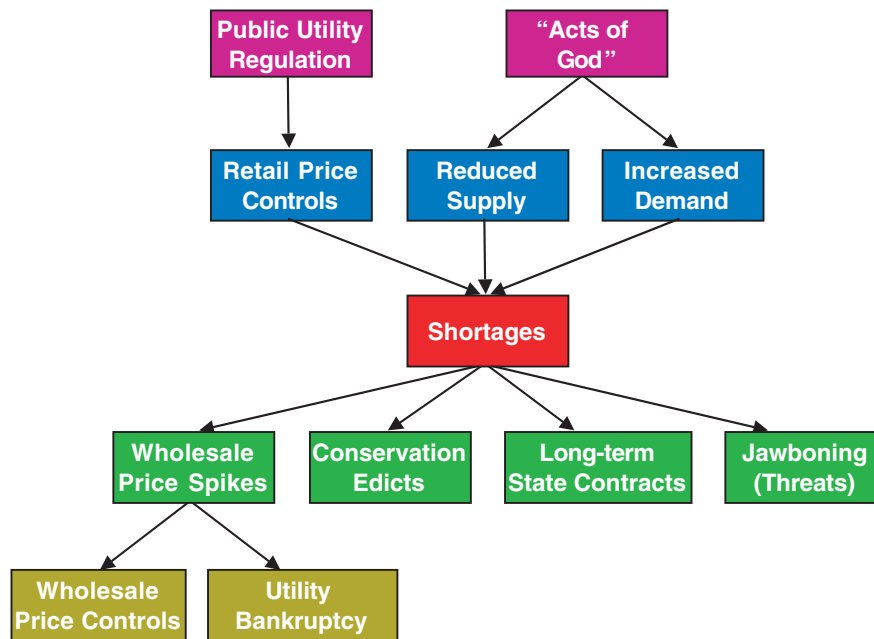
The crisis finally ended during summer 2001 despite the fact that it was generally warmer than the summer before and more electricity was needed for air conditioning. The higher retail rates permitted by the state government, a slowing economy, and conservation programs all combined to reduce demand. In addition, new power plants went on line, and maintenance was com-

¹⁵⁴Ibid.

¹⁵⁵Joseph Menn, “Rule May Spur Firms to Waste Energy,” *Los Angeles Times*, July 2, 2001, p. A1.

CALIFORNIA ELECTRICITY CRISIS: 2000-2001

California’s power crisis was triggered by natural events and regulatory constraints that combined to give the state the worst of all worlds: physical shortages and wholesale price spikes. Rather than deregulate, authorities got deeper into the market by regulating wholesalers, launching new conservation programs, and signing long-term contracts.



pleted on a number of older plants. Further, natural gas production increased significantly (up 4 percent in the United States and 8 percent in Canada), resulting in lower fuel prices.

In hindsight, it seems clear that the market would have ended the crisis without all the sound and fury generated by both the state and federal governments. Unfortunately, politicians wanted voters to see them doing *something* during the crisis, and that led them to create bureaucratic solutions that will no doubt get in the way for years to come.

For example in January and February 2001, at the height of the crisis, the state of California negotiated long-term (10- to 20-year) contracts with power suppliers. Less than a year later, however, the *Los Angeles Times* reported that market prices for power had “collapsed to roughly \$30 per megawatt-hour—less than half of the average price in the long-term contracts.”¹⁵⁶ In the end, consumers will pay the tab for yet another failed experiment in price control.

¹⁵⁶Nancy Vogel, “The State: Power Contracts Improved After Freeman Left,” *Los Angeles Times*, December 27, 2001, p. B8.

One of the subplots of California's power shortage was the political posturing and finger pointing that the crisis engendered. During his re-election campaign, California Governor Gray Davis worked hard to keep any blame for the debacle away from his door. In the process, he made inflammatory comments about "price-gouging" by private power companies. However, in July 2001, lawsuits forced Davis to reveal how much city-owned utilities had been charging for their power during the energy crunch. It turned out that the government-owned producers had charged an average of \$344 per megawatt hour, while privately-owned companies charged less than \$250.¹⁵⁷

. . . AND ANOTHER

The sharp jumps in motor fuel prices experienced in the United States during 2000, 2001, and 2004 were not due to resource shortages, but rather to:

- Output quotas by OPEC. The cartel controls nearly 40 percent of the world's production and can change world crude prices overnight simply by announcing new quotas for its member nations.
- Political turmoil in Venezuela, a major oil producer.
- Unexpectedly high demand from India and China.
- Terrorist acts in Saudi Arabia (2004).
- Too little refinery capacity and too many regulations.

In spring 2001, refineries were operating at 96 percent of capacity in preparation for the summer driving months. But despite running nearly flat out, they were unable to meet demand in a manner to which Americans had become accustomed. Prices shot up.

Normally, companies seeing such high demand and high prices for their products would expand production. However, the long-term trend for refinery product prices has been downward. Temporary price spikes are not enough to justify the huge cost of constructing new facilities that will take years, not months, to complete. Although companies are expanding some existing refineries in the face of rising demand, because of thin profit margins, no new plants have been built in the United States in 25 years.

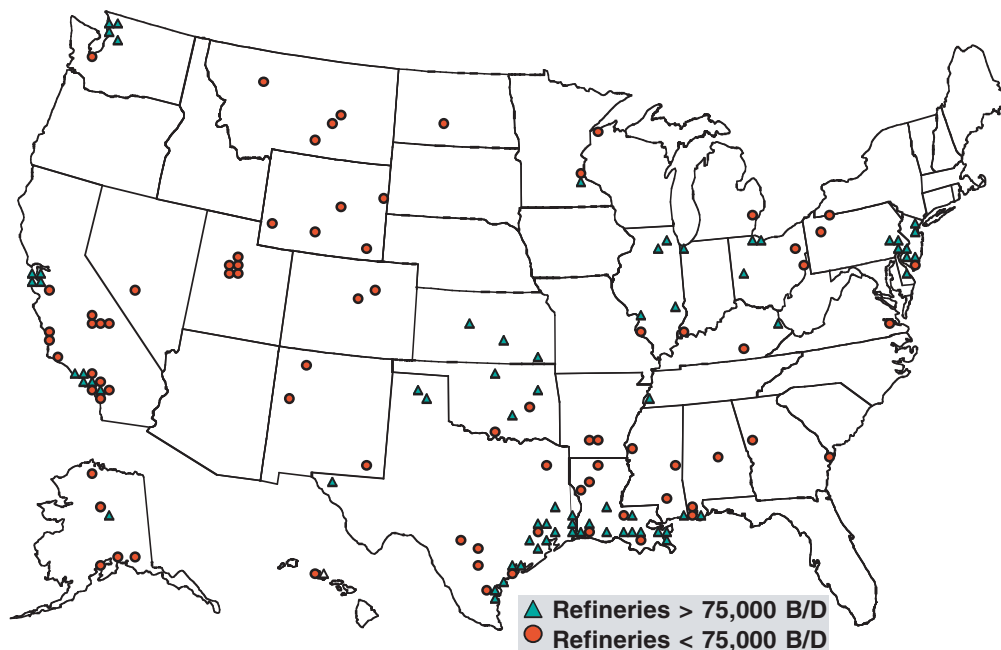
Under such conditions, with relatively few refineries all running at or near capacity, even one plant shutting down (either due to problems or for routine maintenance) can have a severe impact on the nation's fuel supplies.

Making matters worse is that city and state governments around the country have mandated that the gasoline sold locally must meet special environmental rules. As Senator Frank H. Murkowski (R-Alaska), then chairman of the Senate Energy and Natural Resources Committee and later governor of Alaska, said, "Part of the problem is that fuel made for consumption in Oregon

¹⁵⁷Jerry Taylor and Peter VanDoren, "The Suits Tell the Tale," *National Review Online*, July 27, 2001.

U.S. REFINERIES - 2002

This map shows the locations and sizes of U.S. refineries as of 2002. Note that facilities are concentrated in coastal areas where they can receive crude oil and ship refined products by tanker. *Source:* The National Petrochemical and Refiners Association based on data from the U.S. Energy Information Administration *Petroleum Supply Annual*, vol. 1, pp. 83–97.



is not suitable for California. Fuel made for distribution in western Maryland cannot be sold in Baltimore. Areas such as Chicago and Detroit are islands in the fuel system and require special 'designer' gasolines."¹⁵⁸

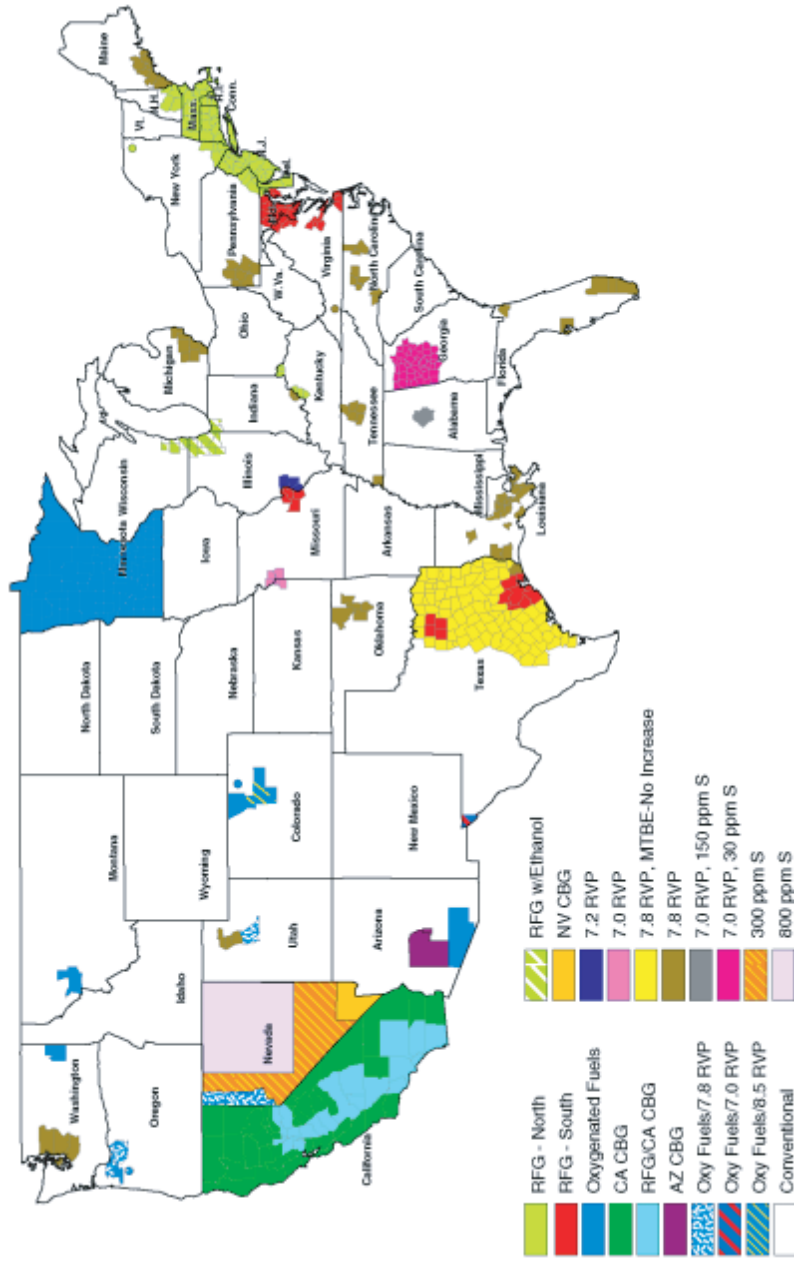
This confusion of laws eliminates flexibility. If a refinery producing gasoline for Chicago has to shut down for whatever reason, fuel from other areas cannot be readily shipped in to make up the difference.

Typically, when gasoline prices rise, the government's first reaction is to investigate the oil industry for possible "price gouging." Since 1973, there has been an average of about one investigation every two years. Each new investigation has begun amid ringing speeches and banner headlines, and each has cleared the industry of any wrongdoing. Often, in fact, the studies have shown that government actions were at the root of the problem. These findings usually get very little media attention.

¹⁵⁸Quoted in Peter Behr, "Kicking the Gasoline 'Cocktail' Habit: Different Mixes of Grades, Ingredients in Localities Driving Costs Up," *Washington Post*, April 29, 2001, p. H1.

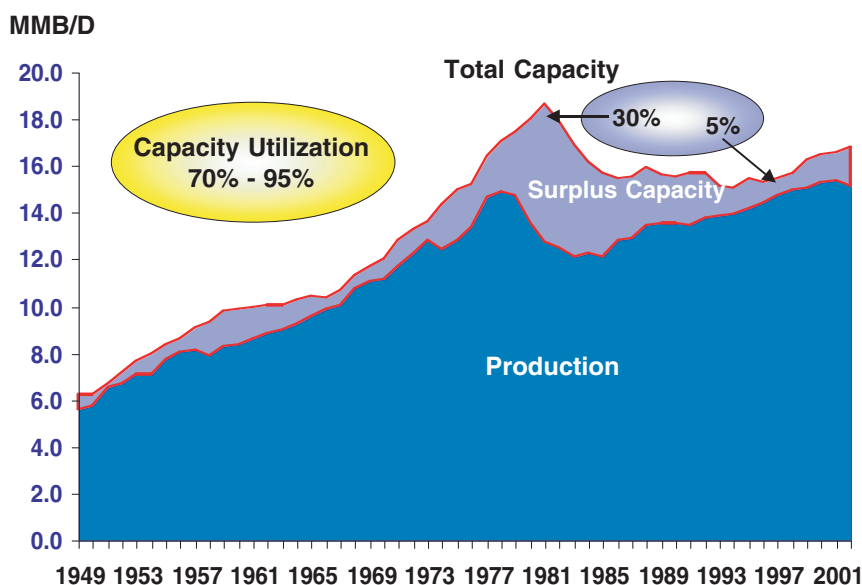
BOUTIQUE GASOLINES: 2001

About 20 different reformulated gasolines have been imposed on U.S. metropolitan areas not in compliance with the Clean Air Act. *Source:* American Petroleum Institute.



U.S. REFINERY CAPACITY & UTILIZATION: 1947-2001

The bars in this chart represent U.S. refinery capacity in millions of barrels per day, and the red line indicates the percent utilization of that capacity. While refinery capacity has increased thanks to retrofits and plant expansions, facilities are still running more than 90 percent full. *Source: U.S. Energy Information Administration, Annual Energy Review 2002, p. 143.*



ENERGY SECURITY

As the following chart shows, 60 percent of the United States' petroleum needs are supplied by imports, over 40 percent of which come from OPEC nations.

Many in this country are concerned about the growing dependency on foreign oil—especially on oil from nations not always friendly to the United States. In the past, government efforts to reduce imports have centered on *tariffs* (that is, taxes on imported oil), *quotas* (maximum allowable imports), or *subsidies* to domestic producers. These strategies all mean higher energy prices, higher taxes, or both. While domestic energy companies may be helped by such measures, they hurt every other industry along with every consumer.

Tariffs and quotas can anger countries that export to the United States and lead to reprisals. The most dramatic example was the creation of the *Organization of Petroleum Exporting Countries* (OPEC) in 1960 in response (at least in part) to the Mandatory Oil Import Program (MOIP), signed into law by President Eisenhower in 1959.¹⁵⁹ The MOIP placed quotas on the amount of oil that could be imported into the United States.

Tariffs, quotas, and subsidies generally do more harm than good, and free market economists question whether oil imports are even a problem that must be “solved” in the first place. Consider two countries, Great Britain and Japan. Thanks to North Sea production, the United Kingdom became completely self-sufficient in petroleum in the 1970s. By contrast, Japan must import all of its

¹⁵⁹Robert Bradley, Jr., *The Mirage of Oil Protection*, p. 67.

U.S. PETROLEUM IMPORTS VS. DOMESTIC PRODUCTION (2003)

	Volume (1,000 B/D)	% of Total Imports	% of Total U.S. Supply
1. Canada	2,068	17	10
2. Saudi Arabia	1,772	14	9
3. Mexico	1,589	13	8
4. Venezuela	1,385	11	7
5. Nigeria	873	7	4
6. Iraq	470	4	2
7. Britain	428	3	2
8. Algeria	397	3	2
9. Angola	370	3	2
10. Norway	255	2	1
Other	2,647	22	13
Total Imports	12,254	100	61
OPEC Imports	5,175	42	26
Arab OPEC Imports	2,484	20	12
U.S. Production	7,875	—	39
Total US Supply	20,129	—	100

Source: U.S. Energy Information Administration, *Petroleum Supply Monthly*, February 2004, pp. 6, 42, 48–55, available at www.eia.doe.gov/emeu/mer/petro.html

oil. Yet each country pays about the same for petroleum as does the United States (though because of high energy taxes, consumers in both Japan and the U.K. end up paying a lot more for “petrol” than they do in the United States).

At first this may seem strange, yet consider what would happen if a barrel of oil sold for \$40 in Tokyo and for \$30 in London. To increase their profits, entrepreneurs would immediately start sending more petroleum to Japan. As supplies rose in Japan, the price of oil there would drop until an additional barrel would fetch no more on the market in Tokyo than in London after adjusting for transportation costs and other differentials.¹⁶⁰

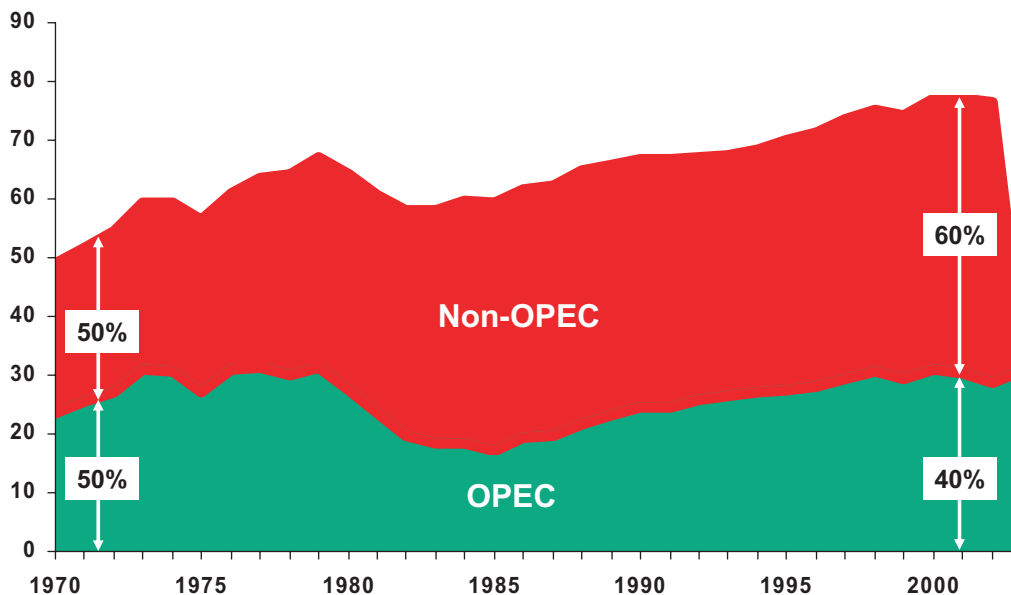
These same market processes make it virtually impossible for OPEC to cut off oil supplies to any single country. Suppose, for example, that Arab producers decide that they will no longer sell to the United States, and instead their oil will go only to Europe. As long as OPEC produces the same amount of oil, the effect on the United States would be negligible. Europe, now getting its fuel from the Middle East, would no longer need to purchase oil from other suppliers. These

¹⁶⁰This example emphasizes the fact that today’s oil markets truly are global. Even if the United States were to become self-sufficient in petroleum, American consumers would still pay world prices for each barrel of domestic oil.

OPEC vs Non-OPEC PRODUCTION: 1970–2003

The share of non-OPEC production has risen since the first energy crisis in 1973–74 to more than 60 percent of world production. *Source: U.S. Energy Information Administration, International Petroleum Monthly, February 2004, Table 1.4.*

MMB/D



suppliers, looking for new buyers for their product, would sell to the United States. Furthermore, Europeans could turn around and resell Arab oil to Americans just as they did during the seventies oil embargo.

The only way that OPEC can really hurt the United States is by cutting back production—impacting not just America, but the world. As long as the government did not interfere with the market, the likely effect would be a temporary price hike. Higher prices will drive demand down and spur production in non-OPEC countries including the United States (assuming that it has not already used all its domestic reserves in an attempt to become “independent” of foreign oil).

Meanwhile, rising oil prices would encourage OPEC nations to cheat on their quotas and sell more of their product. In the end, the only lasting impact would be that OPEC would lose market share to other oil producing nations. As long as oil can flow freely around the world, then, the United States should not have to worry about oil imports.

Under wartime conditions oil cannot flow freely, and the United States might not be able to depend on foreign oil. A sudden loss of oil due to an outbreak of hostilities could have a serious effect on the nation’s economy. On the

other hand, open trade makes wars less likely because countries have little incentive to attack their trading partners. Conversely, tariffs and trade restrictions increase the chance of armed conflict. As nineteenth century French economist Frederic Bastiat once warned, "If goods don't cross borders, armies will."

Leaders of centralized governments typically do not like open trade because it makes it much more difficult for them to control their nations' economies. In a free market, for example, farmers can bypass price controls placed on food simply by exporting their produce. Similarly, consumers can avoid higher prices caused by minimum wage laws by purchasing imports rather than domestic products.

In such cases, government may respond by placing embargoes on exports and limits on imports. Historically, such actions provoked anger from nations whose people's lives or livelihoods depended upon the products or markets being restricted. They often retaliated by erecting trade barriers of their own.

As more and more trade restrictions were imposed, governments were faced with the loss of access to vital raw materials, manufactured products, or markets. In response, they acted to ensure continued access either by conquering territory or by establishing alliances, or "spheres of influence." As a result, trade wars have sometimes been followed by real wars.¹⁶¹

In the mid-1970s, the United States established the Strategic Petroleum Reserve (SPR) to store large quantities of crude oil in case of an international emergency. As many as 700 million barrels of crude oil, equal to three-to-four months of the country's total crude imports, are stored in caverns in Louisiana and Texas. The SPR is capable of pumping 3 million barrels per day (domestic consumption is nearly 15 million barrels a day; between 5 million and 6 million are supplied by domestic wells and the rest by foreign sources).

While the SPR does provide protection against disruptions in the oil supply, it is a very expensive insurance policy. Most of the reserves were purchased between 1978 and 1985 when oil prices were relatively high. The average cost of acquisition in today's dollars is well over \$50 per barrel. In addition, the construction of the reserve and its maintenance add significantly more to the per-barrel cost of the project.¹⁶²

Oil imports have engendered another security concern: the fear of *trade imbalances*. That is, we import more than we export and, in so doing, send money and (it is believed) jobs abroad. Though this concern is widespread, it is based on several fallacies.

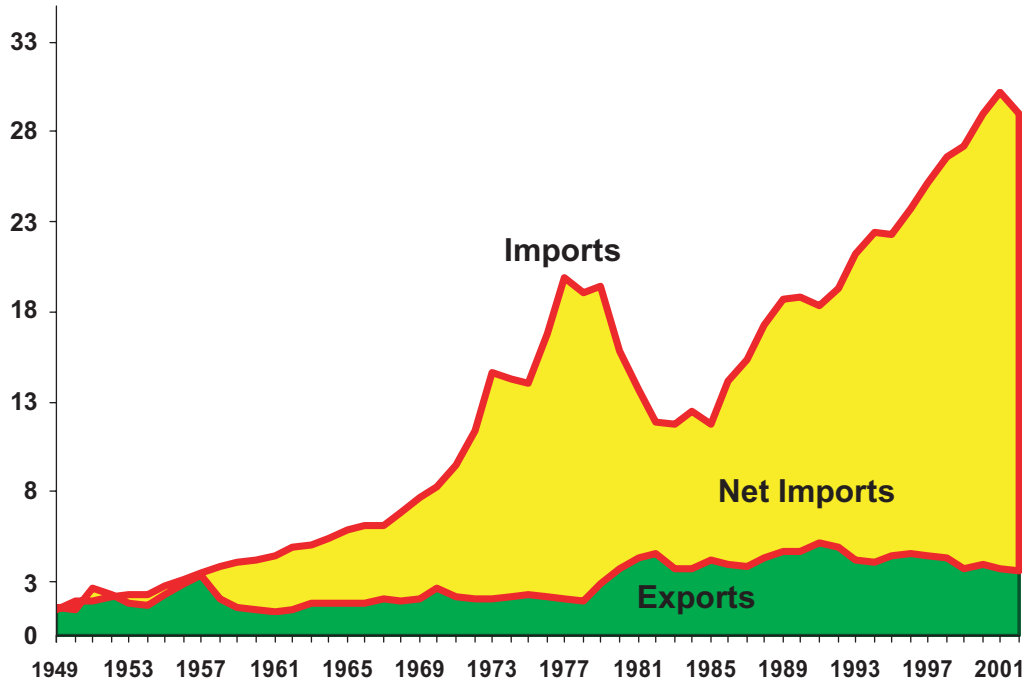
¹⁶¹For more on this topic, refer to Brink Lindsey, *Against the Dead Hand: The Uncertain Struggle for Global Capitalism* (New York: John Wiley & Sons, 2001).

¹⁶²U.S. Energy Information Administration, *Annual Energy Review* 2002, p. 59, and Robert Bradley, Jr., *Julian Simon and the Triumph of Energy Sustainability*, p. 122.

U.S. ENERGY TRADE: 1949-2003

The United States produces more than enough coal to meet domestic demand, but imports about 15 percent of its natural gas and around 60 percent of its crude oil. *Source: U.S. Energy Information Administration, Annual Energy Review 2002, p. 11.*

Quads



Perhaps the most glaring of these misconceptions is the belief that money is wealth. If money truly were wealth, then any nation could quickly grow rich simply by firing up the printing presses. Money is a convenient medium of exchange that lets us compare the relative value of apples and oranges, but it is the apples and oranges themselves and not the money that constitute real wealth. When OPEC nations trade oil for dollars it is not because they appreciate the engravers' art or because they have a thing for paper. They want what those dollars will buy.

Confusing money and wealth leads to another myth—the idea that a nation can become rich by exporting goods and importing money.¹⁶³ If this were

¹⁶³This mode of thought is called “mercantilism” and, though it still persists, has largely been rejected by modern economists. The great danger in this way of thinking is that it tends to lead to international conflict as not all countries can export more than they import. Under mercantilism, there must be winners and losers. Open trade lets all participants win. They each trade that which they value less for that which they value more. Were this not true, no exchange would occur.

true, then why bother to build automobiles, bicycles, and computers and ship them overseas in exchange for little paper rectangles printed in foreign lands? Why not just save everyone a lot of trouble and print those pieces of paper on this side of the ocean?

When we engage in trade, we are not after foreign pieces of paper, we want foreign products. The reason we export goods is to exchange them for imports that we want more. Similarly, when people in other countries trade with us, they want our products, not our dollars.

While it is true that at any given time the country probably has “trade imbalances” with particular countries, this fact should be of no more concern than the fact that the average person has trade imbalances with the local supermarket and the gas station down the street. Dollars sent abroad can change hands many times before they return to the United States. And they may come back in forms (such as stock market investments) that are not considered when the nation’s trade balance is calculated.¹⁶⁴

Another aspect of energy security is the issue of whether the country will have sufficient electrical power generation and transmission capacity in the future. America’s buildings, cities, transportation systems, water and sewage treatment plants, food supply infrastructure, and communications systems all depend upon a reliable supply of electrical power.

A blackout in the northeastern United States and southeastern Canada on the afternoon of August 14, 2003, highlighted just how dependent we are on electricity. This cascading system failure affected an estimated 50 million people, making it even bigger than the “Black Tuesday” outage in 1965 that left 30 million people in much the same region without power.

The blackout brought everything to a screeching halt. Subways shut down, leaving people stranded in dark tunnels far from the nearest station. Elevators stopped. The upper floors of high rise buildings, dependent upon electric pumps for water, were left without. Steel and glass office buildings with sealed windows became intolerable when their air conditioning systems shut down. Traffic became snarled when stop lights went out, and the streets were clogged with pedestrians who—left without mass transit systems—had to rely on their feet to get home. Almost 500 million gallons of raw sewage poured into New York City’s waterways, fouling beaches and creating health and environmental hazards. Pumps at gas stations stopped running. Cash registers and credit cards no longer worked. Untold amounts of food spoiled in refrigerators and freezers rendered useless by the outage.

¹⁶⁴For more information on this topic refer to Henry Hazlitt, *Economics in One Lesson* (New York: Crown Publishing, 1946, 1979), pp. 85–89.

Two BLACKOUTS: 1965 & 2003

In American history, two blackouts have eclipsed all others: the 13-hour blackout of November 9–10, 1965, and the two-day outage of mid-August 2003. Each darkened the media center of the world, New York City (the home of *Time* magazine). Reforms implemented after the 1965 outage were intended to prevent a recurrence. *Source*: Getty Images.



Days later, it was determined that the most likely cause of the failure were downed transmission lines in Ohio. When the local transmission system shut down, the load increased on other parts of the system as they tried to meet the demand. As these systems heated up, failsafe devices shut them down before they could be damaged. Like a wave of falling dominoes, one part of the transmission grid after another went down and the lights went out.

The crisis brought out the best in average citizens and the worst in politicians. People pitched in to help each other, and utility workers labored heroically to bring the grid back up. Meanwhile the nation's politicians pointed fingers and ducked blame as fast as they could—long before the cause of the blackout was even known.

Special-interest groups tried to use the blackout as evidence to support their own particular views: deregulation, re-regulation, alternative energy, nuclear power, hydroelectric power, government investment, private investment, and on and on. Some pundits argued that the blackout proved that utility

deregulation had failed. Supporters of deregulation countered that the failed transmission system was fully regulated, and that the low profits allowed by the regulators left no incentive for companies to expand and improve the grid. Opponents fired back that it was the deregulated power generation system that overloaded the grid in the first place. They argued that only complete regulation of both the generation facilities and the transmission lines could ensure the necessary coordination between the two.

We offer two observations and a simple question: The (partially) deregulated portion of the industry, power generation, kept up with consumer demand. The regulated portion of the industry, transmission, did not. Which, then, is the better way to go—toward more regulation, or less?

