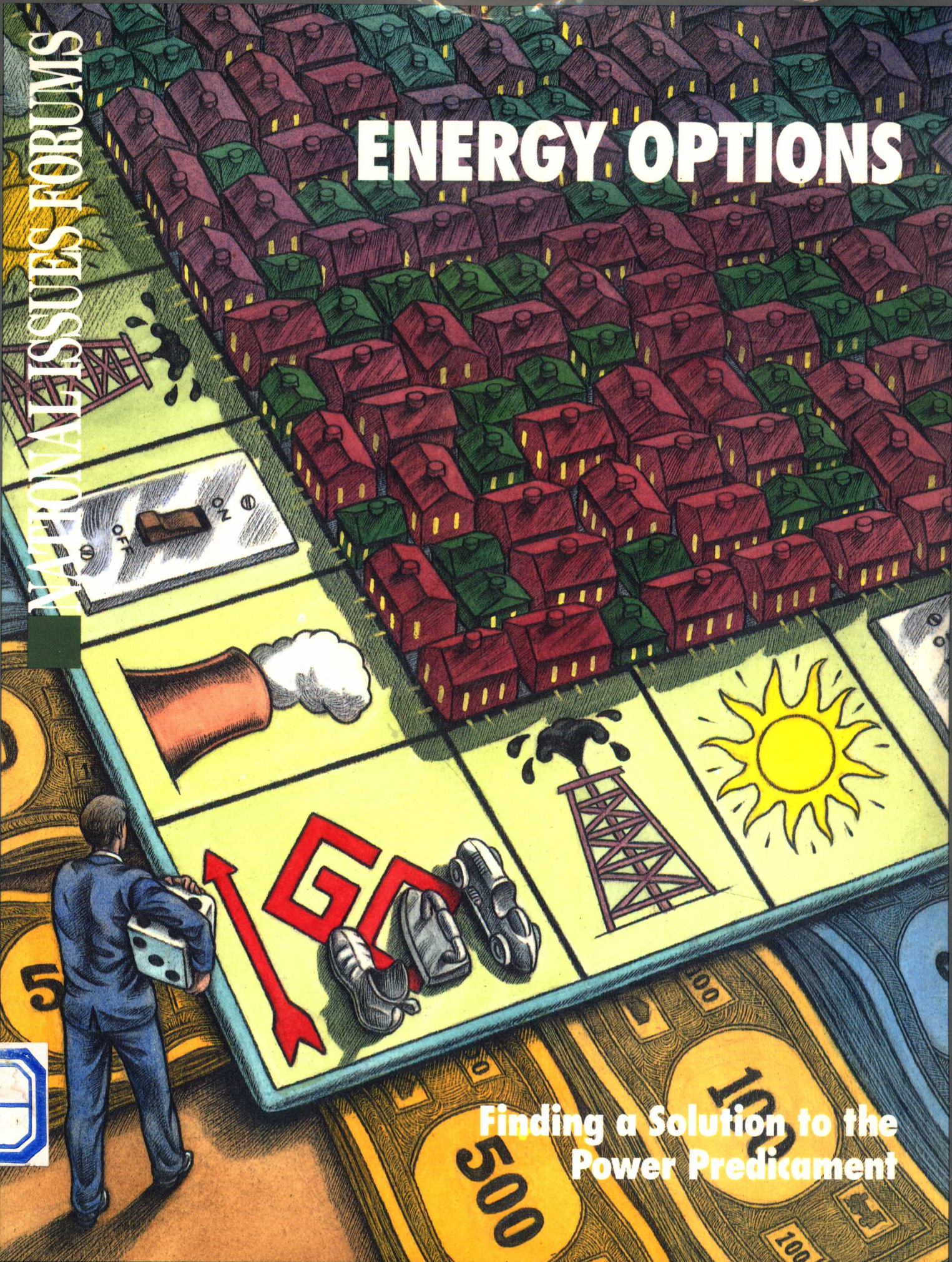


ENERGY OPTIONS



Finding a Solution to the
Power Predicament

NATIONAL ISSUES FORUMS

Over the past decade, writes *New York Times* reporter Matthew Wald, "the nation has approached energy policy in the same ambivalent way it has approached sex education. Some people think it is indispensable while others think it is none of the government's business. A silent majority appears to grudgingly agree that something is needed. But in Washington, the attitude often seems to be: 'Do we really have to talk about it in public?'"

Because energy affects our entire way of life, and shifting to new energy sources would require fundamental adjustments, the answer to that question is an emphatic yes. We *do* need public discussion about energy alternatives. Since the Bush administration announced plans for a national energy strategy in February 1991 — the first such proposal in more than a decade — this has once again become a prominent public concern. Judging by the initial reaction to the administration's proposal, there is little agreement — among elected officials or among the American public — about how to meet growing energy needs.

The purpose of this book is to encourage the kind of public talk that is an indispensable ingredient in the democratic process. This is particularly important with regard to issues such as energy alternatives, where there is no common ground for public action. Rather than encouraging clearly defined issues and well-stated alternatives, the American political process is characterized by fuzzy generalizations, poorly defined issues, and discussion about courses of action to which no price tag is attached. Because television dominates the political process, snappy 20-second sound bites have replaced serious public deliberation. "We've tended to trivialize issues," says Representative Mickey Edwards of Oklahoma, "to the point where meaningful debate has become almost impossible."

In most instances, the American public is not consulted about its concerns or its priorities. It is no wonder so many people feel disenchanting with and disconnected from the political system as a whole. In a deliberative democracy, there must be occasions in which people come together to learn about pressing issues and engage in dialogue about matters of common concern. The National Issues Forums (NIF) — locally initiated Forums and study circles which bring citizens together in communities across the nation for nonpartisan discussion about public issues — provide a place for the practice of citizenship. In several respects, the NIF is intended to restore what's missing from the democratic process.

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After the Forums meet each year, the NIF convenes meetings with policymakers to convey the outcome of the discussions. So we can convey participants' thoughts and feelings about this issue, two ballots are included at the end of this book. Before you begin reading these materials, and then again after you have read them and taken part in Forums, I urge you to fill out these ballots and mail them back to us.

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98ASIA003

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ENERGY OPTIONS: FINDING A SOLUTION TO THE POWER PREDICAMENT

PREPARED BY THE PUBLIC AGENDA FOUNDATION

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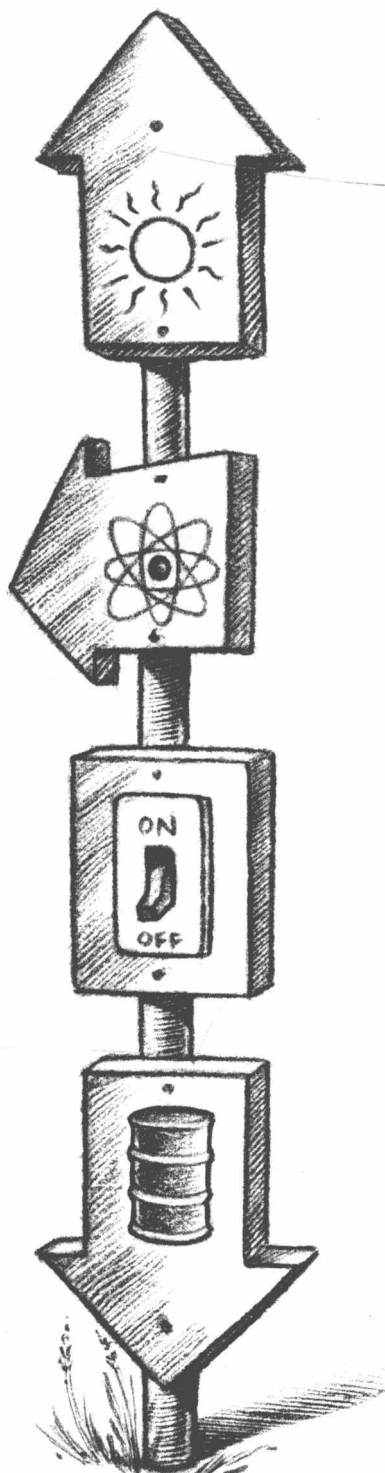
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For Further Reading

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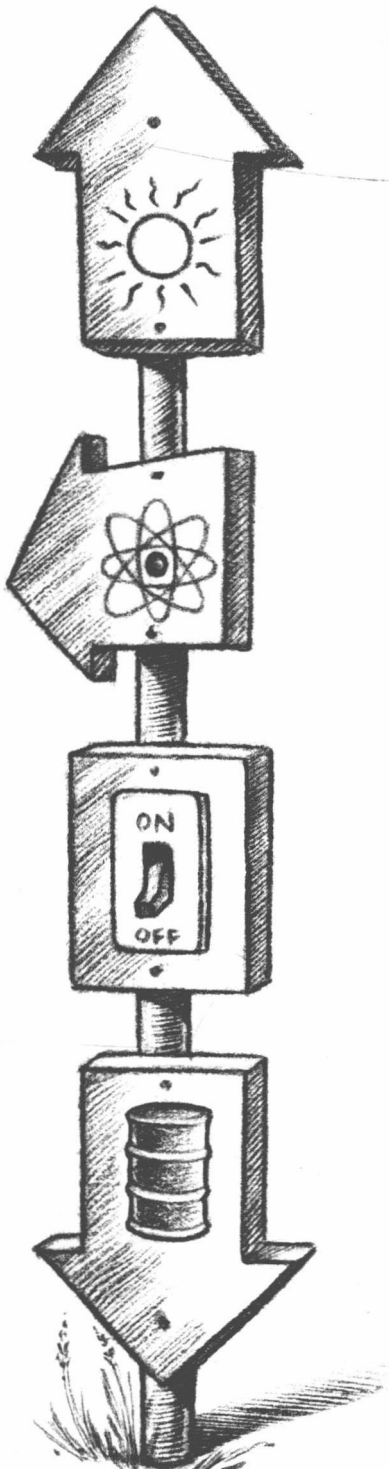
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ENERGY DILEMMA: ONCE AND FUTURE CRISIS

"The United States faces tough decisions about how to meet growing energy needs without harming the environment or hobbling the economy. Various courses of action are available, but no energy plan is supported by a broad consensus."

Essayist Wendell Berry once observed that, "The kind and quantity of energy we use determine the kind and quality of the life we live." One of the striking things about the kind of life Americans take for granted is that it requires a prodigious amount of energy. When you add up all the energy used in the United States in 1989 — for residential purposes, for transportation, and for commercial and industrial uses — it amounts to annual consumption of 327 million BTUs (British thermal units) for every man, woman, and child. That is the equivalent of the energy contained in 2,500 gallons of gasoline per year, or about 7 gallons per day. The United States, which contains just 5 percent of the world's population, consumes 26 percent of the world's energy.

With that power we heat and light homes, schools, and offices, run computers, play night baseball, operate appliances ranging from refrigerators and microwave ovens to VCRs, and drive cars an average of 10,000 miles per year. For the most part, except when faced with gas shortages, brownouts, or sharp hikes in the price of energy, most people don't think about what the options are in meeting energy needs in a way that is safe, sustainable, and relatively inexpensive.

In August 1990, when Saddam Hussein ordered Iraqi troops into Kuwait and announced that Iraq was annexing that nation, he rekindled a debate about energy that had been dormant for ten years. By making Americans painfully aware of our continued dependence on foreign oil, Saddam Hussein may be more successful in the 1990s than President Jimmy Carter was in the late 1970s in pushing the United States toward a reevaluation of its energy needs and how they can be met.

The Persian Gulf crisis, as former President Carter said soon after it erupted, is evidence of "the dismal failure of our country to acknowledge and deal with its energy vulnerability. The hard fact is that we now have no effective national energy policy. We have a choice between the many reasons to do nothing and looking for ways to get the job done."

WHAT'S THE PROBLEM?

In contrast to the 1970s, when Americans were repeatedly told that global oil resources would soon be depleted, America's energy problem today is not imminent shortages of the materials from which energy is generated. Ninety percent of America's energy is generated by burning fossil fuels, and there is no shortage of them. America's reserves of coal and natural gas are abundant. Oil reserves are abundant, too, although not domestically.

Eventually, of course, world oil resources will be depleted. Right now, however, oil is plentiful and relatively cheap. World oil reserves are nearly twice as large as they were in 1970. In the midst of the Persian Gulf crisis in 1990, Saudi Arabia, the world's biggest oil exporter — with 10 times the reserves of the United States — announced the discovery of new reserves of crude oil that will enable that country to continue pumping oil at the present rate for at least another century.

"In terms of the next few decades," concludes a recent study, *Energy Imperatives for the 1990s*, from the Atlantic Council of the United States, "there does not appear to be a shortage of energy supplies in useful forms at acceptable prices on a worldwide basis."

So what is the problem? In the words of energy expert Daniel Yergin, "the most visible and vexing part of the energy problem" is America's increasing reliance on imported oil. At a time when half of the petroleum used in the

United States is imported, there is growing concern that about 70 percent of known world oil reserves available for export are controlled by the politically volatile Persian Gulf nations.

Petroleum provides 40 percent of America's energy needs and more than 90 percent of the fuel for transportation. Unless alternatives to imported oil are found, the United States is likely to be increasingly at the mercy of foreign regimes.

If growing dependence on imported oil is one dimension of the energy problem, growing concern about the environmental effects of burning fossil fuels is another. We are at the end of an era of cheap, readily accessible energy sources whose environmental effects most Americans are willing to accept. There is growing concern about the hazards to human health and to the environment that result from burning fossil fuels.

"It has become painfully clear," write energy analysts Christopher Flavin and Rick Piltz, "that the fundamental constraint on energy systems is not scarce resources, but the threat posed by the forms of energy we use to the livability of our nation and the world. Rising use of fossil fuels could make our nation virtually uninhabitable long before reserves of those fuels are depleted."

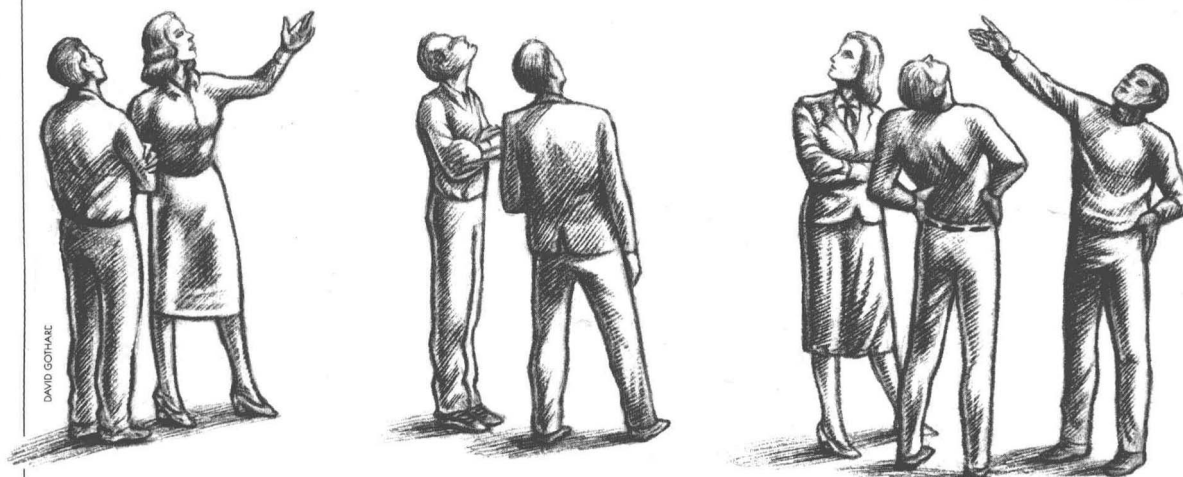
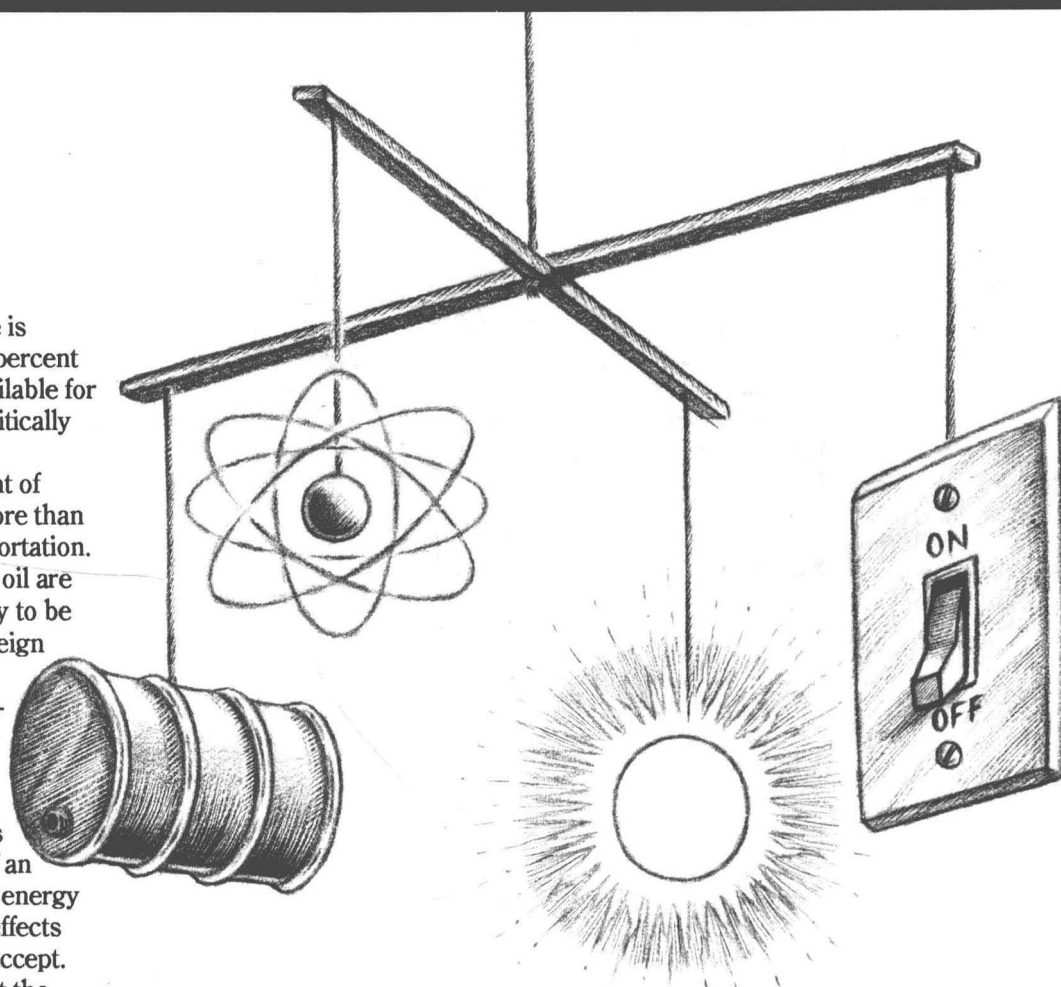
A third aspect of the energy problem is less visible but no less important. Demand for electricity in the United States — which is generated mainly by coal and nuclear power — has increased over the past few years to the point where shortages are anticipated.

"New technology and higher incomes cause people to use more electricity," says Bruce Humphrey, a strategic planner for the Edison Electric Institute, a group that represents privately owned utilities. "High tech is virtually synony-

mous with flowing electrons. There is a need for new generating capacity during the 1990s."

According to the Energy Information Administration, U.S. demand for electrical power is expected to grow for the foreseeable future at an annual rate of more than 2 percent per year. At that rate, the United States will need 110 gigawatts of new power capacity by the year 2000. (A gigawatt is 1 billion watts, roughly the amount of power used each year by a large city.)

Currently, however, only 37 gigawatts of new power generating capacity are planned or under construction. Since the lead time for construction of power plants is typically more than 10 years, it is a matter of some urgency to move ahead with plans to meet the nation's growing power needs — or to reduce consumption.



ERA OF ABUNDANCE

The roots of today's energy problem can be traced to the post-World War II years, when a seemingly endless supply of cheap oil and coal fueled rapid economic growth and a rising standard of living. A lot of new things happened in the United States in the two decades following the war, and most of them plugged into wall outlets or required regular infusions of oil.

In 1949, the Esso Oil Company (which a few years later was renamed Exxon) ran magazine ads in which it tied the fortunes of the oil industry to America's rising standard of living. "The better you live," as Esso put it, "the more oil you use."

And so it was. In the 1950s, cheap oil stimulated a new way of life, a "freeway culture" built around the automobile. With the automobile, journalist Marcia Lowe wrote, "the average wage earner could have more horsepower at his or her disposal than royalty had in other times."

Between 1950 and 1972, the number of motor vehicles in the U.S. doubled. There was growing public enthusiasm for bigger, faster cars. The auto industry responded by producing cars that were, on average, about 700 pounds heavier — and, consequently, less fuel efficient than the previous generation of cars.

The new automobile culture was just one reason why demand for petroleum products soared in the postwar period. From the laborsaving machines used in factories to energy-intensive technologies used on the nation's farms, virtually every sector of the economy substituted machines for human labor.

By the 1970s, for example, the celebrated efficiency of American agriculture allowed a single farmer to feed more than 60 people. Less commonly noted was the fact that the petroleum required for tractors, fertilizers, and pesticides means that a gallon of gasoline is needed to produce a bushel of corn.

The nation's energy appetite increased in less obvious ways, too. Consider the American diet. When you shop for groceries, one item you don't see listed among the ingredients of the products you purchase is the energy required to produce and ship them. "The typical mouthful of food," says energy analyst Alan Durning, "travels 1,300 miles from farm field to dinner plate." Transporting food requires energy.

So do prepared foods, which became an increasingly important part of the American diet in the 1950s and 1960s. "Ounce for ounce," says Durning, "getting frozen orange juice to the consumer takes four times the energy of providing fresh oranges. Likewise, potato chip production has four times the energy budget of potatoes."

Because a cornucopia of new household appliances was produced in the postwar years — including dishwashers, electric clothes washers and dryers, and dozens of other laborsaving products — demand for electrical power soared. In the postwar years, use of electricity in the United States increased at an average rate of 8 percent per year.

In all, during the period 1950-1973, American energy consumption more than doubled. At the time, in an era of

apparently limitless energy, few people were concerned about America's growing appetite for energy or the environmental costs of generating it.

CREEPING DEPENDENCE

Because domestic oil production increased year by year during the 1950s and 1960s, the United States was able to meet its own energy needs. But as energy use surged ahead, domestic oil supplies could not keep pace. By 1973, the United States imported almost one-third of its petroleum, most of it from the Middle East.

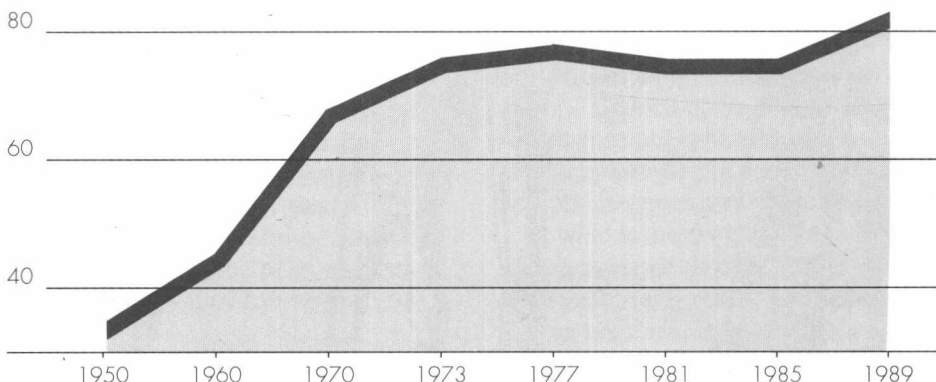
In the fall of 1973, the United States received the first of several jarring reminders of how vulnerable it had become to suppliers of imported oil. When Arab oil producers increased prices sharply, the price of imported crude oil rose from about \$2.50 a barrel to over \$10. In 1979, the turmoil that accompanied the Iranian Revolution drove oil prices up sharply a second time — from \$13 a barrel to \$34. Once again, the United States experienced widespread gas shortages and a recession made more severe by rising fuel prices.

Responding to the oil shocks of the 1970s, three presidents tried to reduce

ENERGY-INTENSIVE NATION

Overall U.S. energy use increased rapidly in the 1950s and 1960s and then levelled off after the 1973 oil shock. Since 1986, energy consumption has risen to record levels.

Quadrillion BTU



Source: Energy Information Administration

"We fell into a dangerous complacency as oil moved into ample supply and prices tumbled. We assumed the problems of the 1970s were permanently behind us."

— Robert D. Hormats

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U.S. dependence on imported oil. President Nixon introduced the ill-fated Project Independence. President Ford proposed a National Energy Act. President Carter, who called the energy problem "the greatest domestic challenge our nation will face in our lifetime," proposed a far-reaching national energy plan. But each time an energy plan was proposed, it was greeted by a recalcitrant Congress with months of protracted debate.

The problem was that proposals to develop new power sources impose substantial cost and political pain. "Any comprehensive proposal has something in it for almost everyone to hate," said Eric Zausner, deputy administrator of the Federal Energy Administration in the mid-1970s. "It exacts difficult political costs, including higher prices and environmental impacts. It takes a long time to build oil and gas production facilities, nuclear power plants, or even energy-efficient buildings. Any solution incurs great political costs today that do not provide benefits — in terms of reduced imports — for up to ten years. Long lead times are a politician's nemesis." That may explain why, despite repeated calls for a comprehensive energy strategy in the 1970s, no such plan was agreed on.

SHOCK ABSORBERS

Still, the energy problem was widely recognized and progress was achieved on three fronts. As a shock absorber against interruptions of imported oil, the United States created the Strategic Petroleum Reserve, containing 590 million barrels of oil.

The United States also began exploring the feasibility of alternative energy sources. Solar energy and wind power attracted particular attention, and photovoltaic cells (which convert sunlight

directly into electricity) showed signs of becoming commercially viable.

By the late 1970s, a dizzying list of energy alternatives was under consideration at the newly created Department of Energy, including alcohol-based fuels, wood-fired power plants, fusion power, tidal power, and the use of waste heat from industrial processes to create energy (a process called cogeneration). Members of Congress proposed tax incentives and other measures to encourage the development of various energy alternatives.

On a third front, Americans began to think about the energy they consumed in their daily lives. Millions of people started to car pool. They bought smaller, more fuel-efficient cars. They examined the energy-efficiency ratings that had begun to appear on appliances. Many Americans also got in the habit of turning off unnecessary lights. Home owners, facing higher heating costs, added insulation to their houses.

Conservation efforts produced striking results. Despite the fact that the American economy grew by more than 40 percent from 1973 to 1986, the amount of power consumed in the United States during that period remained stable.



MARKET FORCES

The 1970s brought a new consciousness about the consumption of energy and dependence on foreign oil. In the 1980s, however, this consciousness faded and energy seemed to disappear as a public issue.

The policies of the Reagan administration were one reason for the change. In an early policy statement, the administration pledged "to minimize federal control and involvement in energy markets." It chose to rely almost exclusively on market forces to determine the supply and demand for energy.

Soon after he took office in 1981, President Reagan instructed the White House staff to dismantle the solar water-heating panels installed by President Carter, an act that symbolized the administration's disinclination to support the fledgling alternative energy business. In 1985, federal tax credits for alternative energy projects were slashed. Fuel economy standards were rolled back for cars and trucks, and federal support for conservation was dramatically reduced.

A second reason for diminishing public concern about energy was the mid-1980s oil glut. Most energy analysts predicted that oil prices would climb during the 1980s, making alternative energy sources such as solar profitable. But just the opposite happened. Be-

INTRODUCTION

cause members of the OPEC cartel exported more petroleum than anticipated, the price of oil fell from \$30 to less than \$15 a barrel. At the same time, the price of natural gas and coal — the nation's other two chief energy sources — also fell. By 1986, the United States was experiencing a glut of low-cost fossil fuels.

Low energy prices were good news for consumers, who saw pump prices drop to their lowest level, in real terms, since 1973. But low fuel prices nipped the alternative energy business in the bud. By 1986, when the price of crude oil fell to \$13, there seemed to be no further need to encourage alternatives to fossil fuels. No matter how attractive alternatives such as solar energy or ethanol might be to some consumers, start-up companies that developed them could not make a profit when the price of crude oil was so low. Largely because of the oil glut of the mid-1980s, much of the momentum to develop energy alternatives — including photovoltaic cells and electric-powered vehicles — was lost.

Plentiful supplies of cheap imported oil also knocked many domestic oil producers out of the business. Because domestic oil is more expensive to produce than oil imported from the Middle East, production in the United States reached its lowest level in 25 years by 1989.

Low pump prices conveyed the message that the energy crisis was a thing of the past. Not surprisingly, America's appetite for energy began to grow again. On the same day in August 1988 when the *New York Times* ran a major story on global warming — the threat to the atmosphere posed by carbon emissions from oil and other fossil fuels — the paper's front page carried a story on renewed demand for gas-guzzling "muscle cars." "With fuel cheap," the article concluded, "a fast car has again become a success symbol."

During the 1980s, Americans became



Oil spills on the California coast: a reminder of pollution caused by fossil fuels.

less energy conscious at home, too. The federal government's Residential Energy Consumption Survey showed that a typical American household set its winter thermostat a full degree higher in 1987 than in 1984, and the number of households operating air conditioners throughout the summer increased by 40 percent.

Demand for oil in the United States reached 17 million barrels a day by 1989, the highest figure in a decade. The surest sign that many Americans have forgotten the lessons of the oil shocks of the 1970s is that overall U.S. energy consumption in recent years has been growing once again. In 1989, U.S. energy consumption reached a record high — 81.3 quadrillion BTUs.

By the late 1980s, the United States was once again deeply dependent on foreign oil. "We fell into a dangerous complacency as oil moved into ample supply and prices tumbled," said Robert D. Hormats, a high-ranking State De-

partment official during the Reagan administration. "We assumed the problems of the 1970s were permanently behind us." In many ways, the Persian Gulf crisis of 1990 was an incident waiting to happen.

THE POLLUTION PROBLEM

While the Persian Gulf crisis reminded the nation of the perils of relying on imported oil, that is just one aspect of the energy problem. Since the 1970s, there has been growing concern about pollution caused by burning fossil fuels, the source of 90 percent of the nation's energy. Three air pollution problems — acid rain, smog, and the greenhouse effect — are all linked to the fossil fuels required to generate the nation's power.

Acid rain is caused by sulfur pumped into the air as coal is burned to generate electricity. Sulfur is carried by the wind, sometimes hundreds of miles, until it falls to the earth as acid rain. Precipitation in the United States is now 5 to 30 times more acidic than it was in preindustrial times. On several Eastern mountains, rainfall acidity is 2,000 times greater than unpolluted rain, or roughly the acidity of lemon juice. This caustic substance is believed to be causing widespread destruction both to forests and to fish life in many regions of the United States and Canada.

Smog is primarily caused by exhaust from cars and trucks. It damages plant life and causes a variety of lung diseases when people are exposed to it for long periods. Since 1970, when Congress passed the Clean Air Act in an effort to reduce air pollutants to acceptable levels, some progress has been made in reducing smog. But in many areas of the country, ozone (one of the chief ingredients of smog) remains unacceptably high. New anti-pollution measures contained in the 1990 revision of the Clean Air Act are a reminder of the seriousness of the problem, as well

“Since the 1970s, there has been growing concern about pollution caused by burning fossil fuels — the source of 90 percent of the nation’s energy.”

as the difficulty of solving it while the nation continues to rely on fossil fuels.

Of this trio of air pollution problems associated with the energy we use, global warming has the greatest destructive potential. When burned, coal, oil, and natural gas combine with oxygen to form carbon dioxide, the chief contributor to global warming. As a by-product of producing and using the energy that powers appliances and cars, and heats, cools, and lights the buildings in which we live and work, two tons of carbon are pumped into the atmosphere each year for every man, woman, and child in the United States. As a result of worldwide fossil fuel use, the amount of carbon dioxide in the atmosphere has increased by 25 percent over the past century and is likely to double over the next century.

Accumulating carbon dioxide in the atmosphere is the chief source of the greenhouse effect, the gradual warming of the earth caused by trapping the sun’s energy near the earth’s surface. While scientists disagree about whether global warming is already apparent, there is a consensus that rising levels of carbon dioxide in the atmosphere will eventually modify world climate. As a result, the temperature could rise 3 to 8 degrees by the middle of the twenty-first century, causing parched farmland, unprecedented high temperatures, and coastal flooding. Global warming could threaten the habitat of many plants, fish, and wildlife.

Although scientists do not agree about the severity of the problem or just when its effects are likely to be apparent, there is growing concern. In January 1991, climatologists at the Goddard Institute for Space Studies reported that average global temperature was higher in 1990 than in any other year since records were first kept in 1880. Recent evidence suggests that this was something more than a chance event. Seven of the warmest years of the

past century have occurred over the past eleven years.

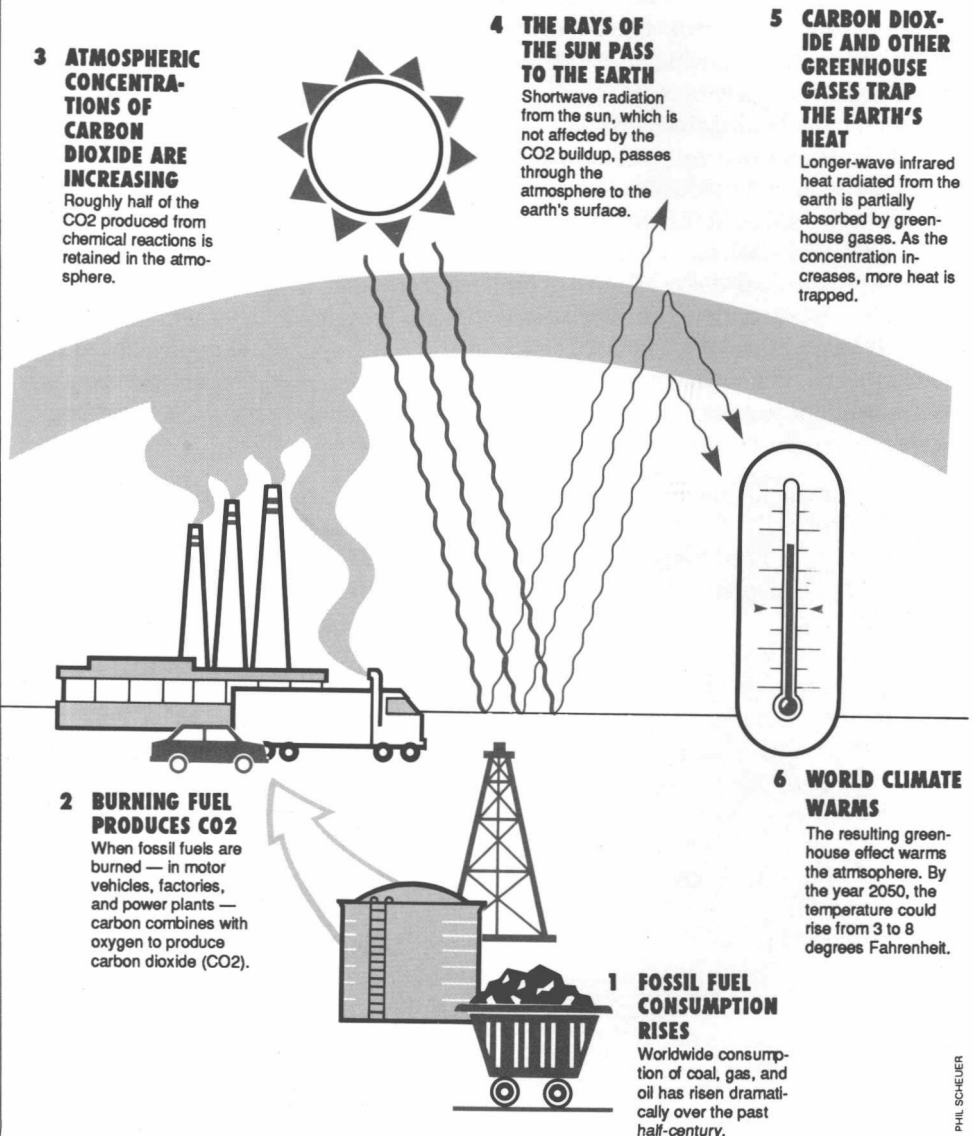
Higher temperatures have convinced many people that global warming caused by an accumulation of heat-trapping gases in the atmosphere has begun. In the words of a letter sent to President Bush by a group of 16 senators soon after the 1990 data were released: “Global climate change is real.

It is not a problem that will disappear if we ignore it. There is an increasingly urgent need for policies to address this issue.”

The question is whether we should change our energy-using and energy-producing habits as soon as possible to avert an uncertain but possibly catastrophic change. If immediate action is necessary, launching a costly and com-

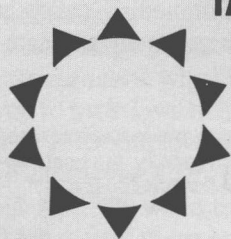
GREENHOUSE EFFECT: CHANGING THE WORLD’S CLIMATE

The concentration of carbon dioxide and other greenhouse gases in the atmosphere has increased by about 25 percent since the start of the industrial revolution. Over the next century, the heat trapped by those gases may profoundly affect world climate. The scenario starts with number #1 . . .



PUMPING CARBON: IS GLOBAL WARMING A CLEAR AND PRESENT DANGER?

The threat of global warming is one of the chief factors that makes today's energy debate different from the debate of the 1970s. Increasingly, people line up on one side or another in the energy debate according to their views on global warming.



TAKING GLOBAL WARMING SERIOUSLY

If James Hansen, head of NASA's Goddard Institute, and other scientists predicting global warming are right, the earth is beginning to undergo a fundamental transformation whose consequences will eventually range from parched farmland in the Midwest to coastal cities threatened by rising waters.

As the sea rises because of glacial melting and the thermal expansion of a warmer ocean, we may face a harsh choice: either to abandon low-lying coastal areas in which a substantial fraction of the American population lives, or come increasingly to resemble Holland, where nearly six cents out of every dollar is spent on holding back the sea. That is just the beginning of the list of wrenching dislocations that may result from global warming, which does not take into consideration its worldwide effects.

The seriousness of this threat is reason to take immediate steps to reduce our reliance on oil, coal, and natural gas. Because continuing to rely on fossil fuels for energy jeopardizes the prospects of future generations, those who share this perspective are persuaded that alternatives to fossil fuels must be found.

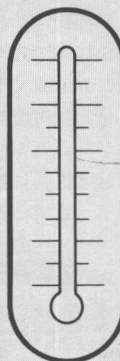
"The basic value of a sustainable society, and the ecological equivalent of the Golden Rule, is simple," writes Alan Durning. "Each generation should meet its needs without jeopardizing the prospects of future generations."

RUSH TO JUDGMENT

Many remain unconvinced that rapid action to reduce carbon emissions is necessary. "Drastic measures based on panic should be resisted," says S. Fred Singer, former professor of environmental sciences at the University of Virginia, "until an acceptable scientific base is established."

Even among scientists who accept the greenhouse theory, there is little agreement about likely effects. Patrick Michaels, professor of environmental sciences at the University of Virginia, anticipates that, as the earth gradually heats up, more clouds will form, deflecting sunlight, thus mitigating the warming effect. "The result — warmer nights and cooler, cloudier days — is something we can live with," says Michaels.

Rapid action is ill advised, say those who are skeptical about global warming, because of the huge cost and massive dislocations that would be caused by an ambitious effort to shift to alternative energy sources. Estimates of the expense of shifting energy sources to slow global warming range from several hundred billion dollars to more than three trillion dollars in the United States alone. "Like it or not," says Andrew Solow, a scientist at the Woods Hole Oceanographic Institute in Massachusetts, "the consumption of fossil fuels contributes to our standard of living. Major shifts in our energy policy need better justification than current fears about climate change."



prehensive effort to forestall a threat that still seems fairly remote poses a daunting political challenge.

OPTIONS AND OBJECTIONS

Over the next few years, the United States faces tough decisions about how to meet growing energy needs without relying increasingly on foreign oil, harming the environment, or hobbling the economy. Various courses of action are available, but no plan about how energy needs can be met is supported by a public consensus. As a framework for debate, this report reviews the arguments for and against four major energy options:

- **Choice #1** presents the case for more aggressive exploration and use of domestic fossil fuels — oil, coal, and natural gas.
- **Choice #2** is the argument for an expanded effort to develop renewable energy sources, such as hydroelectric, windpower, and photovoltaic.
- **Choice #3** is the argument for nuclear power as a practical alternative to fossil fuels.
- **Choice #4** is the case for pursuing energy conservation — solving the energy problem by moderating demand rather than by expanding supplies.

Each option has staunch proponents, as well as critics, convinced that the proposed course of action is impractical or environmentally unacceptable, or that adopting it as an important part of the nation's energy strategy would impose too high a cost.

Because the Persian Gulf crisis has drawn attention once again to the energy problem, this is an unusual opportunity for focused discussion on energy options and for decisive public action. Elected officials face important decisions that will affect the nation's energy habits for years to come. The four courses of action presented here provide a map of competing views and a framework for discussion about energy options. ■

CHOICE #1

DOMESTIC SOURCES: TAKING ADVANTAGE OF AMERICA'S FOSSIL RESOURCES

"Our chief goal should be to achieve a greater measure of energy independence. The most promising way to do that is to take advantage of domestic reserves of coal, oil, and natural gas."

In Texas and Louisiana, hikes in the price of crude oil in 1990 caused by the Iraq crisis provided a shot of adrenalin to this once-bustling center of the U.S. petroleum industry. As the price of crude oil approached \$30 per barrel, drilling companies snapped up used extracting equipment that had been selling as scrap iron a few years ago. "No one's happy with the events in the Middle East," says Texas wildcatter Bud Champlin, "but it's going to make for some good activity here."

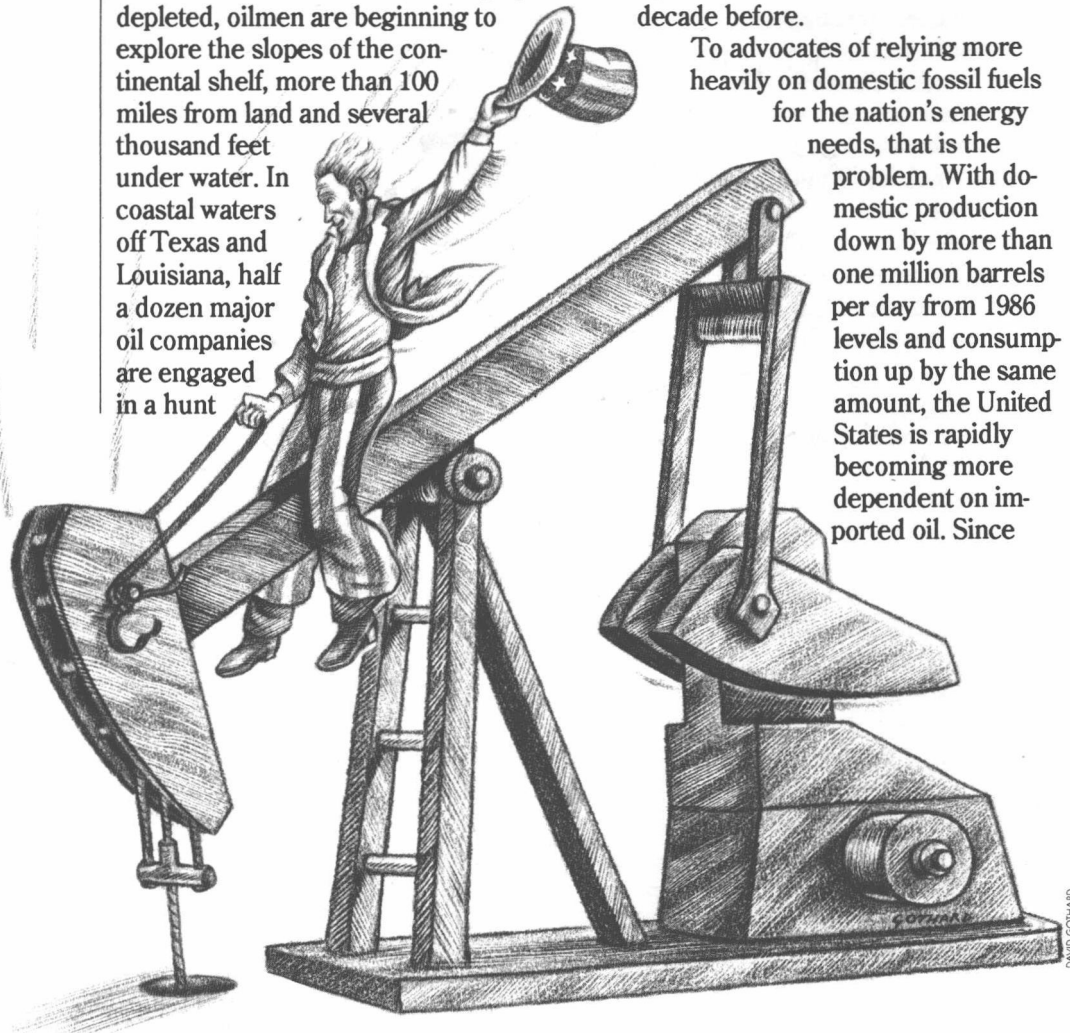
With crude oil prices higher than they have been since 1982, explorers are going to new depths to locate and tap domestic oil reserves. Since easy-to-tap reserves in shallow water are largely depleted, oilmen are beginning to explore the slopes of the continental shelf, more than 100 miles from land and several thousand feet under water. In coastal waters off Texas and Louisiana, half a dozen major oil companies are engaged in a hunt

for reserves that may be four times larger than those found at Alaska's Prudhoe Bay, the last major domestic oil discovery. "Oil at \$30 to \$40 a barrel is suddenly making every project that boosts domestic supplies look a lot more feasible," says Wayne Dunlap, an offshore technology expert at Texas A&M.

Even if oil prices stay in the \$25 to \$30 per barrel range for months, however, domestic drillers who got burned by the mid-1980s glut are cautious and not necessarily optimistic about long-term prospects for domestic oil production. In the Permian Basin of West Texas, which for years was the U.S. oil drilling capital, only about 100 rigs were operating in fall 1990 — down from 600 a decade before.

To advocates of relying more heavily on domestic fossil fuels for the nation's energy needs, that is the

problem. With domestic production down by more than one million barrels per day from 1986 levels and consumption up by the same amount, the United States is rapidly becoming more dependent on imported oil. Since



DAVID COYNE

relatively little exploration for domestic oil is currently taking place, the future of American oil production is none too bright.

The nation's dependence on foreign oil, as Interior Secretary Manuel Lujan put it, poses "an issue that Americans will have to deal with sooner or later. Do we want to become increasingly reliant on foreign supplies for oil that this country must have? Or do we want instead to rely on our capacity to safely produce our own?"

Advocates of the first approach to America's energy dilemma are convinced that the U.S. should take immediate measures to achieve a greater measure of energy independence. The most promising way to do that, in their view, is to take advantage of domestic reserves of fossil fuels — not just oil, but also coal, and natural gas.

Fossil fuels are by a wide margin the most important source of America's energy, supplying roughly 90 percent of it. Oil, coal, and natural gas heat our homes and generate electricity, run our cars, and provide power for American industry. Advocates of the first choice are convinced that, for the foreseeable future, there is no realistic and economical alternative to fossil fuels.

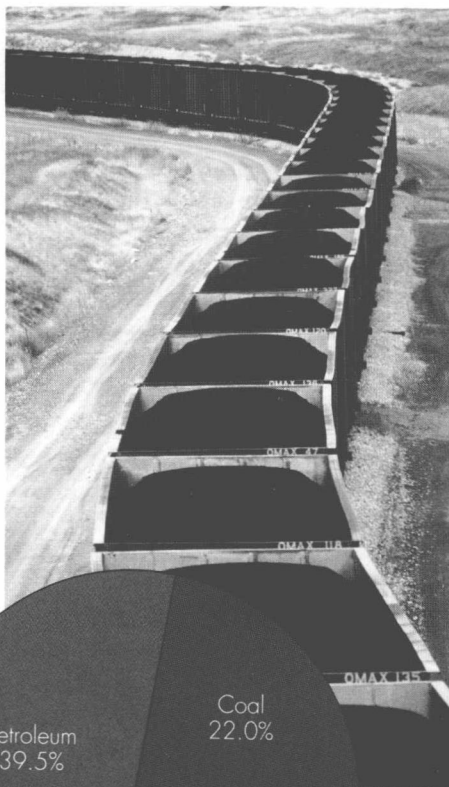
In contrast to other, speculative energy sources such as renewables, advocates of this choice point out, fossil fuels are a proven source of power. They are the fuels that our entire infrastructure — factories, homes, and motor vehicles — is designed to use.

VERSATILE, POWERFUL, PLENTIFUL

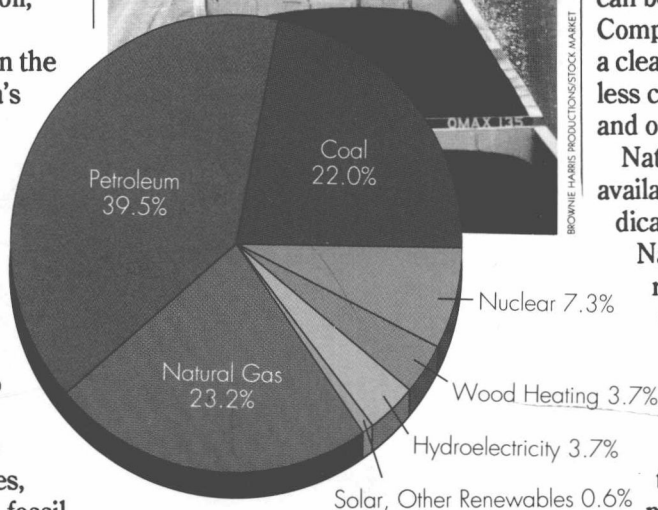
Advocates of this first option point to the fact that substantial reserves of coal, natural gas, and even oil are available domestically, if we take the measures necessary to locate and extract them and put no unnecessary restrictions on their use.

AMERICA'S ENERGY DIET

Fossil fuels are the source of most of America's energy



BROWNIE HARRIS PRODUCTIONS/STOCK MARKET



Source: Congressional Research Service July, 1990

For example, coal deposits can be found beneath 38 of the 50 states. The United States possesses one-quarter of the world's identified coal resources. In sharp contrast to domestic oil production, domestic coal production exceeds U.S. coal consumption. In 1989, the United States exported more than 100 million tons of coal.

The domestic coal industry, propo-

nents of the first option argue, has both the capacity and the available resources to increase production to meet increased demand. Coal, the fuel used to produce 60 percent of the nation's electrical power, could play an even larger role, they say, in America's energy future. In their view, low cost and ready availability make coal-fired generators an increasingly attractive way to meet the need for additional electrical capacity.

The outlook for expanded use of natural gas is also bright, say those who favor this strategy. They note, first of all, that natural gas, which provides about a quarter of America's energy needs, is a versatile fuel. Used to power electrical generators, it can be substituted for either oil or coal. In compressed form, it can be used as a transportation fuel. Compared to coal and oil, natural gas is a clean-burning fossil fuel which emits less carbon monoxide, carbon dioxide, and other hydrocarbons.

Natural gas, like coal, is also readily available. As the Energy Department indicated in its 1990 *Interim Report* on a National Energy Strategy, domestic reserves of natural gas amount to ten times current annual production. In brief, says George H. Lawrence, former president of the American Gas Association, "Ample supplies are available, today and in the future. By using more of its own natural gas supplies, America can reduce its reliance on foreign oil, lower home owners' gas bills, and improve environmental quality."

EXTENDING THE OIL ERA

Substantial amounts of domestic oil are available, too, say advocates of this strategy — if we are willing to take the measures necessary to explore for it and extract it. In the Middle East, oil can be extracted cheaply because vast pools of it lie just below the desert sands. But, in America, the remaining

"The problem is that one obstacle after another has been erected to the extraction and efficient use of domestic fossil fuels."

oil reserves are relatively inaccessible and more expensive to extract.

Nonetheless, America still has large quantities of oil, proponents of fossil fuels argue. Recent studies conducted by the Bureau of Economic Geology at the University of Texas indicate that the U.S. is still rich in untapped oil reserves. According to William L. Fisher, the bureau's director: "Eighty billion barrels of domestic oil could still be produced at a cost of \$20 to \$25 a barrel. An additional 200 billion barrels could be produced at the somewhat higher price of \$25 to \$40 per barrel." That is enough, Fisher points out, "to provide stable U.S. production until the middle of the next century."

The essential point, say advocates of this course of action, is to keep in mind how important petroleum is to our economy and our way of life. The United States consumes 17 million barrels of oil per day because petroleum is a reliable and compact form of energy, easily used in many applications.

For these reasons, says James Critchfield, president of Gulf Futures, which engages in energy research: "Extending the life of the oil era remains humanity's best insurance policy

against a declining standard of living. We need to hang on to the trapeze we're riding until we get a firm grip on the next trapeze."

OBSTACLE COURSE

The problem, say those who favor this course of action, is that one obstacle after another has been erected to the extraction and efficient use of domestic fossil fuels. A series of public actions has hampered exploration for domestic fossil fuels, increased their cost, and curtailed their use.

While production of domestic coal is expected to exceed 1 billion tons in 1990, the National Coal Association is concerned that recent legislation will severely limit coal's contribution to U.S. energy demands in the 1990s and beyond. The legislation, the Clean Air Act approved by Congress in October 1990, imposes two rounds of restrictions on the emission of sulfur dioxide, which contributes to acid rain. Those restrictions, which are scheduled to take effect in 1995 and tighten in the year 2000, require coal-burning utilities to substitute lower-sulfur fuel, or to install scrubbers or other technologies to reduce emissions. "This is going to be the biggest change in the use of coal at

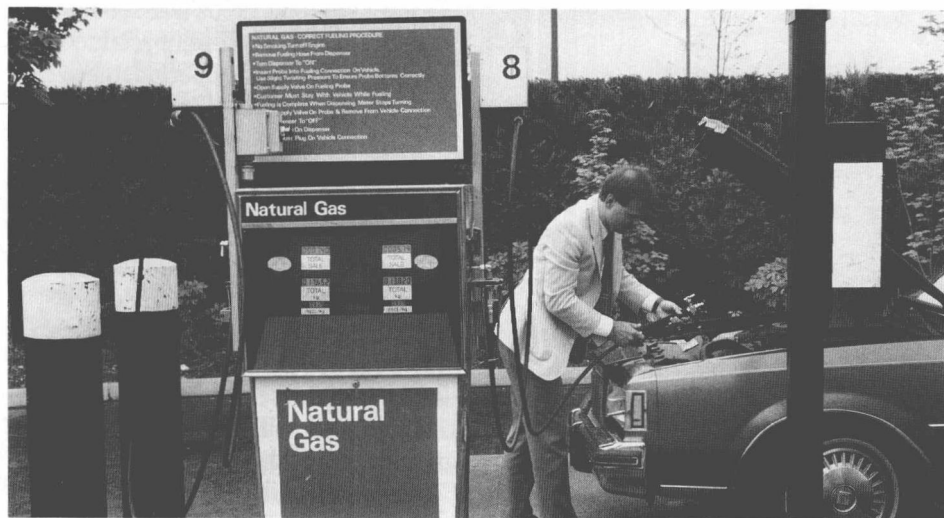
utilities in the past 50 years," says Scott Sitzer, an economist at the Department of Energy.

These restrictions will force utilities to replace high-sulfur coal, much of which comes from the Middle West and Appalachia, with low-sulfur coal, which is available mainly in the West. Especially in the Middle West, where many utilities now use high-sulfur coal, higher transportation costs for coal as well as the cost of scrubbers will push up electric rates.

"Since coal is our most abundant domestic energy option," says David Swanson of the Edison Electric Institute, "we cannot afford to write it off or to unduly restrict its expanded use."

Advocates of domestic fossil fuels are convinced that the use of natural gas as a major U.S. energy source has also been hampered by unnecessary restrictions. Natural gas can meet an increasing portion of the nation's energy needs, they say, only if exploration for new sources is permitted and if public permission is granted for the installation of new pipelines. In several regions of the country, especially New England, the lack of sufficient pipelines is a major barrier.

According to industry officials, a government review process that is overly sensitive to environmental concerns has hampered the installation of pipelines needed to transport natural gas. One example, says Nicholas Bush, president of the Natural Gas Supply Association, is a proposed natural gas pipeline from Wyoming to California. "One of the major factors," says Bush, "is watching out for the desert tortoise. Now, I don't want the desert tortoise to be hurt, but we have to find ways to expedite these reviews. We hear Congress and environmentalists talk about how natural gas is the fuel of the future," says Bush. "But we are caught in a moratorium on offshore drilling. Sixty-six percent of the energy from offshore is natural gas."



A customer fills up at a natural gas service station in Burnaby, British Columbia. Eight thousand Canadians are participating in a demonstration of the potential of natural gas as a safe, economical automotive fuel.