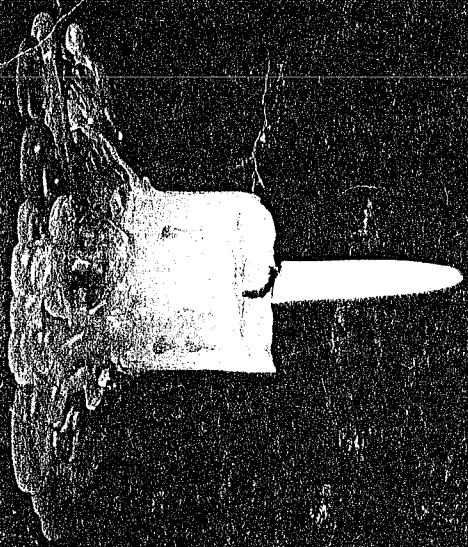


What's  
behind  
the  
**ENERGY**  
**CRISIS?**



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CRISIS?**

*by* George P. Ritter

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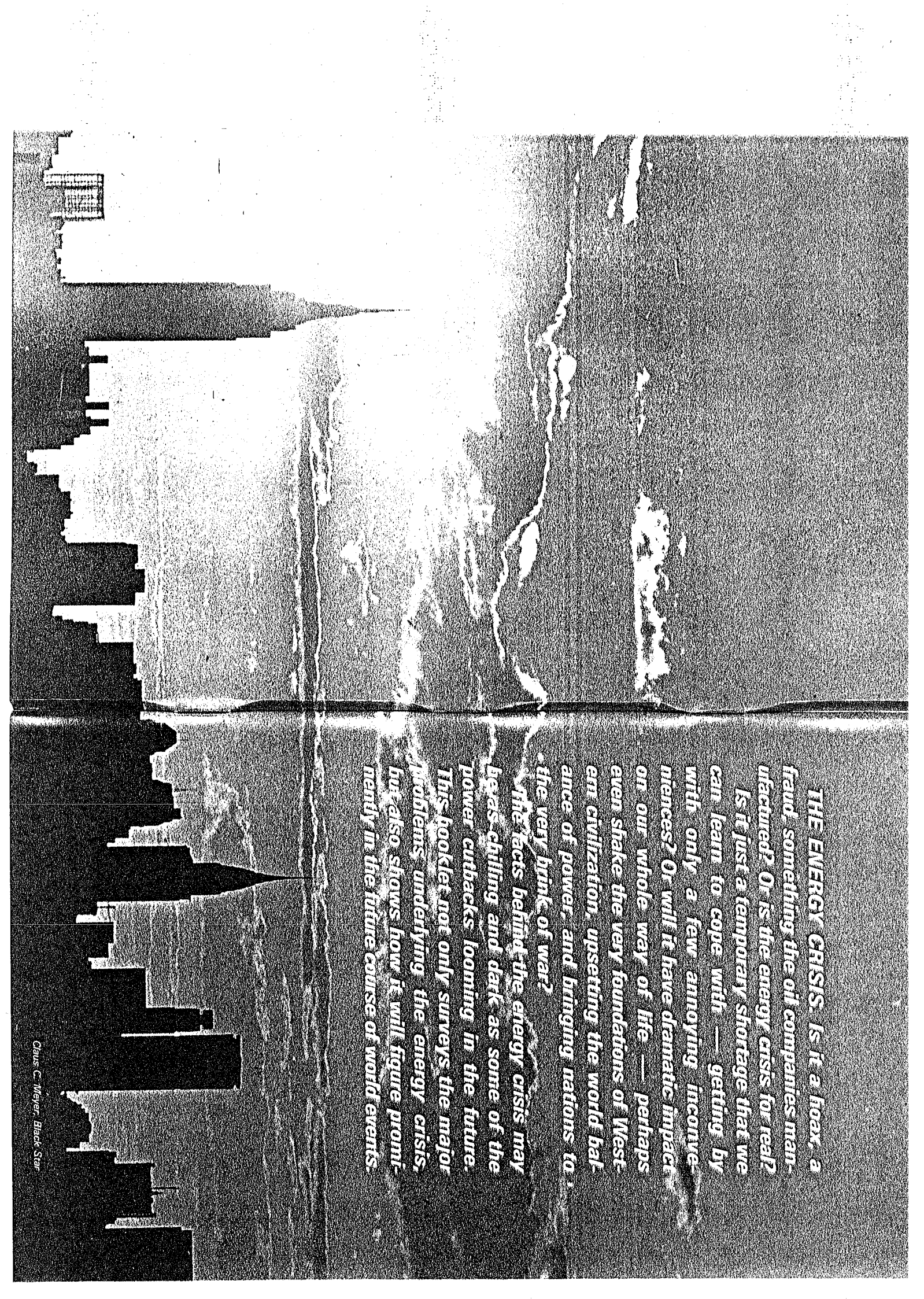
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**THE ENERGY CRISIS. Is it a hoax, a fraud, something the oil companies manufactured? Or is the energy crisis for real? Is it just a temporary shortage that we can learn to cope with — getting by with only a few annoying inconveniences? Or will it have dramatic impact on our whole way of life — perhaps even shake the very foundations of Western civilization, upsetting the world balance of power, and bringing nations to the very brink of war?**

**The facts behind the energy crisis may be as chilling and dark as some of the power cutbacks looming in the future. This booklet not only surveys the major problems underlying the energy crisis, but also shows how it will figure prominently in the future course of world events.**

# Mankind's Awesome Energy Binge

**Y**OU seldom think about energy — unless the lights suddenly go out or the refrigerator stops cooling, or you get only cold water from the water heater, or the furnace won't go on, or the car sputters to a stop because you have run out of gas.

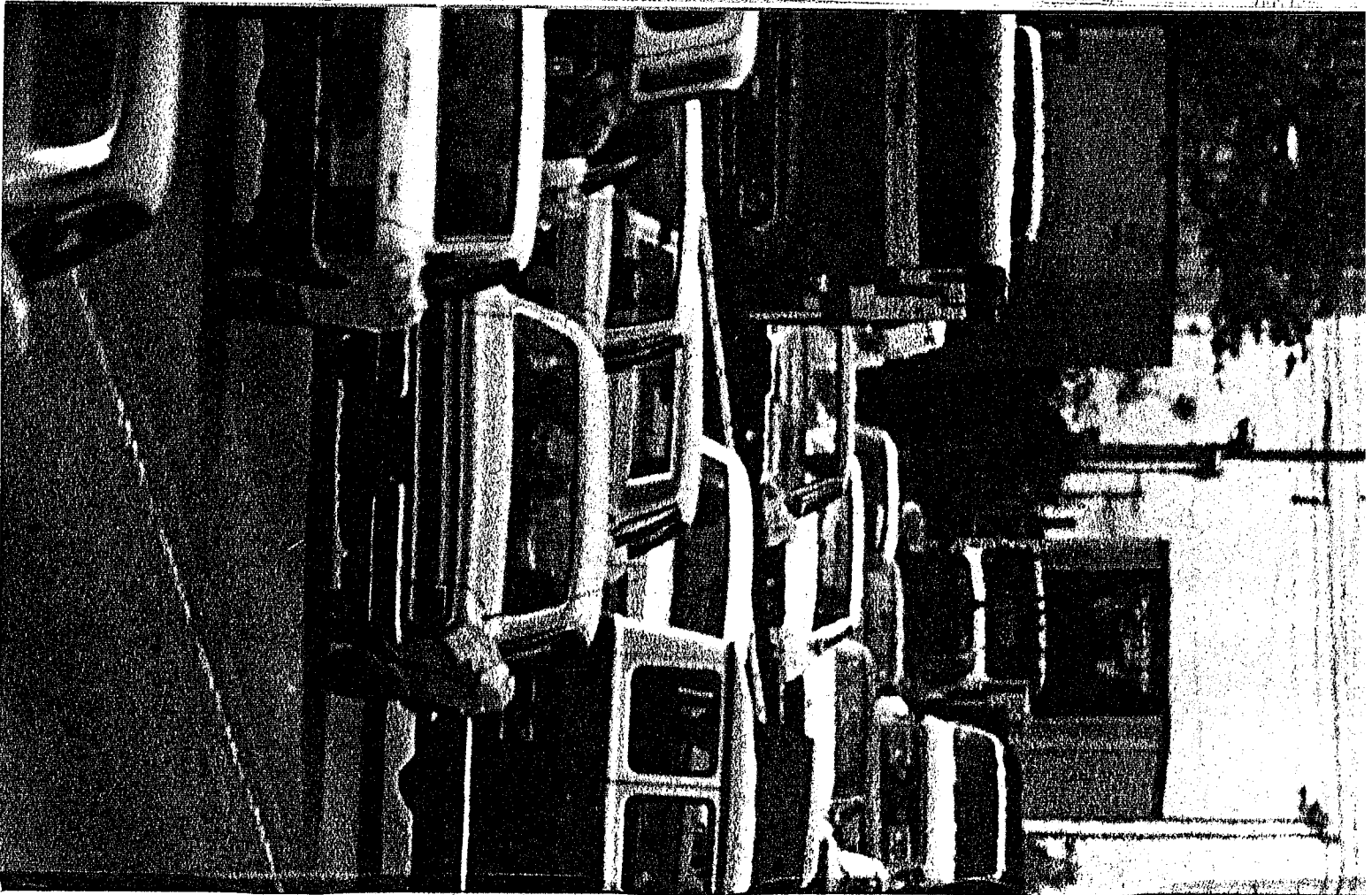
You probably seldom thought about it until the phrase "energy crisis" became a household word in the Western world.

In today's complex world, we cannot live without energy and power. And lots of it!

Just press a button — flip a switch — turn a key — push a lever — set a dial — and **POWER!** Power equivalent to hundreds of thousands of energy slaves.

Power to energize an innumerable array of "labor-saving" devices. Power to speed our luxury cars and giant trucks. Power to turn the massive wheels of industry. Power to thrill us in dozens of forms of entertainment or recreational equipment.

Power is the lifeblood of modern society. With it we have shrunk the diameter of the globe and spanned vast barriers of space and time. Power in many forms put men on the moon. It provides us with warmth, clothing, food and shelter. It gives us instant communication with people



thousands of miles away. It drives ships, trains, trucks, and airplanes — delivering vitally needed goods and services. There is little in Western society that can survive without power and energy.

In the last few decades, mankind has shattered all records for volume of energy consumed. We have consumed more energy in the last thirty years than was consumed in all of history before 1940! And if present rates of increase were to continue, demands in most of the world's major industrial nations would double in the next fifteen years or so, and triple or quadruple by the year 2000.

### America the Prodigal

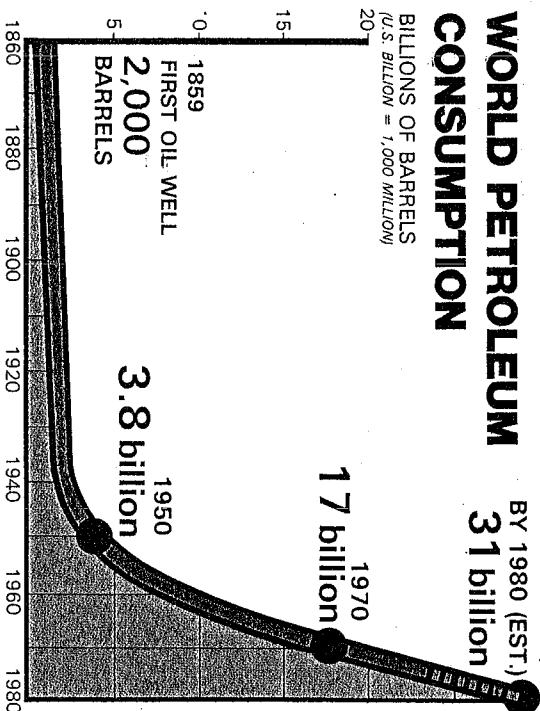
Leading the way on the world's energy parade is the United States. With only six percent of the world's population, we have been consuming *one third* of the energy and mineral resources produced worldwide every year. Our 210 million people burn up more energy fuels annually than the 500 million people of Japan, Great Britain, Germany and Russia combined. In 1970 American homes consumed six times as much electricity as they did in 1950, and our consumption of basic home heating fuels rose by 50% during the same period.

The reasons for our growing energy appetites are obvious. We are a "power-based" society. Our automobiles come equipped with power brakes, power steering, power windows, power seats, and even power antennas. Our homes are well stocked with electric toothbrushes, shavers, tape recorders, automatic washers and dryers — to name a few.

### Oil — The Vital Essence

Most of our power comes from one source — oil. In fact, over one half of the world's energy is derived from this sticky black fossil fuel.

The world's demand for oil has grown with reckless abandon since World War II. During the decade of the 70s the world will consume as much or more oil than it did during all of its history before 1970. World demand for oil



is now a mind-boggling 50 million barrels daily. By 1980, if our pre-energy-crisis trends were to continue, the world would be eating up a staggering 85 to 90 million barrels daily. Ninety million barrels a day is the equivalent of a train of tank cars (10,000 gallons each) approximately 3000 miles long. Such a train would stretch from New York City to Los Angeles.

One reason for the world's burgeoning demand has been the rapid industrialization of Western Europe and Japan during the 1950s and 1960s. Western Europe, for example, consumes three times as much oil as it did ten years ago. By 1985, according to recent trends, European oil needs will be twice what they were in 1970.

But the really big oil guzzler of the world is still Uncle Sam. One day's worth of American oil consumption would fill a train of tank cars 550 miles long. One week's consumption, a train from Alaska to Florida.

U.S. demands, before the energy crisis, were growing at the rate of one million barrels per day each year. For instance, in 1972 the United States consumed roughly 16

million barrels of oil a day. In 1973, our daily consumption was up to 17 million barrels. If this trend were to continue, by 1985 American daily oil usage would be a staggering 30 million barrels!

Even with Prudhoe Bay in Alaska, the picture is not promising. Total reserves of the Alaskan field are estimated at ten billion barrels, but this represents less than a three-year supply for the United States. Peak production capacity will be around two million barrels a day, but this won't be available until at least 1977. By that time, if pre-energy-crisis trends continue, domestic demands would have leaptfrogged by another three million barrels.

Concerning this problem, Robert E. King, an oil consultant, observed: "In the U.S. it is customary to refer to oil fields with recoverable reserves of 100 million barrels and more as 'major' fields... oil fields with reserves of more than 500 million barrels are commonly called 'giant' fields. When we reflect that an oil field with reserves of 100 million barrels can only furnish, during its entire life of 25

to 40 years, enough oil to supply the world for TWO DAYS or the U.S. for a week, we have a conception of the rate at which we are depleting irreplaceable reserves."

And according to the London *Daily Telegraph* magazine: "It is sobering to realize that by the Eighties and Nineties we [the world] shall need to find fields as big as Alaska every six months in order to keep up with demand" (December 3, 1971, p. 17).

It is no wonder then that the United States may only have ten years' worth of proven petroleum left. World reserves are not in much better shape either. Approximately 500 billion (thousand million) barrels remain. As impressive as this sounds, it represents a mere fifty years' supply at current usage rates.\* Undoubtedly, much more oil exists and is yet to be discovered by exploration. Some estimates hold world oil reserves at two trillion barrels. However, potential supply doesn't mean demand can be met. Much of the oil can be tapped only if immense technological difficulties can be overcome, high costs met and stable geopolitical conditions exist.

### Metal Supplies Dwindling

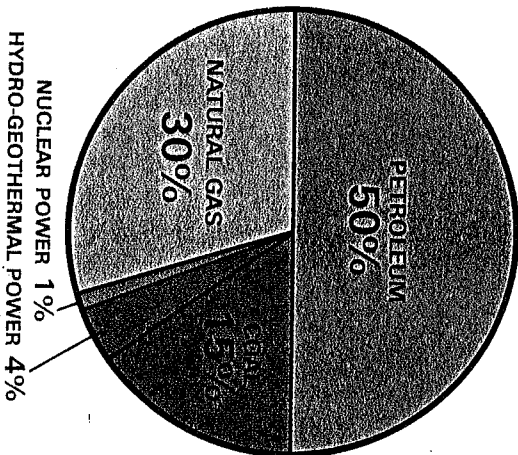
In addition to the energy crisis, we may soon find ourselves in the grips of a "resource crisis" if present demands on raw material — especially metals — continue. A recent report from the U.S. Geological Survey warned: "The real extent of our dependence on mineral resources places in jeopardy not merely affluence but world civilization" (*International New York Herald Tribune*, May 10, 1973).

According to the director of the Survey, Dr. V. E. McKelvey: "With our dependence on minerals and fuels, the consequences of failure to anticipate mineral shortages in time to make appropriate adjustments could well be catastrophic...."

\* Alternate sources of energy can probably be developed during this period. This figure is given to illustrate how rapidly the world is consuming its fossil fuels.

### SOURCES OF ENERGY IN THE UNITED STATES

(1973-74 estimates)



Dr. Charles F. Park, Jr., Professor of Geology and Mineral Engineering at Stanford University, gloomily forecast the following: "The big drain, however, will come if and when the world population reaches its projected level for the year 2000 [roughly double that of today] and the nations of Asia, Africa and South America become fully industrialized."

The end may already be in sight for many of the metals that are staples of Western industry. Dr. Preston Cloud of the University of California predicts: "Platinum, zinc, gold and lead are in very short supply... and present commercial deposits of silver, tin and uranium will be pressing their limits by the end of the century."

### American Metal Woes

Even the United States, abundantly blessed with mineral deposits, is already beginning to feel the pinch. It is estimated that in the last thirty years, the United States alone has consumed as many minerals as were expended by the entire world in all of its history before 1940. These voracious demands have quickly outpaced our supplies. We used to produce 40 percent of the world's minerals. Now our production is down 20 percent.

*No longer is America the master of its own fate when it comes to raw materials.* In 1970 more than 40 percent of our metals were imported. By 1985 imports could account for over half of the total.

We are *totally* dependent on imports for our supply of chromium, tin and columbium. Chromium is indispensable to the manufacture of stainless steel. Columbium is used for turbine blades, while tin has a variety of important uses.

Supplies of other domestic metals, while not yet exhausted, are dwindling rapidly. Reserves of copper are expected to last for only another forty to fifty years. Domestic manganese is in short supply, and over 90 percent must be imported. Few realize how lack of this little-known mineral could jeopardize our economy. Manganese is necessary in order to manufacture steel. As the U. S. Geological Survey reported: "The element is essential to

the whole industrial capacity of the world... when we can do without steel, we can do without manganese."

### Change or Else

Like it or not, the energy crisis is going to be with us longer than some may have realized. The joyride is over — the days of cheap energy are gone. "From now on," said Peter C. Peterson, the recent U. S. Secretary of Commerce, "the energy crisis... will have an impact on almost every aspect of our domestic and international lives." In the future, he said, the day of cheap and easy energy "will be an era on which we will look back with nostalgia, but no amount of wishfulness and sentimentality will bring it back." And as Representative Morris K. Udall so aptly put it: "The fact is that America has been on a three-decade-long energy binge, and a massive hangover is in prospect."

According to U. S. Interior Secretary Rogers Morton: "It will take almost 'SUPERHUMAN EFFORT' for modern nations to meet their energy needs without disastrous conflict during the next 15 years." Morton also warned: "If we fail to take actions necessary to avoid a potential deficit in our energy supply, the consequences to our position in the world, to our economy and to our whole way of life, could be DEVASTATING."

The message to the world and especially to the nations of Western Europe, Japan, Canada, Australia, and the United States is "we've got some changes to make."

But before we consider some of the political, economic, and social implications of the energy crisis, let's understand how we got ourselves into this sad state of affairs.



## Why the Energy Crisis?

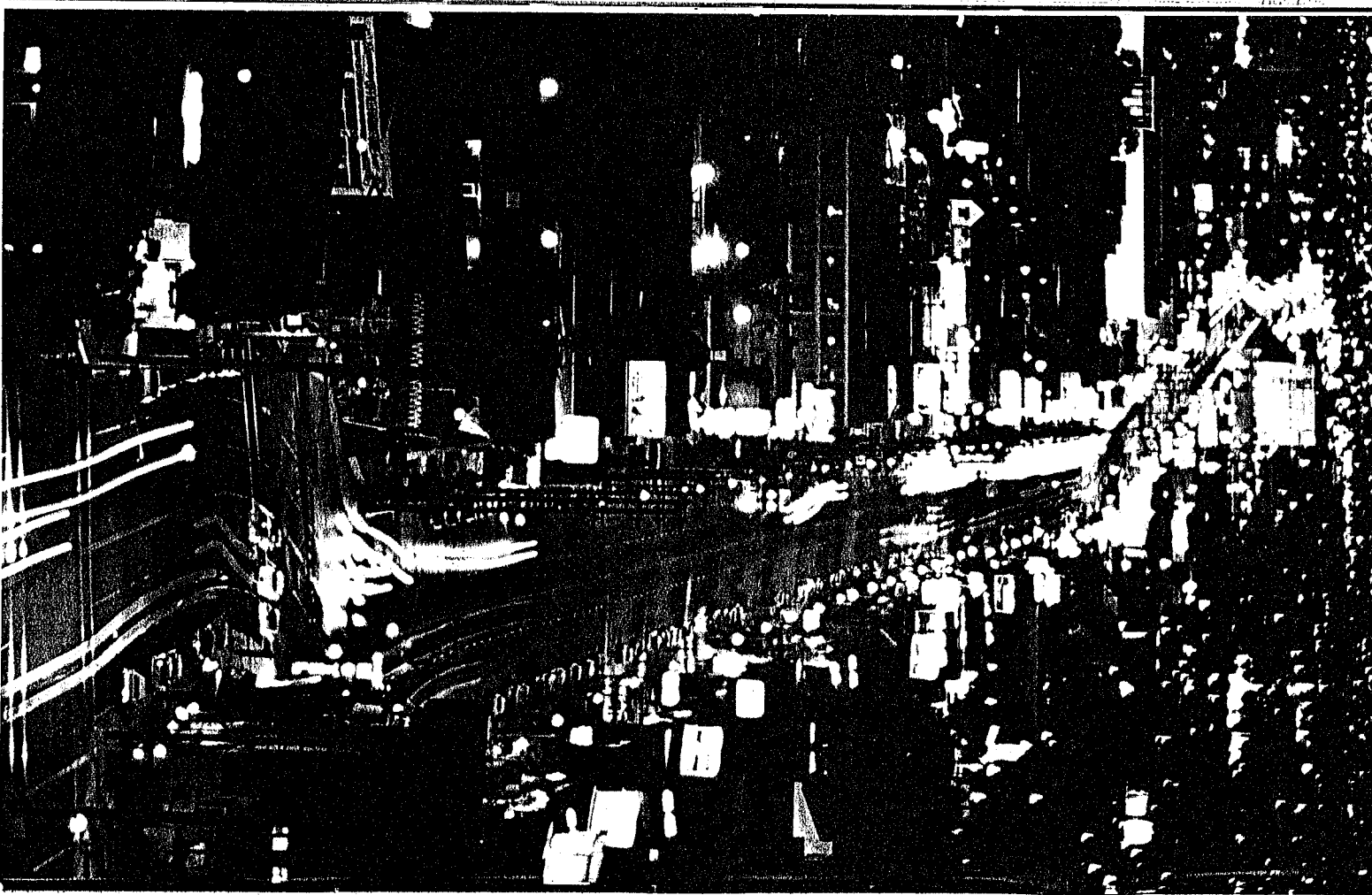
**A**LTHOUGH the energy crisis seemed to take the world by surprise, the circumstances that precipitated it didn't happen overnight.

At the outset of the Industrial Revolution, coal was the prime power source turning the wheels of industry. Petroleum had yet to come into its own as a prime mover of our economy. As late as 1920, oil and natural gas provided only 16.3% of United States energy consumption. Coal was still very much king. It took care of almost three quarters of American power needs.

But all this changed with the rapid development of the internal combustion engine. After 1920 the use of oil and natural gas began to mushroom. Paralleling this rapid growth was the discovery and development of the giant oil fields of Oklahoma, Texas and California. At the time they seemed limitless.

The United States quickly became the world's leading producer of petroleum. During the thirties America turned out almost two thirds of the total global production, and United States petroleum exports accounted for approximately one fifth of the oil consumed by other nations.

But after World War II the balance in world petroleum production gradually shifted toward the Middle East. Although United States production continued to climb, domestic demands were outstripping supplies. By



1948, America began to import more oil than she exported. And during the next two decades the deficit continued to grow.

Even so, the United States wasn't seriously hurt in 1967 when the Arab nations decided to embargo oil during the Six-Day War. America still had sufficient reserve capacity (in the Western Hemisphere) to supply its own domestic needs as well as those of its European allies.

During the 1973 Jew-Arab War, it was a different story. United States demands were now breaking all sorts of records. Domestic refineries couldn't begin to match the skyrocketing demands. Americans were already facing shortages in heating and fuel oil for the winter of 1973-74, even without an Arab embargo.

For the first time in history, the United States was critically short of a primary energy source. Suddenly we, along with the nations of Western Europe and Japan, found ourselves at the mercy of a few relatively underdeveloped countries in the Middle East.

### The Throw-away Philosophy

The "throw-away" psychology has been a big part of the problem. In the past, many vital resources have gone down the drain because we never considered saving or recycling all our packages, bottles or containers. Tons of aluminum, tin and steel have gone into beer and pop cans. Copper has gone down the drain by way of millions of brass lipstick holders. Annually, the U.S. consumes about 200 million tires made from petroleum-based synthetic rubber. Less than 10% get recycled.

And just as detrimental to America's resources over the long haul has been an almost fanatical adherence to the principle of planned obsolescence.

As far back as 1934 some people in the automobile business were already talking about the "desirability of building automobiles with a limited life" (Vance Packard, *Wastemakers*, page 52). And during the fifties, various statements to the same effect began to appear in industry trade journals (*ibid.*, pp. 52, 53).

Planned obsolescence of a particular product is very

simple in theory and execution. Either make the product so that it will wear out after a few years or simply keep changing styles so that the consumer will be "forced" into making new purchases. This philosophy has affected the design of everything from clothing to home appliances.

One of the biggest leaders in the field of planned obsolescence has been the American-made automobile. For years Detroit has been indulging in a veritable "shell game" with the American public.

Detroit thought they had to keep changing styles in order to sell cars — and they were probably right. Americans were so style and power conscious that most forgot what the automobile was all about — that is, until a funny little model from Germany called "the people's car" came along. Built with an almost unchanging body style, the Volkswagen had another virtue lacking in most American models — *economy*. Back in the sixties, thirty miles per gallon was a snap for most beetles. Then came Toyotas, Datsuns and even tiny Honda cars. As imports started to eat into American markets, Detroit began to get the message — the Motor City started manufacturing economy cars. Even so, standard car engines got progressively bigger and gas mileage conversely got smaller.

According to one trade journal, the average car got twenty miles to the gallon in the forties and fifties. At the latter end of the fifties, after a few years of horsepower increases, the figure was down to a paltry fifteen miles per gallon. Today, American cars have achieved an overall figure of eleven to twelve miles to the gallon.

### A Nation of Automaniacs

To add "fuel to the fire," our gas-consuming mobiles have been recently multiplying at record numbers. During the last two years automobile plants have poured out 11-12 million cars and trucks *each year*. Motor vehicle production (cars, trucks, buses, tractors) outstripped human births three to one during the same period.

Result: The United States owns almost half of the world's 200 million motor vehicles. Fifteen million American families own two cars, and two million own *three or*

# THE STEAM ENGINE: "Pollution Solution?"

One alternative to the internal-combustion engine — the steam-driven automobile — has existed for decades but somehow got lost in the shuffle. An early model known as the Stanley Steamer existed shortly after the turn of the century and even then was considerably ahead of its time. Versions of this remarkable vehicle were known to have clocked 60 and 70 miles an hour.

Today, steam-powered vehicles are considerably more advanced and efficient than the old Stanley versions. They use less fuel than the internal-combustion engine and — a big plus in their favor — create considerably less pollution.

Other advantages of a steam-driven automobile include:

- 1) Absence of transmission. This means less engine wear; a lighter weight, and thus more power per unit weight.
- 2) Considerably less brake wear.
- 3) No starter motor, carburetor, fuel injection, engine-block cooling system, distributor, muffler, or elaborate (and fuel consuming) air-pollution control equipment.

The steam engine is smaller than its internal combustion cousin. It consists of a two-cylinder, double-acting engine having the same number of power strokes as an eight-cylinder internal-combustion model.

While it is estimated that 40 percent of the engine

power of an internal-combustion model is wasted within the power train, only 10 percent of a steam engine's power is lost in that manner.

Since the steam engine works on the principle of *external* combustion, its fuel would require neither octane ratings nor lead. Oil companies could recover a larger amount of salable fuel per barrel of oil.

Steam engines can be started in 30 seconds or less and are very quiet once in operation. Water consumption is quite low due to a condensation and recycling system. They can run as low as one gallon for every thousand miles of travel.

Congressman Richard Ottinger of New York once told a Senate committee:

"The root cause of the pollution problem lies in the nature of the internal-combustion engine.

"The problems of the internal-combustion engine are built into it. You can engineer it a little better, and it will perform a little better, so long as it is in proper repair. But let anything go wrong and you have trouble.

*"I drove a steamcar here today. The steamcar I drove was built by Mr. Charles Keen, a pioneer in the industry; it was further perfected by Mr. Charles Gill, of Thermal Kinetics Corp., in Rochester, New York, and his associates. He and they are here today and can give you any details on its operations that you wish. I can only give you my layman's reactions: it works. It is easily and quickly started, easily driven, easily stopped, and it is a pleasure to drive.*

"Mr. Gill is here to tell this committee, and he is in a position to know, that with only a very modest expenditure for research on refinements of existing technology, a vapor automobile could be constructed in a short period and marketed competitively with the internal combustion engine."

And that was 1968!

more cars! And many of the latest models are loaded with power options. It's no wonder that one oil company official noted even before the present crisis:

"An overwhelming percentage of the new models are equipped with such power-consuming options as air-conditioning and automatic transmissions, and have pushed motor fuel demands to unprecedented levels."

Another factor in the unprecedented waste of energy and resources has been inefficiencies in mass-energy technology. Because of heat losses, incomplete combustion, conversion losses, and transmission losses — an estimated 50% of energy ends up being "wasted."

An automobile, for example, shoots 60 to 80% of its energy out the exhaust pipe. The pilot light on a gas range consumes a hard-to-believe one third of the total fuel this appliance burns. And about 25% of our energy is used generating electric power in systems which waste about 70% of the energy input. Needless BTUs have also been lost because of our cheap and shoddy construction practices. Buildings with "paper thin" walls have required artificial cooling in summer and artificial heating in winter.

Another fundamental factor involved in our energy decline has been:

### **Inadequate and Uncoordinated Energy and Resource Management**

In the past, responsibility for government regulation of energy was in the hands of dozens of agencies — many with conflicting and overlapping authority. As Senator Jennings Randolph of West Virginia recently stated: "At present, U. S. energy policy is a mix of uncoordinated, sometimes conflicting and occasionally inept programs carried out by... highly independent agencies." For instance, the following groups have all been involved: Environmental Protection Agency, Department of Interior, Department of Commerce, Bureau of Mines, Geological Survey, Office of Oil and Gas, Office of Coal Research, Department of Defense, Office of Emergency Preparedness, and the Maritime Administration.

In 1959, William R. Connole, then Vice-Chairman of the Federal Power Commission, lamented that "the need for a national energy policy seems so obvious that I am simply unable to understand how thoughtful people concerned with this business can overlook it." But until very recently nothing really concrete was done about it.

### **Cheap Fuel in Short Supply**

Because our resource and energy planning in the past was woefully inadequate, petroleum reserves in the lower 48 states have suffered accordingly. Oil and gas companies heavily exploited the easy-to-reach portions of these reserves and did little to develop less accessible, more expensive petroleum deposits. Profit considerations obviously had a lot to do with this.

But on the other side of the coin, oil companies have been heavily regulated with price controls, quotas and taxes that prevented them from getting even more profits. In the short run, these controls have helped keep oil and gas prices down. But over the long haul, they have also discouraged the development of harder-to-get domestic gas and oil reserves.

Recent wage and price controls instituted to combat inflation have compounded oil producers' problems by dampening incentive for investment in badly needed refineries. And with domestic oil production passing its peak around 1970, refinery builders have been even less inclined to sink several million dollars into a new refinery unless a continual, long-standing supply of oil can be assured.

Natural gas is another good case in point. According to Hollis M. Dole, Assistant Secretary for Mineral Resources: "The intent of wellhead gas price regulation was to insure that consumers were able to enjoy a premium fuel at a low price. But the price of gas was set so low that trillions of cubic feet of it were burned under boilers for a purpose that coal could have served as well, and increasingly consumers are unable to get gas at any price."

Gasoline has also been relatively inexpensive and easy to get. Had it not, perhaps like the Europeans and Japa-

nese, we would have reconsidered our policy of manufacturing the gas-guzzling monsters that now crowd our highways.

Government regulation also has an effect on what the oil companies produce — sometimes to the detriment of the consumer. A good case in point has been fuel and heating oil.

A few years ago when domestic demand for fuel oil was beginning to outrun the capacity of U. S. refineries, governmental officials were faced with a choice of either forcing consumers to pay higher prices for coal or allowing for more imported fuel oil. The latter decision was taken because it would have been politically unpopular to force consumers to pay a higher price. As a result, East Coast consumers then became critically dependent on Middle East oil for their heating and power needs. (This was also aided by environmental regulations.)

When price controls went into effect in the summer of 1971, fuel oil prices were seasonally low and gasoline prices were at their summer highs. During the winter, oil refineries naturally concentrated on the more profitable gasoline to the detriment of fuel oil supplies. This in part resulted in the fuel oil shortage during the winter of '71-'72.

Wage and price controls have also hampered domestic oil development in another rather ironic way. In 1973 some Texas drilling concerns were restricted in their development of new wells because of a shortage of steel tubing. Reason for shortage: Government wage-price controls which encouraged production of plate steel rather than the tubular variety.

Government regulations, however, are not totally to blame for all of our shortages. The oil companies have undoubtedly contributed as well. During 1972 when it appeared that domestic demands for heating oil and gasoline were on the increase, major oil companies apparently chose to run their refineries at less than peak capacity. At the close of that year, the majors belatedly began to make substantial increases in production, but by that time they were hard pressed to keep up with the increasing demands of American consumers and industry.

### Miscalculations of National Energy Demands

In 1970 a Government task force estimated that U. S. oil needs by 1980 would be around 18.5 million barrels a day. But by 1973 oil demand was already at 17 million barrels a day and rapidly heading toward 18.

The same task force report said that the U. S. should never get into the position of needing to import more than ten percent of its oil from the Eastern Hemisphere (mainly Mideast). But a decline in domestic oil production after 1970 pushed fuel imports from the Mideast to 15-17% of our national consumption in 1973.

### The Skyrocketing Cost of Developing Energy Resources

America's current energy problems are not due to a lack of *potential* energy reserves, rather they revolve around *costs* and *availabilities*. Just because a particular resource is known to be in the ground isn't enough. Money, time and technology are required to extract it. Until recently, this hasn't been a problem. The United States grew up with a plentiful supply of easily tapped energy resources — coal, oil and gas.

But now most of the easy stuff is gone. The existing oil fields in Texas, Oklahoma and California that proved to be such energy bonanzas over the last three to four decades have for the most part passed their peak production years. It has become increasingly difficult to find worthwhile petroleum deposits in the lower 48 states. This has resulted in steadily rising development costs for both oil and natural gas.

Before 1970, oil or gas exploration and drilling might have cost a Texas wildcatter \$50,000 or \$100,000 for a well 10,000 feet deep. Today, drilling in Texas is averaging closer to 20,000 feet. And exploration and drilling costs approximately double for every 3,600 feet. So a well drilled at 20,000 feet could cost anywhere from 800,000 to one million dollars — dry or wet. For wells over 20,000 feet

deep, the costs run anywhere from 1.5 to five million dollars. The odds of striking oil are even more discouraging. Out of every 100 wells drilled, only nine find oil or gas, and only two make discoveries of commercial significance. The odds, then, are one in 50 that a driller will strike profitable oil.

The cost for drilling an offshore well is even more astronomical — something like seven to eight times that of a land-based well. This could mean that multiple millions of dollars have to be invested in the erection of only one large offshore platform and well. In addition, new and complex environmental safety devices required of these offshore rigs further inflate operating costs.

We can begin to understand why "the days of cheap energy" are history.

### Buy Now — Pay Later

Heavy reliance on cheap, easy-to-use energy sources in the past has resulted in:

- 1) The failure to develop alternate renewable energy sources such as solar, wind and geothermal energy, and coal gasification. Had any or all of these been pursued after World War II, they could now be making a significant contribution to America's current energy needs.
- 2) A tendency to place increasing reliance on imported oil and natural gas.

As the late 1960s rolled around, an unforeseen factor suddenly appeared that further aggravated our energy problems.

### The Environmental Crunch

We finally woke up to the fact that our ever-expanding power-based society was taking a fearsome toll on our air, water and land resources. Positive steps were taken to clean up the environment. Domestic energy production was directly affected. Vtally needed construction of oil refineries and power plants came to a virtual standstill. Offshore oil drilling ceased after the disastrous Santa Barbara spill. The Alaskan pipeline project was suddenly thrown into limbo.

It was paradoxical. On one hand we wanted power, fuel and energy so we could continue to enjoy the good life. On the other hand, we wanted less smog, cleaner water, quieter cities. But we quickly realized the incompatibility of both within our present society. The average citizen would say: "I want power, light and heat, but don't you dare build that dirty old plant in my back yard."

Measures designed to protect the environment also resulted in a marked increase in petroleum consumption. Smog devices — designed to clean up the environment by causing more gasoline to be burned — were required on new cars. This further decreased the already sagging gas mileage of new autos.

Industrial concerns began a massive campaign of installing antipollution and recycling devices. But this required more power just when new power plant construction had bogged down in a maze of bureaucratic regulations and lawsuits. What further compounded the problem was the lead time of three or more years required for construction of a new power plant or refinery. All of this was happening while domestic energy demands continued to climb steadily.

But there was one other environmental factor that really put us behind the energy eight ball — the demand for low sulphur fuel. Out went the highly pollutive coal-fired furnaces and in came fuel oil. This further increased our dependence on oil at a time when alternate energy technologies were already lagging. The East Coast of the United States was the most heavily affected. Since 1967, the use of fuel oil there has doubled, while coal consumption has declined.

This new upsurge in demand took domestic fuel oil producers by surprise. For years fuel oil was the unwanted stepchild of the oil industry. Petroleum refineries were designed to primarily turn out gasolines and other lightweight fuels. Fuel oil was usually sold as a low-cost item and consequently yielded little in the way of profits.

So, increasingly, imports were used to meet domestic fuel-oil demands. By the early 1970s the East Coast was

heavily dependent on foreign oil for its heating and power needs. To make matters worse, most of this oil (until the recent embargo) came from the Middle East and North Africa.

### The Changing Geopolitical Situation

Middle Eastern petroleum provided an easy solution to America's growing energy and resource problems. It was cheap, and there was plenty of it.

For years the Western powers and our major oil companies called the shots economically and dominated the area politically and militarily. But the 1956 Israeli, Anglo-French attack on Egypt upset the Western applecart. Russia, seeing a chance to redeem herself after the bloody Hungarian revolt, quickly aligned with the Arab nations. U. S.-Egyptian relations went sour. Since then more and more Arab nations have been drifting toward the Russian camp.

The striking progress of the Russians in the Middle East can be directly attributed to long-standing grievances that have arisen between the Arabs and the West. Many of the Arab nations have been resentful at what they felt to be Western-style imperialism, have always been fearful of what Israel might do, and have smarted from years of foreign domination and control of their oil resources.

By the early seventies, the tables had turned against the West. The Arabs now held most of the trump cards. Their economies are backed by huge reserves from Western oil revenues; they had mended many of their internal differences; they had a growing voice in the control of their own oil; and they enjoyed strong political and military support from the Russians. Even more vitally important: the U. S., Japan and Western Europe were now dependent on *their* oil.

### Warnings That Went Unheeded

A few farsighted individuals saw the energy crisis coming years ago. For example, in 1952, William S. Paley, then chairman of CBS, conducted a Government study of resources at the request of President Truman. His pre-

diction: Americans would one day have to face up to resource shortages. The problem was that nobody took such warnings seriously.

One oil company president observed: "Some people did see it [the energy crisis] coming and sounded warnings a number of years ago, but the problem had to come to crisis proportions before even leadership in Washington could recognize it."

And the chairman of another large oil concern: "Let me also remind you that our energy difficulties in the 1970s have arisen — not because we lack an adequate resource base — but because we failed to foresee our problems and to act in a timely manner to meet the situation."

A White House study conducted in 1966 roundly miscalculated the nation's future energy needs. It rather soothingly reported: "The nation's total energy resources seem adequate to satisfy expected requirements through the remainder of the century at costs near present levels."

The Government also grossly underestimated the potential dangers of an Arab oil embargo. Prior to the 1973 Jew-Arab War, the feeling was: "The Arabs can't drink their oil."

Had we taken some positive and forceful action in advance, we might have mitigated or forestalled some of the major effects of the oil embargo. As it was, our increasing dependence on imported oil that came about because of decades of mismanagement and waste left us wide open for the startling events that emerged out of 1973.

# The World's Crippling Dependence on Oil

**I**N THE year 1967, America really became "hooked" on oil. That was the last time the United States still had enough refinery capacity to make up for any losses of imports. From then on, we dug ourselves deeper and deeper in the hole. By 1971, oil accounted for almost one half (44%) of the nation's energy needs. Oil and natural gas together provided for over three fourths of our energy supplies.

Even without an Arab embargo, experts estimated that by the latter part of 1973 the nation would be running short of oil to the tune of half a million barrels a day.

## The Real Extent of Our Dependence on Arab Oil

But then the Jew-Arab War burst upon the world on Yom Kippur 1973 and the Arab oil embargo came right on its heels. Officials reassured the public that only six per cent of our petroleum came from the Middle East. But that was only part of the story. What few seemed to realize was that we were also receiving shipments of refined heating oil, fuel oils, etc., from the Middle East via third-party countries such as Canada, Trinidad and Hol-



land. Apparently this wasn't figured into the first estimate. It wasn't long before six percent grew to 12 percent and then 17 percent. The Arab embargo was no longer a laughing matter.

By late 1973 the United States was consuming roughly 17.5 million barrels of oil a day. Domestic production accounted for only 11 million barrels. That meant our imports were running about 6.5 to seven million barrels daily. Almost half of this deficit — 3.5 million barrels (not 20% as earlier estimated) — was being imported from the Middle East.

The real crunch of the Arab embargo was initially with heating and fuel oil — especially on the East Coast of the U. S. Because of the shift away from coal in recent years, 90% of the eastern seaboard's energy needs were being met by oil. The bulk of this was imported from the Middle East. United States refinery capacity, geared primarily to gasoline and other light fuels, is not about to make up the difference.

Fortunately for the United States, not all of the oil it imports from the Arab countries was embargoed. Libya, for instance, miffed at Egypt and Syria for excluding her from recent war and peace negotiations, continued to ship oil to Caribbean refineries used by the United States. And other Arab nations found it more profitable to defy the embargo in order to get badly needed Western revenues. These leaks in the Arab embargo added approximately 700,000 barrels a day to United States supplies — reducing our daily deficits from the expected 3.5 million to 2.7 million barrels.

In Eastern Europe and Japan, the situation was fraught with much graver possibilities. Oil supplies Europe with 60% of her energy needs and almost all of it (95%) comes from the Middle East. In Japan things were even worse. Fully seventy percent of this nation's energy is provided by oil — 90% of which originates in the Middle and Near East. Without Middle Eastern oil the U. S. aches and hurts; Europe slowly strangles to death; and Japan — well, Japan keels over and dies on the spot.

### The Awesome Impact of Oil

Lack of oil would be a nightmare for modern nations. It is their *lifeblood*. And, increasingly, as we shall see, it can be their Achilles' Heel.

Just quoting facts and figures hardly gives a true picture of the Western world's utter dependence on petroleum. So let's take a closer look at what can happen to a modern industrial nation when its fuel supplies are threatened.

The impact of the recent Arab oil embargo on the United States is a good case in point. Initially there was a downward plunge of the stock market, massive layoffs in major industries (with more certain to follow), and the prospect of a major economic downturn. Experts predicted unemployment could soar to 8% if the embargo continued. Some areas of the country faced drastic reductions in fuel and oil power. Shortages of 30 to 40% loomed in New England and Southern California, which until recently relied heavily on Middle Eastern oil. Consumers in these and other areas girded for rolling blackouts, brownouts, and voltage reductions.

But this was only the visible effect of the fuel-oil shortage. The effects of the energy crisis actually go much further. Reason: energy is the common denominator of any industrialized society. Eric Sevareid of CBS news recently stated: "Energy is basic. A cutback in energy means cutbacks in production, in sales, in services, in jobs, in personal and corporate income, in tax collections, a rise in welfare payments, rise in government deficits. In other words, recession, and at a very high cost of living level."

But even that is only part of the story, because petroleum does much more than provide energy. From it we get over 3000 different products vital to our way of life.

According to the chief executive of DuPont, the petrochemical industry accounts for roughly four million jobs and one quarter of the nation's total manufacturing output. The petrochemical industry per se is not that big. Its total work force is only 360,000, but loss of its products would have a domino-like effect in scores of other industries. Paints, pharmaceuticals, fertilizers, plastics, asphalt,

clothing fabrics, vinyl and synthetic rubber are only a few of the more prominent items involved.

The importance of petrochemicals and plastics extends far beyond the industries that manufacture them. Without these products other giant manufacturing industries are handicapped if not crippled. Aircraft manufacturers, construction, defense, medicine and the clothing industry to name a few are heavily dependent on petroleum-based products.

Other major industries affected include:

#### **Automotive**

Most American car makers were caught flat-footed by the energy crisis. Prior to the oil embargo, the "Big Three" were still emphasizing standard and large-sized cars (e.g., 4000 lbs.; 11 to 12 miles per gallon). With consumers clamoring for small economy cars, Detroit awoke to the fact that the era of the big car had suddenly vanished. Sixteen General Motors plants were ordered to shut down for a week subsequent to the Arab embargo.

The cutbacks not only affect the 900,000 persons directly employed in automobile assembly and parts manufacturing, but many others as well. According to the Motor Vehicle Manufacturers' Association, the automobile industry generates 16 other industries and is responsible for *one out of every six jobs* in the nation. Heavily involved are the steel (one fifth of its output goes into automobiles), rubber and glass industries.

Also hurting production are shortages of plastics for dashboards, knobs, etc. Petroleum cutbacks have affected the supply of synthetic fabrics for upholstery, transmission fluids, antifreeze, and roof vinyl.

#### **Steel**

Prior to the Arab oil embargo, U. S. steel mills were running at maximum capacity. So any reduction of fuel is bound to cause a sharp decrease in production. In fact, for some steel manufacturers just matching the fuel supplied in 1972 is not enough.

Power and fuel cuts for the steel industry could easily

result in a vicious energy cycle. At the onset of the fuel embargo, oil drillers found themselves short of steel pipe which is essential for drilling wells. Steel is also vital for the construction of reactors, boilers and other power-plant equipment. Power-plant manufacturers such as Combustion Engineering have been forced to order steel from foreign manufacturers because of domestic shortages. How long this door will remain open is another question. A healthy steel industry is also indispensable to the railroads. If steel production drops, so does the construction of badly needed passenger cars and gondolas for coal.

Again, part of the problem is price controls. Domestic steel prices have been kept artificially low compared to those in other countries. Steelmakers, feeling an acute pinch in their profits, have sought out more lucrative foreign markets. Result: steel desperately needed in the U. S. is being sold abroad.

#### **Transportation**

With speed and fuel restrictions, the trucking industry faces the prospect of added delays, increased fuel stops, and higher operating costs. For the consumer it means cancelled deliveries, soaring costs and longer delivery time.

The airlines have already felt the impact of fuel shortages. Fewer flights, pilot lay-offs, and cancellation of service to the more out-of-the-way areas. Reverberations will undoubtedly be felt by Boeing, McDonnell Douglas and Lockheed as orders for new aircraft diminish.

#### **Agriculture**

The farming industry is particularly vulnerable to fuel shortages. Planting and harvesting operations were already in trouble before the embargo, and have been suffering since due to tight fuel supplies. Food grains must be dried by natural gas and then kept in a controlled climate to prevent rotting. Most of these functions are done with natural gas.

But the United States economy was not the only one to feel the weight of the Arab embargo. More serious repercussions were felt far beyond America's shores.

### Japan's Oil Jitters

Japan, more than any other industrial nation, is extremely vulnerable to the effects of an oil shortage. Unlike the United States, Japan must import 99% of her petroleum. Ninety percent comes from the Middle East, ten percent from Southeast Asia (mainly Indonesia). The consequences of a prolonged oil embargo to Japan would be "horrendous" according to one American economist.

Fears of depression, food shortages, and consumer riots loomed ahead for the Japanese in the wake of the Middle East crisis. Leading industrialists predicted a 10 to 15% loss of industrial output, and economists feared that Japan might lose up to one half of the economic gains she achieved in the last fiscal year.

In the face of these mounting economic pressures, the Japanese bowed to Arab demands and called on Israel to withdraw to the 1967 cease-fire lines. They also served notice on the United States that: "Japan's policy toward Arab countries was not a matter on which we should consult with the United States. What Japan will do is up to the Japanese government to decide."

### Britain's Ballooning Balance of Payments

Already staggering under her biggest trade deficit in history (over \$5 billion for 1973), Britain braced for higher bills as fuel prices soared and production sagged during the Arab embargo. To compound her energy troubles, thousands of coal miners, electrical and locomotive engineers decided to slow down production and shipment of badly needed fuels. The announcement of a three-day work week for industry was certain to aggravate Britain's already serious balance of payments problem and further weaken the pound on world money markets.

### The Third World — Whopping New Oil Costs

*Lack of available oil is not the problem with most underdeveloped countries — rather it is finding the means to pay for it.* India, for example, already financially

depleted because of massive grain imports, now faces the prospect of backbreaking fuel bills. If she decides to pay the price for petroleum, it means depriving herself of other vital materials needed for her five-year development plan. If she decides to forego some of the oil, then less fertilizer (petroleum based) becomes available — and that means less food for the 575 million mouths she has to feed.

### Europe's Energy Woes

The impact of the Arab embargo was immediately felt in Europe as governments banned Sunday driving, cut automobile production, and limited gasoline purchases. Rotterdam's refineries, which provide the bulk of Europe's fuel supply, initially were expected to suffer heavily from the embargo. But a combination of oil company redistribution and sizable leaks in the Arab boycott have kept the lights burning brightly in Europe — so far.

Perhaps more worrisome for Europe and the United States were the political overtones of the energy crisis. At the onset of the Arab embargo, European nations, with the exception of the Netherlands, maintained a strictly neutral position toward the Middle East. The NATO alliance was tried and found to be sorely wanting. One prominent European journal even went so far as to blame Europe's energy woes on the United States.

Like it or not, the energy crisis has driven a deepening wedge between America and some of its staunchest allies. But this is only the beginning of our geopolitical and economic problems.

# Finding Solutions to Our Energy Problems

**S**UPPLY and demand. That's the name of the game in the energy crisis. Reduce demand and increase supplies and we've solved the problem. It's as "simple" as that.

In other words, it is much easier said than done. But it can be done — if we have the patience and if we are willing to pay the price.

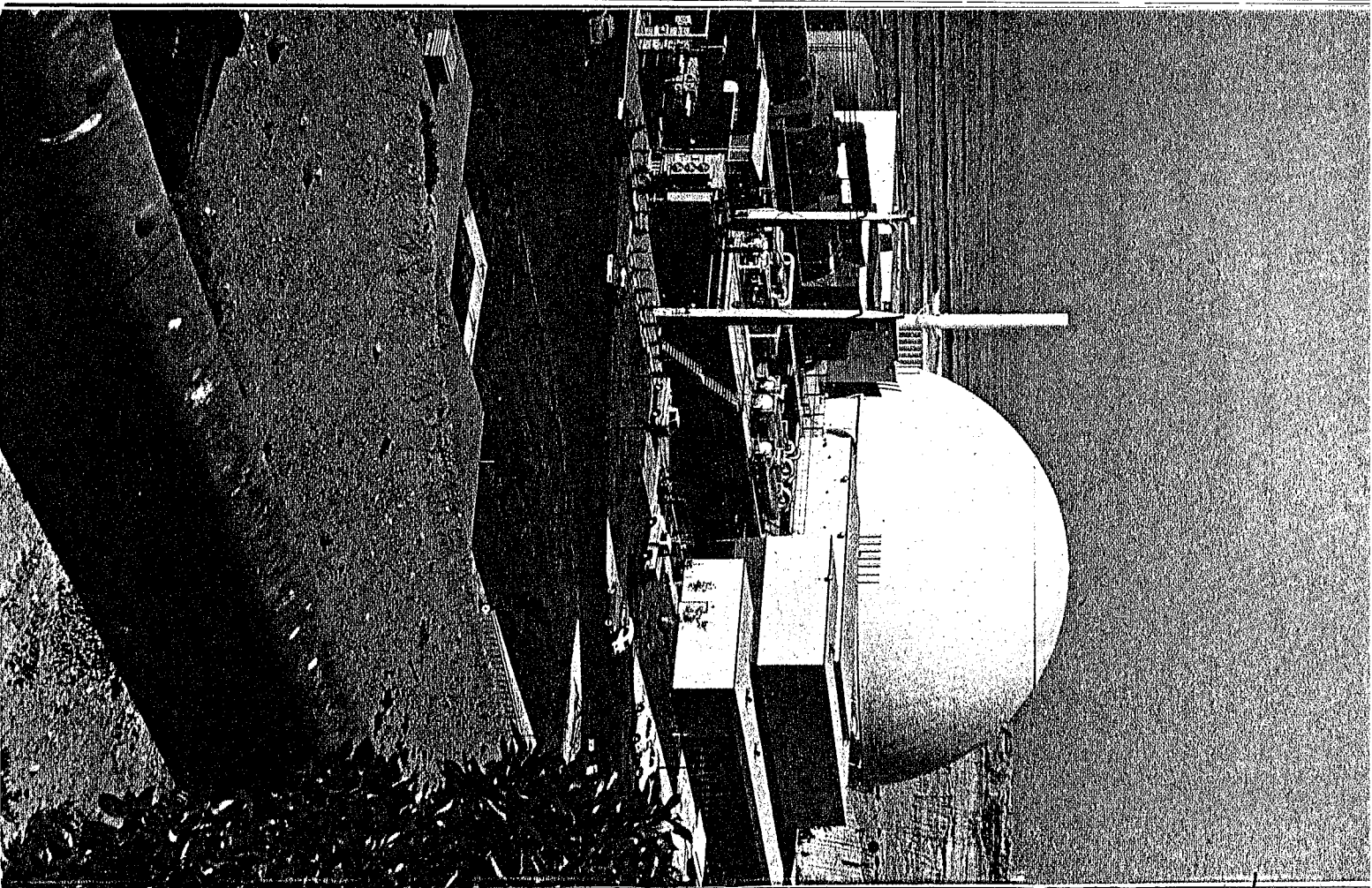
There are two basic ways we can increase our energy supplies:

- 1) Continue to exploit nonrenewable resources such as coal, oil, natural gas and uranium.
- 2) Develop alternate forms of renewable energy — e.g., sun, wind and geothermal power.

## Tapping Our Oil and Gas Reserves

It's not that we're running out of oil in the ground at the present time. The problem is getting it out.

Known gas and oil reserves in America are estimated to start running out in about ten to eleven years at present rates of use. But the United States has *potential* reserves of 385 billion barrels of oil and 1100 trillion cubic feet of natural gas. This amounts to roughly a 60- to 80-year supply at present rates of consumption. But that's



*potential* reserves — not what is immediately available. About half of them (45%) are underwater. And some of these reserves cannot be recovered with present levels of technology.

Vast offshore deposits are thought to exist along the Gulf and Atlantic Coasts. Drilling will have to go deeper to get it, and that takes money — lots of it. Recall (from Chapter Two) what the going prices were for *one* large offshore rig (several million dollars!) and then start adding on to that.

Alaskan oil is not a cure-all either. Prudhoe Bay deposits are estimated to contain ten billion barrels. But that amount alone would last for less than three years if we used it to satisfy America's present voracious appetite. On top of this, Alaskan oil can't be in peak production until 1977.

The North Sea deposits offer some hope, but Europe will get first crack at them. Even so, conservative estimates figure this field will only last for twenty years at present rates of consumption.

Canada also has large deposits of oil, much of which is located in Alberta. But how much can be extracted and exported is debatable. The Canadian government estimates that only about one tenth of it (65 billion barrels) can be feasibly recovered with existing technology.

Shale-oil exploitation is another distinct possibility. Already two trillion barrels of oil are estimated to be locked in vast deposits in Colorado, Wyoming and Utah. But only about a third of it is thought to be recoverable.

In addition, shale-oil mining has significant drawbacks. One is cost. A 100,000-barrel-a-day shale plant would cost 300 million dollars. And it would take a lot of these "little" 100,000-barrel plants to satisfy our domestic oil needs. Extraction of shale also requires massive removal of ore from mines. This means large quantities of spent shale are left over and vast tracts of real estate must be torn up. This poses a sticky environmental problem. Even if adequate land-fill measures were taken, it would add significantly to the cost. On top of this, vast quantities of water are needed to process shale oil. This could be a

problem in the semiarid regions of the West where most of the shale is located.

Time lag is one of the biggest problems we face with our oil reserves at present. At best we can expect no significant contributions from Alaskan and North Sea oil until sometime in the late 1970s. Although some shale-oil production could begin in three to four years, it would be well into the 1980s before the project could really get into high gear.

There are, as you might expect, giant environmental problems involved in future oil exploitation. Oil is a polluting fuel whether it be the low or high sulphur variety. Also yet to be resolved are conflicts and priorities of offshore drilling. Solutions in these areas obviously aren't going to come overnight. It's going to take time and money. Meanwhile the United States is going to be short of oil.

### Corralling Our Coal Deposits

With 390 billion tons of coal reserves that could last for 600 years, you would think that Americans would have energy to burn. Unfortunately, that is not the case. Although we still have vast coal reserves, that is all they are right now — reserves. Reserves don't run power plants. Coal used to be king. In 1910 it provided us with over 75% of our energy needs. Now it has sunk to a dismal 18%. What went wrong?

First of all, oil and gas replaced coal on many of its traditional markets. Petroleum was cheaper and more efficient, so it was a natural choice over coal. The only area in which coal retained any supremacy was power-plant generation. In 1969 it still accounted for sixty percent of all electric power generation fuel consumption. But this percentage was soon to drop as well.

Throughout the 1960s development of new coal mines started to lag. First, there was the bright promise of nuclear power which would greatly reduce our need for coal. This resulted in less incentive to open new mines or build badly needed gondola cars necessary for rail transport. Unfortunately, nuclear power hasn't filled the energy gap as originally anticipated.

Then there was the environmental problem. Coal is a dirty fuel, even when it is transformed into gas or coke. The by-products leave much to be desired. When coal is burned, sulphur gasses contribute significantly to air pollution. So, in the late 60s and early 70s more and more power plants began replacing coal with low sulphur fuel oil. This further reduced the economic incentive to develop our coal resources. Coal mines were also hobbled by their share of bureaucratic red tape, price controls, problems in mine safety inspections and stagnant technology.

But the biggest problem now facing the nation's coal industry is in the field of labor-management relations. Wildcat strikes, absenteeism and high labor turnover have significantly cut into industry output. Pay is good, but that probably contributes to some of the absenteeism. Workers can afford to miss a day here or there and not really get hurt financially. Also, there is a crying need for experienced miners due to high turnover rates.

The upshot of all of this is that coal production has actually declined from 1972 to 1973 by five million tons. And industry spokesmen say it will be at least five years before productivity will significantly increase.

Environmental conflicts will also be a big factor in the future development of coal as an energy source. A decade ago only about one third of our coal mining was done by the strip method. Today it accounts for nearly one half of what is mined. In addition, about two thirds of the coal east of the Mississippi cannot meet present air pollution standards because of high sulphur content. And it will be three to five years before coal-burning smokestacks can really be cleaned up. So there is increasing incentive to mine the vast coal deposits of the Western states and Rockies. Most of this will be done by strip mining. But the end result of this could be a Western Appalachia if it is not carefully managed and controlled.

The hassle involved with shipping Western coal back East is certain to hike future prices as well.

Coal gasification is another possibility, but some authorities estimate it will be ten to 15 years before anything significant comes of it.

Whether coal production can triple by 1985 in order to meet projected energy demands is a wide-open question. And for the time being, America can't count on it for much help in bridging present energy gaps.

### The Uncertainties of Uranium

After World War II, the world was supposed to enter the atomic age. In one sense we did — with the bomb. But the peaceful uses of uranium haven't panned out as expected.

Almost from its onset, the nuclear-power program has been plagued by a host of problems. Chief among them are disposal of the radioactive wastes produced by reactors. Other environmental and safety concerns have further slowed down development of new plants and left an air of uncertainty hanging over the whole program.

Like oil and coal, uranium reserves can only last so long. Currently we have enough to last us until the end of the century. But there is going to be a continual squeeze on supplies for the next few years until the "fast breeder" reactor can be developed. Even if the fast breeder significantly prolongs the life of our existing deposits, there eventually comes the time when our supplies will be exhausted.

Perhaps all this is one more reason why we should now turn our attention to some nonpolluting energy sources which have much better prospects of lasting for some time to come.

### Solar Power

Solar energy is all around us. It's free. It's nonpolluting. And it is inexhaustible (at least for the next several million years).

By far the most practical known use of solar energy is for heating purposes. In most areas of the world, the roof of a single-story house is more than enough area for the solar collector panels needed to heat the house. The beauty of heating with sun power is that the only cost is the initial equipment itself. And according to solar heating experts, it will pay for itself in five to eight years.

### Solar Hot-Water Heaters

Like solar space heaters, solar hot-water heaters have also been around a long time. Approximately ten million units are now being used by the Japanese. Every sixth Israeli family has one. In the 1950s over 50,000 were installed in Miami to beat the then high cost of electricity and the scarcity of natural gas. Homes, schools and hospitals in Australia use solar hot-water heaters. There, a family-sized unit sells for a reasonable 200 dollars.

The fuel savings that could be realized from solar heating — even with the existing levels of technology — are enormous. Residential hot water heating now consumes about 2.9% of the nation's power. If everyone had a solar hot-water heater, that would save the equivalent of about a million barrels of oil a day.

### Wind Energy

Wind generators have been with us for decades. During the last 100 years, windmills and wind generators provided American farmers and ranchers on the Western plains with pumped water and electricity. The Great Plains, with its average annual wind speed of ten to sixteen miles an hour, was an ideal place for the windmill. The Danes used windmills during both World Wars I and II when coal and oil imports were cut off. A typical generator back then could crank out 20 to 35 kilowatts.

Small and efficient wind generators are available on the market today and have successfully provided individual homes with power. But large scale uses of wind power would most certainly be inadequate in today's society.

### Other Sources of Power

Other potential sources of power that have possibilities are:

*Geothermal power* — Derived from hot water and steam escaping from the interior of the earth, this is potentially an almost pollution-free source of electricity. But it is limited to, at most, a few areas where this type of natural energy is available.

*Hydroelectric:* The use of water power is not expected to expand greatly since we have already utilized the major waterways in the United States and there is environmental pressure against further development.

*Tidal power* has been developed in France and Russia, but few sites lend themselves to capturing it.

*Methane:* Organically produced methane has been running a car in England for several years and is used for cooking in various areas. On a large scale, it has distinct possibilities for use by sewage and waste disposal plants.

*Hydrogen:* Hydrogen is clean burning, nonpolluting (forms water vapor when ignited) and is plentiful. It is a highly efficient fuel because of its proclivity to readily combine with oxygen. The problem with hydrogen is that large amounts of power are required to produce it in quantity.

*Nuclear fusion* — to make nuclear fusion work (same principle of power generation used in the hydrogen bomb and the sun), an electrified gas (plasma) must be heated to 100 million degrees. This is hotter than the surface of the sun. So far, controlled fusion techniques consume more energy than they produce. Even if a breakthrough comes, the engineering problems are so enormous that fusion probably could not make an impact on our energy needs until the twenty-first century.

### Needed: Fundamental Changes

All of the sources of power we've discussed, whether renewable or nonrenewable, have one thing in common. None of them can make any significant contribution to our existing energy supplies for some time to come. For most of them, even predicting the mid-1980s is being optimistic. In the case of some fuels such as coal and oil (assuming we could import sufficient quantities of oil to meet our current demands), supplies are available to sustain us for the immediate future, but only at a fearsome toll to the environment. Coal is particularly abundant in this country — but are we ready to rip up, gouge out and plow under huge tracts of land in order to forever sustain our energy-guzzling society?

One way to alleviate this problem is to curtail our ever-spiralling energy demands. Local power and gas companies, along with the press, have already published a great deal of information on what we as individuals can do. But measures such as observing a 50-mile-per-hour speed limit or turning down our thermostats, while certainly helpful, are really only expedients designed to temporarily ease the pain of our current supply-demand dilemma. They don't really get to the heart of our energy problems.

Needed are some more fundamental changes in industrial and commercial practices if we expect to lick the energy crisis on a long-range basis. For instance, we could:

1) *Improve Building Construction*: Improving the insulation in buildings to correct FHA standards would recover something like seven percent of total U. S. energy use. Improved insulation would make air-conditioning unnecessary in some structures. More practical use of glass and lighting would also significantly cut power consumption in high-rise buildings and skyscrapers.

2) *Reduce Air and Auto Travel and Increase Rail Travel*: During the 1960s, passenger traffic on U. S. railroads decreased drastically, while automobile and airline mileage skyrocketed. Both the automobile and airplane require significantly higher amounts of energy per passenger mile than trains. The same is true of freight transportation. The truck requires more than four times the energy of a train per ton mile. One source estimates that with a combination of a 50 mph speed limit, increasing the average number of auto passengers from 1.3 to 2.3, and filling 70% of the available seats on airlines instead of 50%, would by themselves put us in the black as far as fuel is concerned (Los Angeles Times, November 19, 1973).

3) *Improve the Efficiency of Industrial Processes*: Several major industries have already made significant cuts in their power requirements by installation of a number of power-saving measures. Devices such as vacuum furnaces require one fourth of the energy consumed by earlier models. The utilities industry has improved the efficiency of its generating from five percent in 1900 to nearly 40 percent in the newest coal-fired plants. Since industry uses nearly

30 percent of all U.S. energy, major savings can be made in this area.

4) *Reduce the Number of Energy Conversions in Our Technology*: Each energy conversion (converting energy from one form to another) results in a loss of 10 to 30% for each conversion. A typical space-heating gas furnace (one energy conversion), for example, is about 75% efficient. But heating with electricity (three energy conversions, plus transmission losses) is only 25% efficient.

5) *Use Renewable Energy Sources When Possible*: There are energy needs where an unrenewable energy source is necessary. Steelmaking, for example, requires temperatures far in excess of 1595 degrees F. (melting point of iron). To obtain these temperatures, an unrenewable energy source like coal is a good selection. However, energy for space and water heating can be supplied conveniently and economically by solar power.

6) *Increase the Use of Natural Materials*: Greater utilization of natural materials such as cotton, wool and wood could ease our dependence on petroleum-based products. Natural materials have one distinct advantage over synthetics — they are renewable and are not dependent on a finite supply of fossil fuel.

### The Critical Time Lag

Most of these changes can't be made overnight. And it will take time to develop the alternate sources of energy mentioned earlier in this chapter. The newer alternate energy sources will require an enormous time and expense to make them technologically feasible, economically profitable and environmentally safe.

Europe and Japan will be in an even worse energy bind over the next few years. While the recent North Sea gas and oil discoveries have raised great excitement and optimism, this oil and gas is tremendously expensive to extract (as much as ten times that of Middle East oil). And there just aren't enough oil wells on the continent to fill growing demands. Britain's ample coal reserves won't be that much help either. The most optimistic predictions indicate that nuclear energy and North Sea oil will pro-



vide only one fourth of the European community's total energy needs by 1985. Japan is vigorously developing a nuclear-power program, but little can be expected before the mid-1980s.

This all means that for at least the next critical decade, oil will have to tide the West over until alternate energy sources are developed. Oil will be the single most important "swing fuel," without which no modern industrial nation can survive. In the United States in particular, unless there is a drastic reduction of domestic petroleum demand, more and more of our oil will have to be imported. The big question is: where is it going to come from?

#### A Worldwide Squeeze for Non-Arab Oil

Until 1970, the bulk of America's imported oil came from the Western Hemisphere. Venezuela for years has been our number-one supplier. But recently, Venezuela's oil production has been declining. To compound the problem, domestic demand in Latin America is expected to rise in the next few years.

Venezuelan oil prices have also skyrocketed. In the short space of 12 months during 1973, prices of Venezuelan crude oil doubled. And with further price hikes expected, the prospects of an increased oil flow coming from Venezuela look pretty bleak.

The oil import situation as far as Canada is concerned isn't much better either. Canada's growing internal demands, along with the recent Arab embargo, have forced a cutback in the amount of oil she exports to the United States. In addition, the Canadians recently slapped a stiff \$6.40 export tax on every barrel going to the United States, and are expected to raise the price of their exported oil even more steeply in the future.

Other non-Arab oil producers outside the Western Hemisphere won't be much help either. Nigeria's modest exports will undoubtedly be leaned on heavily by the oil-hungry Europeans. And Indonesian oil, which has not expanded as expected, is being competed for lustily by Japan.

By process of elimination, then, we are inevitably led back to the Middle East. George A. Lincoln, Director of the Office of Emergency Preparedness, put it this way:

"The answer is that our demand is growing so fast that *we are going to have to look to the Middle East and North Africa*, where three fourths of the world's oil reserves are located, for most of future increases."

The New York Times put it this way:

"By the late nineteen-seventies, if military opinion holds, the United States, Western Europe and Japan will be increasingly dependent on Persian Gulf oil as energy demands rise and other supplies dwindle."

For years, *The World Tomorrow* broadcast and *The Plain Truth* magazine have repeatedly warned that the Middle East would one day dominate our news and pale into insignificance events such as the Viet Nam War.

What you have been reading in your headlines is only the beginning.

# Will the World Survive the Energy Crisis?

**D**EPENDING on other countries for our vital materials is something new and unique in United States history.

In the past we have been gripped by a traditional independent, self-confident and self-reliant spirit because we could provide for our own. But now along with the nations of Western Europe and Japan, our whole way of life can be seriously jeopardized by other countries. America is "hooked" on foreign oil (although to a lesser degree than Europe and Japan), and we can't go cold turkey — not for the time being, anyway.

It's rather ironic that the most powerful industrial nations in the world should find themselves in such a vulnerable position. As the House Foreign Affairs Subcommittee on the Near East recently declared:

"Never before in the history of mankind have so many wealthy, industrialized, militarily powerful and large states been at the potential mercy of small, independent, potentially unstable states which will provide for the foreseeable future, the fuel of advanced societies."

John Swearingen, Chairman of the Board of Standard Oil of Indiana, had this to say about the oil situation: "I think you see evidence here now, of the dependence



of Japan, Western Europe and the United States on Middle East oil, and whoever controls this oil and has access to it really has a knee on the Adam's apple of the industrialized West" (Los Angeles Times, November 26, 1973).

### The High Cost of Dependence

Increased insecurity and dependence is one thing. But when you have to pay for it, that's another. With the oil market no longer a buyer's paradise (as it was a few years ago), the top has blown off crude petroleum prices. Iran, for instance, jacked the price of its crude oil by a thumping 70% in October of 1973. And now oil is selling in the costly, if not economically devastating, range of \$7 to \$20 a barrel, or more.

The impact of such petroleum price hikes will stagger future Western fuel bills. Even before the oil price hikes in late 1973, Europe's annual energy bill was estimated to be between \$20 to \$26 billion by 1980, compared to \$8.5 billion in 1970. Japan was figured to shell out nine to 15 billion dollars annually by 1980, three to five times larger than 1970. America's energy import bill was projected to be \$15 to \$20 billion by 1980, compared to only \$2.5 billion in 1970. By 1985 energy imports could be costing us an unbelievable \$25 to \$30 billion a year. And these whopping bills were figured at oil rates that weren't much higher than early 1973 prices. What we are seeing is only the beginning of mushrooming oil bills — and economic hardships — for the Western and developing world.\*

### The Balance of Payments Bonanza

Naturally, the Arab countries stand to make a killing off the oil consuming nations. Even without recent price increases, Saudi Arabia's bank accounts could have conceivably risen to \$10 to \$12 billion in five years. *This will*

\*Increasing the price of oil also increases the economic feasibility of alternate energy technologies such as shale, solar and geothermal power, etc. However, it will still be years before these sources can compete with oil on a large-scale basis.

*be more than the reserves behind the U.S. dollar.* With that kind of bank balance, Middle-Eastern nations would hardly feel the loss of any Western revenues resulting from an embargo.

In fact, the Arabs' supersaturated currency reserves will serve as another very effective weapon in their already growing arsenals.

*Newsweek* magazine recently observed: "... The ultimate nightmare is that the Arabs might capriciously dump those vast hoards of hard-currency reserves on international money markets in a full-scale holy war against the dollar."\* (This type of action has already been very instrumental in the last two attacks on the dollar.)

### Toward Greater Oil Control

The Arab countries are also demanding — and getting — greater control of petroleum operations. The turnaround here has been rather remarkable. In the past, United States foreign oil companies could practically dictate terms for oil concessions in the Middle East. Since the underdeveloped producing countries desperately needed the revenues, but didn't have the expertise to produce petroleum, they had to rely heavily on the major oil companies.

The West took full advantage of the politically and economically weak Middle East. At the end of World War II, for instance, production cost per barrel was ten cents in the Middle East, 80 cents in Russia and \$1.30 in the U.S.A. Western oil companies would bring the ten-cents-a-barrel oil from the Middle East and sell it in the United States at the price of \$1.30 a barrel, making \$1.20 a barrel profit, less shipping costs.

\*The West also has items such as food and consumer goods in their economic arsenal. A counter embargo of these is a possibility, but to be effective it would require the full cooperation of the U.S., Western Europe and Japan. This doesn't appear likely in the face of the currently fragmented Western alliance. The effects of such an embargo could also be mitigated by the Russians and other Communist-block countries to some degree.

The dominance of the major oil companies added to the growing Arab resentment of the West and caused them to feel foreign to their own resources, since they had neither control over them nor much say on how they were utilized. Today, all that has changed. In recent years the Organization of Petroleum Exporting Countries (OPEC) has joined together as an effective bargaining group to ensure better "cuts" in the oil revenues. And while some Arab or African nations have fully nationalized their oil fields and partially nationalized others, most have so far chosen to avoid the massive upheavals that such moves would bring. Recently signed "participatory" control agreements (between the oil companies and host countries) are now considered obsolete. The major oil producing nations are now rapidly changing them to meet new conditions.

*Russian-made missiles bristle skyward during Egyptian military parade. Soviet support has strongly contributed to Arab nations' economic independence of Western powers.*

*Ambassador College Photo*



### **The Weakening of the West**

The turnaround of the economic fortunes of the West in the Middle East has also been accompanied by a strategic retreat politically and militarily. For years the Mediterranean belonged exclusively to the United States 6th Fleet, while the Persian Gulf was the private domain of the British. The vital sea gates of the Middle East were also British property. Britain once controlled the Suez Canal, Gibraltar and Aden. Now only Gibraltar remains. The United States 6th Fleet still patrols the Mediterranean, but is being steadily outclassed by a young, modern and aggressive Soviet Navy.

Whenever the British or Americans abandon a portion of the globe, it seems that the Russians are always around to pick up the pieces. The Middle East has certainly been no exception. Ever since Britain relinquished control of the Suez Canal, Russian influence in that area of the world has grown steadily.

The Soviets certainly have a lot going for them in this regard. While Communism has proved to be unpalatable to the Arabs, the Russians have other redeeming factors. One big plus, of course, is that they have supported the Arab cause against Israel. Secondly, while the Arabs are still somewhat leery of the Russians, the Soviets don't bear the colonial stigma that has been traditionally attached to the West. And thirdly, the presence of a strong, aggressive Russian fleet in the Mediterranean Sea and Indian Ocean makes neighboring countries sit up and take notice.

### **Russia's Growing Naval Might**

The Russian fleet in the Mediterranean now outnumbers the aging, somewhat obsolete United States fleet. In the Indian Ocean, the government of Bahrain, where the United States Indian Ocean squadron is based, has given America a year's notice to clear out. And apparently there are no other alternatives, short of supporting our forces by seaborne replenishment.



*Crossroads of the world, the strategic Middle East bridges three continents — Europe, Africa and Asia. Shown are major oil shipping routes.*

### **Soviet Global Strategy and the Middle East**

One of the major Soviet objectives for being in the Middle East is to further her political influence and to split the Western allies over the question of Israel. Russia may also have need of Middle Eastern oil in the not-too-distant future. Although she is currently self-sufficient from an energy standpoint, her current domestic growth, along with her foreign commitments to India, North Vietnam, Eastern Europe and others, has meant that demands for oil are growing faster than supply. While she still has vast oil reserves, most of them are in the distant, hard-to-exploit reaches of Siberia. If they can't be readily tapped in the next few years, Russia would undoubtedly be strongly tempted to move in on the Middle Eastern oil markets.

But far more significant is the strategic value of the Middle East in world geopolitics. For centuries the Middle East has been recognized as the fulcrum or crossroads of

the world. Its landmass and littorals bridge three major continents — Europe, Africa and Asia.

Concerning the Middle East, General Eisenhower once remarked: "So far as the sheer value of territory is concerned, there is no more strategically important area in the world."

Even as far back as 1890, Alfred Thayer Mahan, the famous American naval strategist, saw the imminent value of its waterways: "Circumstances have caused the Mediterranean Sea to play a greater part in the history of the world, both in a commercial and a military point of view, than any other sheet of water the same size. Nation after nation has driven to control it, and the strife still goes on."

Whoever controls the Middle East also controls one of the vital gateways to the Indian Ocean. And the Indian Ocean is becoming increasingly critical as a source of strategic raw material for a number of Western nations. According to the October 1971 issue of *Sea Power magazine*: "Of the 40-odd strategic materials on which these nations [the West] rely for their industrial existence, over 20 are produced in nations bordering the Indian Ocean."

For years Russian ambitions in the Persian Gulf and Indian Ocean have been no secret. In the secret Russo-German discussions that went on during 1940, due note was made of Russian territorial aspirations in this area of the world. To date, however, Russian achievements have not yet measured up to expectations — primarily because of the closure of the Suez Canal in 1967.

#### **A Soviet-Controlled Canal!**

If the Suez Canal were opened, Russia could fulfill her long-standing dream of free access to a warm-water ocean. Her Black Sea fleet would have an easy egress to the Indian Ocean and could avoid the long voyage around the tip of Africa. The Soviets then could potentially dominate the oil-rich Persian Gulf area. And she would be the virtual master of the Indian Ocean from Aden to Singapore.

On the northern end of the Suez Canal, the Russians already have access to Egyptian ports such as Alexandria.

At the lower end of the Red Sea, the Soviet Navy is also firmly established in the former British naval base of Aden which controls the southern exit of the canal into the Indian Ocean. The Russians have garrisoned the final link in the Suez chain — the tiny island of Soootra (another former British possession) which sits astride the shipping lanes of East Africa.

Russian influence, in fact, extends throughout the breadth of the Indian Ocean. Shipping facilities are already established in Singapore, Somalia, Yemen, and in the Bay of Bengal. Negotiations are reportedly also underway with Ceylon for yet another base.

As the *Washington Post* recently stated: "It seems only a question of time until the naval expansion that has made Russia a power in the Mediterranean, the Atlantic and the Pacific will spread into the vast sea area between Aden and Singapore, giving Russia a needed link for its Atlantic and Pacific fleets...."

### The Growing Threat to the West

Why such a powerful and vigorous program of strategic-ocean-going expansion by the Soviet Union?

A few years ago one would have thought them to be incapable of such moves. Traditionally a land power, the Russians have used their surface naval arm primarily as a coastal defense force.

The long-range strategic surface fleet concept has long been the forte of the United States and Britain. But the days of unchallenged Anglo-American sea power are fast disappearing. The Russians are now forging ahead in this area at a time when American and British interest and desire is waning. While Congress is looking with a jaundiced eye at American naval outlays, the Soviets are coming up with the first flattop in their history. Some defense experts feel the Russians are aiming to achieve undisputed control of the world's major sea lanes.

As the *U.S. News and World Report* stated: "... The Soviet Navy is now positioned to isolate the U.S. from trading partners and allies in both the Pacific and Atlantic Oceans. The Russians are establishing a powerful presence

along the vital oil routes to Japan and Europe in the Indian Ocean and the eastern Mediterranean" (March 12, 1973).

What better way to dominate the world than to control its sea-lanes? And what better place to start than the Middle East and Indian Ocean (where most of the world's oil supply is located)?

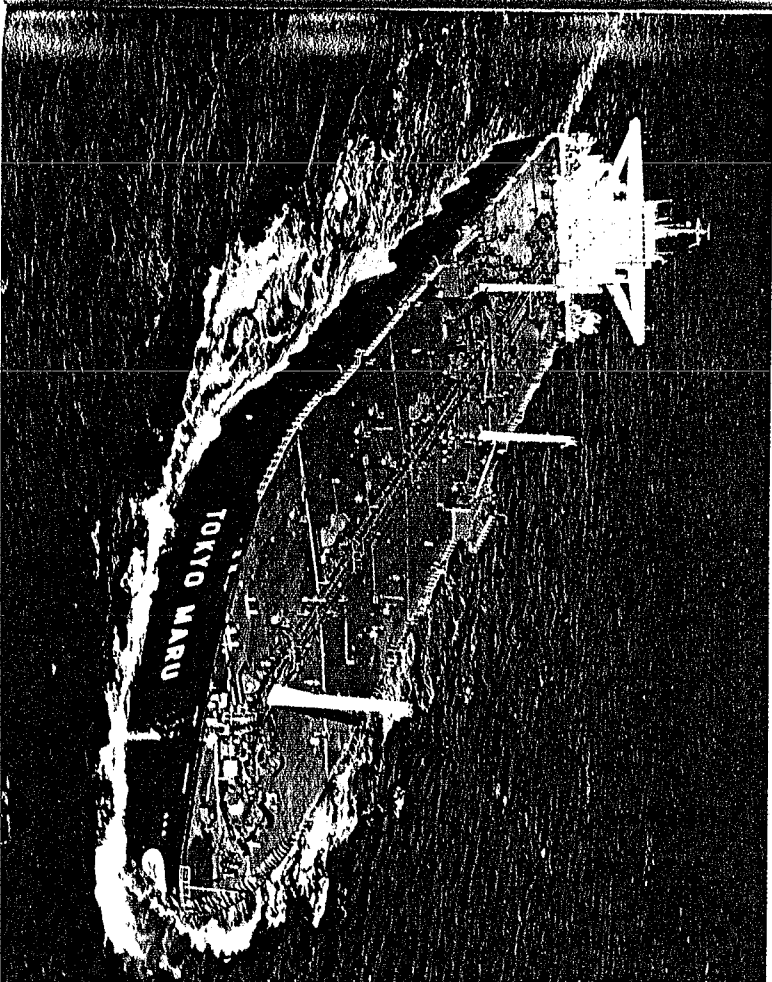
### Enter Europe and Japan

No one is more vulnerable to the threat of Soviet domination of the Middle East and Indian Ocean than Japan or the nations of Western Europe.

Today, Japan has a "floating bridge" of more than 100 giant tankers sailing to and from the Middle East (prior to embargo). If that supply line were broken for one reason or

*The mammoth Tokyo Maru, one of the new breed of supertankers built to carry oil from the Middle East to Japan.*

*Sun Telegraph*



another (for instance, by Russia's fleet of 340 submarines), it would bring Japan's industry to a crashing halt. Japan could also be jeopardized if commerce through the Straits of Malacca were sealed off. Circumventing this vital waterway would add three days to the journey.

Neither is Europe in a much better position. Her ocean-going commerce would have to pass down either the eastern coast of Africa or through the Suez Canal if it were opened. Russia now has access to bases that sit squarely athwart both these vital passageways.

Russia's powerful thrust in these areas is made all the more menacing in the face of the steadily weakening position of the United States Navy, already stretched thin by worldwide commitments. If the Soviets were to gain military and political dominance in the Middle East and Indian Ocean, she could bring the industrial West to its knees — without even dropping a bomb.

### Industrial Strength and Diplomatic Weakness

None of this has been ignored by the nations of Western Europe or Japan, both of whom are acutely aware of their weaknesses in the Middle East. Japan, especially, has had to knuckle under to Arab demands in the latest Middle East war. Mutterings of a militaristic nature were recently sounded in some circles in the wake of that experience. "Diplomacy without force does not work," said one Japanese official (*Time*, December 24, 1973).

The Europeans, too, began calling for stronger measures as the impact of the Arab oil embargo hit home. German Chancellor Willy Brandt put in a strong plea for European unity and observed that: "The Middle East crisis had clearly shown up the weakness of the *European nations on their own*" (Reuters, November 12, 1973). Brandt went on to say a few days later: "People from other continents have felt perhaps more than we that in a world whose destiny cannot, and should not, be determined by two superpowers alone, the influence of a united *Europe has become indispensable*" (*Christian Science Monitor*, November 15, 1973).

### Global Trade Wars?

Currently, the nations of Western Europe and Japan are industrial giants but comparative military weaklings. In the years ahead, especially if Mideast troubles threaten, can they afford to sit idly by without the capability to intervene — especially to protect their vulnerable economies from oil blackmail, embargo or behind-the-scenes machinations by the Russians?

In the past, to deprive a country of survival needs has typically been considered an act of war. The American embargo of oil and scrap iron to Japan in 1941 undoubtedly had a great deal to do with Pearl Harbor. Could we someday see armed intervention involving the major powers in the Middle East aimed at forcing the Arabs to export their oil? And if it meant virtual life or death for a nation's oil-hungry industries, might not they feel justified because of the extreme circumstances?

As time goes by, the prospects of such a global conflict may very well become a reality. On the one hand, some see the scarcity of resources coupled with the threat of nuclear war acting as a stimulus toward greater international cooperation. But others see the situation differently. Arnold Toynbee felt that in the last quarter of this century, or in the first quarter of the next, *the world will be engaged in a massive struggle between the industrialized nations for limited natural resources* (Department of Interior, news release, December 11, 1972).

Dr. Preston Cloud, noted authority on natural resources and Professor of Biogeology at the University of California at Santa Barbara, also warned: "Some minerals already are in short supply at any practicable price and are likely to engender sharp competition for their possession — conceivably even military conflicts."

With the United States, Western Europe, Japan and the Soviet Union all developing industrially in tandem and all involved in the energy crisis, a quadrilateral fight centering around the Middle East is the grim prospect for the 1980s.

According to John Swearingen, Chairman of Standard

Oil of Indiana: "If there's not [some sort of political settlement in the Middle East], the situation over there is going to be so tense and so tight we're going to be on the verge of a real conflagration which would involve the major powers as well as the minor ones that are already in the Middle East" (Los Angeles Times, November 26, 1973).

### The Most Futuristic Forecast

So far we've heard some pretty strong predictions concerning the world's future energy problems. Now let's look at another prediction that is just as up-to-date today as it was almost 2000 years ago. The man who made it was Jesus Christ of Nazareth and it is recorded in the 24th chapter of Matthew, Luke 21 and Mark 13. He predicted centuries in advance that one day the Middle East would be the focal point of a major world conflict. Notice what He said in Luke 21:20, "*And when ye shall see Jerusalem compassed with armies, then know that the desolation thereof is nigh.*"

A similar prophecy is given in the 11th chapter of Daniel, where at the "time of the end" a mighty army will overrun the "glorious land" (Palestine).

These events lead up to the time of "great tribulation." "For then shall be great tribulation [great trouble], such as was not since the beginning of the world to this time, no, nor ever shall be" (Matt. 24:21; Dan. 12:1).

Are we living just prior to that unique time? Could the energy crisis be the spark that ignites World War III? No human can say for sure, but for whatever combination of causes, if God didn't intervene to stop the resulting conflict the world would commit cosmic suicide (see Matt. 24:22).

### National Survival and the Energy Crisis

And what about the United States, Britain and other modern industrial nations? *Will we be able to survive the energy crisis?* Will it bring us to our knees? Or will we be brought to our knees because we, as a nation, have rejected our God? The Bible tells what happens to nations that do this. The description given has some strong paral-

els to conditions Western nations find themselves in today. In the book of Deuteronomy, chapter 28, notice the blessings a nation would receive if it obeyed God — blessings that our peoples aren't receiving, especially in comparison to the past.

"And it shall come to pass, if thou shalt hearken diligently unto the voice of the Lord thy God, to observe and to do all his commandments which I command thee this day, that the Lord thy God will set thee on high above all nations of the earth [we — U. S. and Britain — used to be in that position].... Blessed shalt thou be in the city [not with ghettos, pollution and crime], and blessed shalt thou be in the field [no floods, crop failures, late spring thaws and blight]" (verses 1, 3).

Further: "The Lord shall cause thine enemies that rise up against thee to be smitten before thy face: they shall come out against thee one way, and flee before thee seven ways" (verse 7). That hasn't happened in quite a while — not since World War II.

But if that nation doesn't obey, then God says: "Cursed shalt thou be in the city [urban problems — including blackouts, brownouts, loss of services?], and cursed shalt thou be in the field [agricultural setbacks and problems]. Cursed shall be thy basket and thy store [dwindling national reserves and resources].... Thy heaven that is over thy head shall be [like] brass [referring to drought], and the earth that is under thee shall be iron [hot, interminable days that soak up all the moisture out of the ground]" (verses 16, 17, 23).

And also Deuteronomy 8:7-10:

"For the Lord thy God bringeth thee into a good land, a land of brooks of water, of fountains and depths that spring out of valleys and hills; a land of wheat, and barley, and vines, and fig trees, and pomegranates; a land of oil olive, and honey; a land wherein thou shalt eat bread without scarceness, thou shalt not lack any thing in it; a land whose stones are iron, and out of whose hills thou mayest dig brass. When thou hast eaten and art full, then thou shalt bless the Lord thy God for the good land which he hath given thee."



Have we done this? Or haven't we rather forgotten our God? (See verses 12-14.)

Jeremiah 2:7 very accurately sums up our present state of affairs: "And I brought you into a *plentiful country*, to eat the fruit thereof and the goodness thereof; but when ye entered, ye defiled my land, and made mine heritage an abomination."

Maybe all this doesn't mean us. But if it doesn't, then why is it that at the very apex of American affluence the United States leads the world in crime, in divorce, and is one of the leading earth-polluting nations in the world? The structure of our homes is coming apart at the seams. Education is in trouble and the national government has a credibility gap unparalleled in our history. At the same time, we hear of multiple murders in our cities, inflation, fuel and food shortages, international wars and unrest. Why all at once?

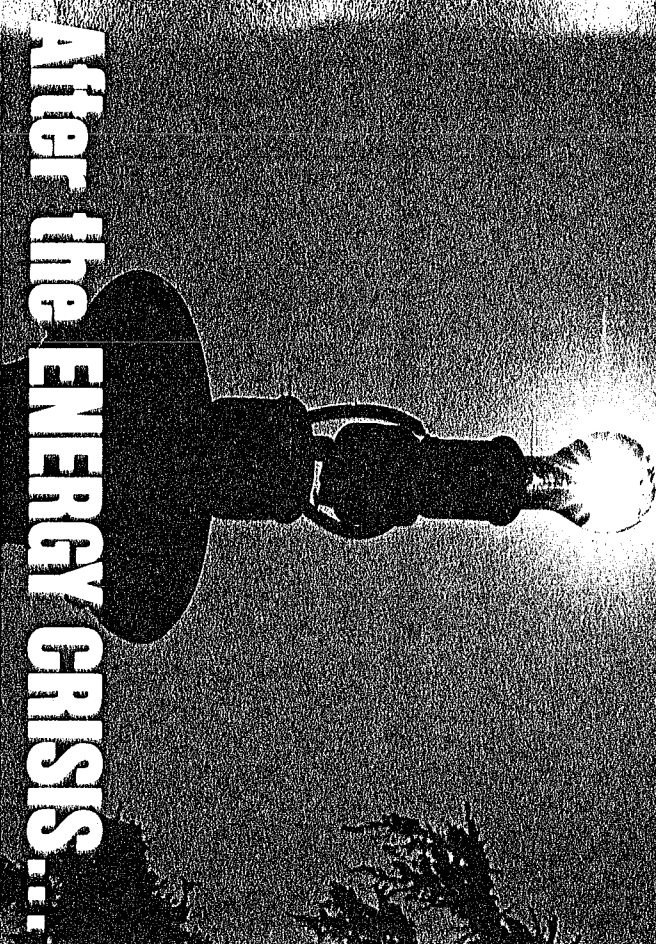
Is it a result of our disobedience to God that we are in the midst of an energy crisis, or is it just a natural consequence of an endless series of cycles? Whatever you choose to believe, you can't escape the reality of the multiple crises now facing America and other Western nations.

Yet there is nothing to prevent us from changing, making an about-face, and *repenting of the way we have been living*.

We could tighten our belts and meet the challenge of the energy crisis. And we could meet this challenge that God lays before us:

"... I have set before you life and death, blessing and cursing: therefore choose life, that both thou and thy seed may live" (Deut. 30:19).

The choice is ours. Which one will it be?

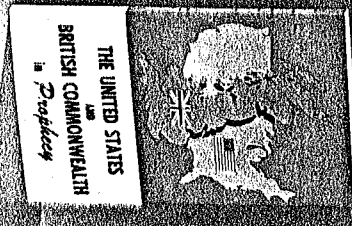


# After the ENERGY CRISIS...

## then what?

For years America had it all going her way — reserves of vital minerals, coal, iron ore. We monopolized world petroleum production. But now we are forced to go to other nations to fuel the fires of our massive industries. Likewise, Britain, for decades the world's wealthiest nation, has been steadily declining in power. Now she is saddled with record-breaking balance-of-payment deficits, shortened work weeks, brownouts and monumental labor problems.

What went wrong? Why do the United States and Britain find themselves in a steadily weakening position? The answer is found in *The United States and British Commonwealth in Prophecy*. This 240-page, full-color book traces the true origins of our peoples and focuses in on the fundamental causes of our national decline. Send for your free copy. Turn page for nearest mailing address.



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