

cessor, Mr. James Bruney, will continue in that tradition. I want to take this opportunity to wish both of them the best of luck.

I ask that the articles which appeared in the Littleton Courier be printed in the RECORD.

The articles follow:

40 YEARS OF HARD WORK

Last week marked the final issue of The Courier in which John H. "Jack" Colby served as Editor. For 40 years he has had a daily diet of searching out happenings in the North County.

In 1940 when Jack assumed the reins of this newspaper, the nation was still in "The Great Depression." The ethic of the days was to find steady employment, stick with it, work hard and do your best. Jack has been true to that ethic.

Not only was he the Editor, but he sold all the advertising for a number of years and personally supervised the placing of every line of type which went into print. He listened to complaints and did all within his power to see that any error was corrected.

When there was a local promotion, Jack was the first contacted and The Courier would give it its best shot. Not only did he publicize events—he also took an active part personally in countless enterprises. He served as the first president of the newly-revived Littleton High School Alumni Association, faithfully contributed to the Littleton Rotary Club, and served on various committees to promote education and business in the community.

His deep sense for fairness is well-known. Those of us on the staff knew his pain if someone was inadvertently overlooked in a story. He felt that to get as many names in a story and as many faces in a photo was a virtue. He personified the traditional approach to smalltown journalism.

He endured the complexities of changing from hot type printing to the photo offset method the newspaper adopted six years ago. We suspect like so many other Editors of that vintage, the romance went out of the job when the Linotypes and letterpress passed from the scene.

With the retirement of Jack Colby, concepts of producing The Courier will no doubt change. The newspaper will have a new personality, but we hope with the changes there will be a continued priority on the ethics Jack Colby valued.

Like the Apostle Paul, Editor Jack Colby "has kept the faith and fought a good fight." He has been a valued and honorable man to the communities served by The Courier.

JAMES BRUNEY SUCCEEDS JACK COLBY AS EDITOR OF LITTLETON COURIER

LITTLETON.—James Bruney, 39, of Chillicothe, Ohio, has accepted the offer by Publisher Douglas Garfield of the Editorship of The Littleton Courier, replacing John H. Colby, who retired last week after flying the Editor's desk since a year before Bruney was born. Bruney will assume his new duties at an as-yet-undetermined date after he has settled his affairs in Ohio and moved himself and his family to Littleton.

In announcing the appointment, Garfield stated, "We feel very fortunate in getting a man with such a strong newspaper background." Bruney has served as news editor of the Chillicothe Gazette, a daily newspaper, for the past 10 years. Prior to that time he served as news editor for the Spectator Newspapers in Columbus and managing editor of the Marysville (Ohio) Journal-Tribune.

Bruney will put his extensive experience directing news staffs and his reporting and editorial skills to work at The Courier. His honors include awards from the National

Newspaper Association and the Ohio Associated Press.

Bruney graduated from Ohio University after attending Lancaster public schools. He earned a Key Man award in 1968 from the Marysville Jaycees. He chaired the Statehood Day event for the Chillicothe Kiwanis Club in 1971-72 and organized the first statehood muzzle-loader shoot, still an annual event. He handled publicity for the Scioto Society and was a member of the Board of Trustees during the first years of its "Tecumseh" dramatic presentations.

Bruney, his wife Suzanne, and four children, Annetta, 16, Karin, 13, Jennifer, 8, and James Jr., 4, are arranging the sale of their home in Chillicothe. They plan to settle in Littleton at a future unspecified date.

Publisher Garfield has appointed Tom Golden acting editor in the interim.●

UNIVERSITY OF ARIZONA WILDCATS

● Mr. DECONCINI. Mr. President, last Friday, June 6, I had the distinct pleasure and thrill of hearing the results of the final game of the 1980 college world series—the National Collegiate Athletic Association's national baseball championship. As I am sure most of the Senate is by now aware, the Arizona Wildcats held off repeated challenges to defeat the Rainbow Warriors of the University of Hawaii 5 to 3, thus earning their second national championship in 5 years.

A number of my staff members, as well as myself, are graduates of the University of Arizona, so it is a matter of tremendous pride to us to see this championship. The Wildcats, who are coached by former major leaguer Jerry Kindall, faced tremendous odds all year long and, in fact, won several games in the world series by coming from behind. After losing their opening game in the series to St. John's University of New York, the Wildcats were forced to win all their remaining games to avoid elimination. Needless to say, in light of the close scores and come-from-behind victories, a great deal of tension existed among baseball fans in the Tucson area last week. We are breathing easier now.

Mr. President, it is a matter of record that my home State is, per capita, one of the country's most prolific States in terms of perpetuating the summer game. Although we cannot lay claim to having a major league franchise, virtually every other level of organized baseball is represented magnificently. Tucson and Phoenix both boast of successful Pacific Coast League (triple A) franchises; Arizona and Arizona State Universities are perennial powerhouses in the NCAA; Grand Canyon College, a Baptist school in Phoenix, earned the National Association of Intercollegiate Athletics championship a few days before the college world series was completed; the Arizona Community College Athletic Conference, a network of 10 junior colleges throughout the State, is widely feared nationally and has produced several national champs; the semipro, or "sandlot" teams of Arizona are always a threat to win national tournaments; and high schools from throughout the State are a virtual breeding ground for future professional ballplayers. Of course, the eyes of base-

ball fans everywhere are on Arizona in February and March of each year as several major league teams play in the spring training Cactus League.

No doubt part of our success in baseball can be attributed to the warm desert climate, which provides a lengthy playing season. But even in light of that, I am sure my colleagues will agree that Arizona teams are more successful than simple coincidence would warrant.

The University of Arizona's championship season this year saw them win 45 games, lose 21 and tie 1. Twenty-one losses, it could be argued, is a substantial number; but when one considers that the Southern Division of the Pacific 10 Conference, which is where Arizona and Arizona State play, arguably contains 6 of the Nation's top 20 teams in any given year, it is hardly surprising that a team will sustain a few losses.

Indeed, the Wildcats annually play one of the Nation's toughest schedules, including not only the Pac-10 teams but also the cream of the crop of other southern California schools—one of which, California State University at Fullerton, was the 1979 national champ.

Judging by our past record, Mr. President, I feel it is safe to predict that several members of the current Arizona baseball team will ultimately play major league baseball. Arizona's last national championship team, the 1976 team, produced two players who are currently starting for American League teams: Dave Stegman, an outfielder with the Detroit Tigers, and Ron Hassey, a catcher for the Cleveland Indians. A few days before the Wildcats claimed this year's championship, Terry Francona, their All-America leftfielder, was drafted in the first round by the Montreal Expos of the National League. He later was named outstanding player in the college world series, and made the all-tournament team, along with three other Arizona players: first baseman Wes Clements and pitchers Craig Leferts and Greg Bargar.

I am extremely proud of these young men and the rest of the 1980 University of Arizona baseball team. Mr. President, I thank the Senate for allowing me this opportunity to commend them.●

THE ENERGY PROBLEMS OF NEW ENGLAND

● Mr. DURKIN. Mr. President, I would like to call the attention of my colleagues to an exceptionally perceptive series of articles by Gary McMillan of the Boston Globe. Mr. McMillan has critically and concisely analyzed the unique problems faced by New England in solving our energy crisis.

For over 4 years, I have fought in the Senate for a Federal energy policy that is fair to the people of New Hampshire and New England. I have spoken of our region's costly and dangerous dependence on imported oil. I have fought to build a balanced transportation system to relieve our need to drive long distances to work, stores, and schools. I have introduced a variety of financial

incentives promoting alternative energy resources to help lower the skyrocketing cost of energy and curb our double-digit, energy-induced inflation.

We are fighting an uphill battle. Heating oil is over a dollar a gallon and gasoline is rapidly approaching \$1.50. The major multinational oil companies are reporting outrageous profits unfairly earned at the expense of hard-pressed, hard-working consumers. The Department of Energy continues its bureaucratic bungling, hindering rather than helping efforts to solve our energy problems. Just recently the General Accounting Office reported that the Department of Energy has actually slowed the development of hydroelectric and solar power.

Congress and the administration must be made to realize the gravity of the crisis we face. Gary McMillan adopts social critic Lewis Mumford's comments about the technology age to describe our energy ignorance—

Like a drunken engineer on a streamlined train plunging through the darkness at a hundred miles an hour, we have been going past the danger signals without realizing that our speed only increases the danger and will make more fatal the crash.

I believe that we all could learn from Mr. McMillan's articles and I ask that they be printed in the RECORD.

The articles follow:

CAN NEW ENGLAND SOLVE ITS UNIQUE ENERGY PROBLEMS?

(By Gary McMillan)

New England, of all the regions in the nation, suffers most from the energy dilemma.

The region relies on oil for 79 percent of its total energy—almost twice as much as the national average.

Almost 99 percent of New England's energy is imported in one form or another—about three times as much as the national average.

Because we import more, we pay more.

New England's energy tab is 40 percent more than the rest of the nation. In 1979, New England paid an \$18 billion energy bill, about \$4,390 for every household in the six States. The annual median income in the region is just barely above \$10,000.

The region is at the tail end of the supply line for virtually every fuel. For instance, 60 cents of every dollar we pay for natural gas is for pipeline transmission costs. And a nickel of every dollar shelled out for gasoline goes to pay the freight.

Fuel shortages are more acute in New England because we are isolated and dependent. We are susceptible to everything from oil embargoes to frozen harbors.

New England's energy picture is unique and grim, but, perhaps, not hopeless.

New Englanders have just weathered the second supply and price storm in six years. Now, while supplies are at least temporarily adequate and prices relatively stable—while we are between crises—we can step back and take stock, assess the damage and look to the future.

The intent of this New England energy assessment and subsequent articles is to present a comprehensive inventory of the region's energy deficits and resources. It is an effort to help readers better understand, interpret and act on the flow of energy news from OPEC nations, from Washington, from industry and from around the region.

What this assessment shows is that we are highly vulnerable to events beyond our control. But it also shows that our vulnerability is the result of decisions which we, at least tacitly, approved. It indicates, as well, that New England can now affect its own future,

that there are indigenous energy supplies we can use to reduce—but not eliminate—our dependence on oil, and that in a direct and personal way we can husband what we do have and, perhaps, improve the quality of our lives in the process.

It all begins with a greasy combustible substance that we are taking out of the ground one billion times faster than it was put in—oil.

Until the massive East Texas oil fields were found after World War I, coal was king, itself usurping wood in the 1930s as the prime energy source in New England. Through the 1930s, coal heated more than half of New England's homes, wood 40 percent.

But those new oil fields made petroleum cheaper than either wood or coal. It was cleaner and didn't require the backbreaking chore of shoveling it into the furnace three times a day. When the first big East Coast refineries were built during World War II, the transition to oil was completed.

Once oil got into the home, it was only a matter of time before it took over in other areas. Here's why:

Our energy is used mainly at home.

New England is cold. Only North and South Dakota have worse winters on the average than we do. To heat our homes in these winters takes a lot of energy. Utilities are the biggest users and biggest producers of energy. Add the energy needed to light our homes and run the toaster to the direct fuel we burn for heat and hot water and that is almost 50 percent of New England's total energy consumption. And more than 80 percent of all that home energy comes from oil.

The fuel we use in our cars and trucks and buses accounts for 28 percent of our total energy use. Some of that indeed goes to mass transit, but a recent report prepared for the Massachusetts Legislature's Energy Development Caucus shows that a Cadillac gets better mileage per passenger mile than the MBTA.

Business and industry in New England use less energy than their counterparts in the rest of the nation but it still accounts for 32 percent of the total. Again, oil accounts for more than 76 percent of the energy used by New England industry.

Once oil got its foot in the door, nothing could keep the whole body from lurching in.

In 1960, New England burned some 263 million barrels of oil. By 1972, consumption had ballooned to 438 million barrels. Even in 1978, the last year for which complete numbers are available, New England used more than 418 million barrels.

There are 42 gallons in each barrel, so New England's annual consumption works out to 17.5 billion gallons a year. That's enough to fill Walden Pond 23 times.

Low-cost residual fuel kept electricity cheap. The last utilities switched from coal to oil in the 1960s, and coal use fell from 5.7 million tons a year in 1960 to less than 1 million tons a year, equivalent to 7.6 million barrels of oil.

The seven nuclear power plants in New England provide 32 percent of all the electricity in the region, almost three times the percentage for the nation as a whole. Because New England is far away from domestic coal, oil or natural gas sources, it is one of the few places in the nation where nuclear-produced electricity is competitive with oil or gas-generated power.

There may be no clearer example of the energy dilemma than the problems of nuclear power: With it, we spend billions for the plants with potentially deadly results, and without it we spend billions for the oil or coal to replace it and commit ourselves to depending even more on fossil fuel.

The world's first hydroelectric dam was built on the Connecticut River in the 1880s, and New England never entirely abandoned hydro power. Six percent of New England's

electricity comes from water, but that is only half of the national average. Overall, hydro power equals just one percent of New England's total energy use, compared with about 5 percent for the rest of the country.

Natural gas was never a major factor. There are just four pipelines serving New England and only Boston. Of all the region's towns and cities, has more homes heated by gas than oil. In 1960, New England used 120.8 billion cubic feet of natural gas. That grew to 260 billion cubic feet by 1972. But as late as 1978 New England used only 262 billion cubic feet of gas, the equivalent of 46.2 million barrels of oil.

Last year's oil price explosion made natural gas a better bargain because almost all of it is still domestically produced and under some kind of price controls. The kicker is that price controls on gas end in 1985, and many experts believe the price explosion then will make 1979's oil increases look puny by comparison.

For 30 years, wood has been little more than a fireplace beauty. Even the Maine pulp mills found oil cheaper to burn than their own sawdust. Until 1977, wood consumption was so minimal not one even kept track of how much was burned. But the latest surveys show that in the winter of 1978-79 New Englanders burned 2.8 million cords of wood in their homes alone, equivalent to some 8 million barrels of oil.

Coal is even less of a factor. In 1978, New England factories and utilities burned 912,000 tons of coal, compared to the 623 million tons burned in the US overall. More New England utilities are converting from oil but, despite the conversions, the majority of generators will still run on petroleum.

This dependence on oil has been more insidious than statistics indicate.

Former state energy director Henry Lee recalls attending a seminar in 1972 with some energy economists on how much could be charged for oil produced from Georges Bank.

"There was a debate on whether it could bring as much as \$6 a barrel," Lee remembered. "They all agreed it was absolutely ridiculous, the price would never get that high." Eight years later, the price of oil had increased 500 percent over even that "ridiculous" figure.

"We developed an entire economy and capital infrastructure based on cheap energy," said Lee, who is now with Harvard's energy center. "Buildings were built with the feeling that energy was cheap and didn't have to be insulated. Our whole transportation pattern was built on cheap energy, and our economic structure went with that, shopping centers, drive-in movies."

Between 1960 and 1972, while American oil was cheap, the percentage of this region's total energy that came from oil grew from 74 percent to 82 percent. The decisions made during that period are coming back to haunt us now.

In 1959, President Eisenhower began what came to be known among energy experts as the "Drain America First" program. In the interest of national security and at the behest of oil companies worried about competition from newly-tapped Middle Eastern oil fields, Ike imposed an oil import quota. That killed the last three New England refineries, in Maine, Everett and Providence, all of which had processed imported oil. No crude, no business.

Had that quota been upheld, the resulting cutbacks of oil supplies might have turned out to be a boon in the long run, forcing New England to find alternate sources while it still had the time and the money.

But, in 1965, President Lyndon Johnson lifted the quota for residual oil—the heavy grade fuel used mainly by utilities to generate electricity—and the floodgates opened. The same companies that had pleaded for the quota had already gotten around it by building refineries in the Caribbean, where they manufactured dirt-cheap residual fuel from foreign fields.

1978 ENERGY CONSUMPTION IN NEW ENGLAND

State	In million barrels				Natural gas (billion cubic feet)	Coal (tons)	Electricity consumed (billion kilowatt-hours)	Wood (cords)
	Gasoline	Distillate	Residual	Other oils				
Massachusetts	58.7	57.4	72.2	18.4	160.5	75,000	28.8	963,000
Connecticut	34.1	23.1	36.3	6.3	65.1	18,000	20.9	714,000
New Hampshire	10.8	8.2	5.4	4.1	7.9	791,000	5.8	367,000
Maine	13.9	13.3	11.4	5.5	2.1	18,000	8.7	575,000
Rhode Island	9.4	7.6	4.1	2.7	23.1	4,000	4.9	108,000
Vermont	6.4	5.1	1.1	1.8	4.4	6,000	3.8	262,000
New England, total	133.3	114.7	130.5	38.8	262.7	912,000	72.9	2,900,000
Equivalent in barrels of oil (millions)					46.2	3.5	127.3	5
Percent of total	28.2	24.3	27.6	8.2	9.7	0.74		1.05

¹ Total amount in oil equivalent of residual fuel, coal, hydroelectric and nuclear power used to produce this much electricity. Percent of total for residual fuel and coal includes utility use for electricity.

LEGEND

Distillate is primarily home heating oil.
Residual is heavy oil used by utilities and industries.
Other oils include jet fuel, kerosene, propane and others.
Oil is given in millions of barrels (mb) at 42 gal per barrel.

Natural Gas is given in billions of cubic feet (bcf).

Coal is given in tons (t).

Electricity is given in billions of kilowatt-hours (bkwh).

Wood is given in cords (cords) which is a stack of wood 8-ft long, 4-ft high and 4-ft wide.
Percentages may not total 100 percent due to rounding.

Sources: U.S. Department of Energy, Massachusetts Office of Energy Resources.

"Once, 20 years ago, we had decentralized sources," said Bruce Carlson of Connecticut's energy office. "We had water and wood and coal. But with oil, it all became much more centralized. Oil became our primary fuel."

The last quotas on all foreign petroleum products were removed in the early '70s—at about the same time Americans were insulated from the real cost of oil by the first round of price controls.

And so in 1972 no one really noticed or cared that New England depended on oil for 84 percent of its energy. And 75 percent of that oil was imported.

After all, prices were stable and supply was virtually unending. Harold Keohane, current director of the U.S. Department of Energy's Boston office, points out that "no one could conceive of what could happen and what did happen. This just looked like it would go on forever."

In 1973 the era of cheap, abundant oil ended abruptly.

The Organization of Petroleum Exporting Countries (OPEC), begun in 1961 but, experts agree, generally an agent of the international oil companies, declared its independence.

In one year, heating oil went from 18 cents to 35 cents a gallon. In 1977, it hit 47 cents; 50 cents in 1978. Gasoline began 1972 at about 35 cents a gallon and hit 58 cents in 1975.

The shock apparently had a reverse effect on consumers. Consumption rose. Inflation and price controls allowed Americans to adjust easily to the price increases of 1973. In 1977, President Jimmy Carter declared the "moral equivalent of war" on the energy dilemma and was laughed at because the acronym spelled MEOW. So, in 1979, OPEC flexed its muscles again and the punch knocked our socks off.

Heating oil began 1979 at 53 cents a gallon on the average in New England. By June, it was 69 cents, more than 90 cents by the end of the year. It broke the dollar a gallon barrier in January and is continuing upward at the average rate of a penny or more a month. Gasoline started 1979 at about 69 cents a gallon. Last week in Boston, some brands of unleaded gasoline sold for \$1.30 a gallon.

Electricity, which cost 2.59 cents a kilowatt hour in 1972, is now pushing five cents per kilowatt hour. Even the cost of natural gas has risen 60 percent in those same years.

In 1973, the average New England family heating with oil paid \$307 a year for its fuel. It's pushing \$1200 a year now.

For homeowners, the 1973 shock did begin the conservation process that accelerated vividly this winter. Heating oil sales to resi-

dential and commercial users dropped from 109.6 million barrels in 1972 to 104.73 million barrels in 1977. The 1979-80 winter burn in New England is expected to be below 90 million barrels when the final statistics are tabulated later this year.

The impact of last summer's gasoline lines also are being felt. Gasoline consumption in New England has dropped 8.8 percent since last year, even accounting for a surge in use before the lines hit in the spring of 1979.

That conservation—and, as industry statistics show, a deliberate attempt by oil companies to stockpile heating fuel and gasoline—will likely eliminate the possibilities of shortages this year.

But energy economists say there is absolutely no chance prices will drop significantly. There has been a moderate decrease in the cost of residual fuel and gasoline prices are now stable. But few people in industry or government doubt that the curve will soon begin a new climb.

Most economists believe that in the long run—and these days the long run is measured in months because of periodic and unpredictable price increases—prices may stay just below the rate of inflation.

Under President Carter's program to remove price controls from US-produced oil, domestic oil will be pegged to the price of OPEC oil. OPEC ministers have said they may peg their oil to the rate of American inflation. If those policies hold, consumers will be locked into a spiraling feedback loop which neither the federal government nor OPEC will interrupt.

The effects on the region's economy are clear.

The New England Regional Commission estimated last year that unemployment in New England could rise to 7 percent or more as a direct result of oil prices, and the constant outflow of energy dollars may further weaken New England's precarious economy.

Rising oil prices also took a mighty chop out of our wages, money that might otherwise be spent on goods and services that help propel our overall economy.

"It's an ironic situation. When people had the money to insulate their houses, they bought fuel instead because it was cheaper," said Bill Ferguson, deputy director of the Rhode Island energy office. "Now, when they really need to insulate, they don't have the disposable income to do it because it's all going to fuel."

And there are those who can barely pay for the fuel at all. Some 572,000 households in New England—more than 13 percent of the population—are eligible for some form of government fuel aid.

This merry-go-round cannot continue forever.

New England, of all the nation the first and hardest hit by the energy dilemma, has the sole advantage of making the transition first.

It is more than a mere technological fix—synthetic fuels, for instance, to replace fossil fuels—because New England has little enough of either. And it is something more than what we do have—renewable resources, such as wood and water and sun. It is, the energy futurists believe, all that, plus our ability to change direction and remold our society and lifestyles to accommodate a new energy mix.

It is how we develop that new mix and pay for it that sits at the heart of our energy dilemma.

NEW ENGLAND ENERGY MIX CRUCIAL

(By Gary McMillan)

Once there were the wind and the wood, the sea and the sun.

The New England forest spread from Coventry to Lake Memphremagog, warmed and powered a burgeoning people and their commerce. Rivers were sluiced through dams to power the waterwheels and spin the looms. The wind churned across the lands and onto the sea to propel the three-masters in the search for the energies of whales.

And above it all, the primal energy of the sun.

It is still there.

Waiting.

They are New England's renewable energy resources—far more ample than oil or natural gas and the best ultimate escape from the cycle of crises caused by our overdependence on once-cheap fossil fuels.

The key to solving the energy dilemma is to place the renewables in a proper mix without swapping one addition for another.

That mix also implies a shift from thinking only in terms of a centralized national energy system to thinking in terms of regionalized energy systems which make best use of indigenous resources.

New England cannot ever entirely divorce itself from the global energy system. But what the region needs, many experts agree, is to begin to supplement imported energy supplies with its own locally available, alternative energy resources. The elements for a logical transition from the one system to the decentralized age of renewables include:

Conservation. New England now depends on oil for 79 percent of its energy supply. The New England Regional Commission's energy task force estimates that even by 2000 oil will still provide 52 percent of our

total energy. The task is to stretch that supply until other options are developed.

Biomass. In New England, energy grows on trees. We have more wood than any other region in the nation. Biomass is also trash and peat and even chicken manure. The New England Energy Congress estimates that by 2000 New England could tap biomass for the equivalent of 142 million barrels of oil a year. That would reduce our current 418-million-barrels-a-year oil consumption by a third.

Water. There are 9605 potential hydro dams already in place along New England rivers, more than 300 functioning now. Maine's Cobscook Bay is one of two places in the United States where tides are strong enough to run electric generators. The ocean itself can provide inexhaustible hydrogen fuel if the process is ever developed commercially.

Wind. The average annual wind speed in New England is 18 miles per hour. Other regions have stronger gusts, but New England's breezes are more consistent. That is the key to making electricity from wind.

Solar. The ultimate pie in the sky is the sun. If somehow New England could tap all the sunlight that falls on it we would have 260 times more energy than we use now.

Fossil fuel sources. There may be some oil and, perhaps, much more natural gas under the waters of Georges Bank off the Massachusetts coast. There is the hint of natural gas pools in some areas of the Berkshires. There is coal in the Narragansett Basin of southern Massachusetts and northern Rhode Island.

Nuclear. There are seven operating nuclear reactors in New England—three in Connecticut, two in Massachusetts, one each in Maine and Vermont. Two more are under construction in New Hampshire, one more in Connecticut. The operating reactors now provide 32 percent of the region's electricity, compared with 12 percent for the nation as a whole.

But there are no panaceas. The numbers and predictions made here, while based on the best studies available, are in some cases little more than good guesses. Moreover, as the authors of Harvard's influential Energy Future, Robert Stobaugh and Daniel Yergin, point out: "So intense and heated has the debate been that it led participants to make exaggerated statements that have discredited their various positions."

Still, as Harold Keohane, director of the US Department of Energy's New England office in Boston, notes:

"What we do have and what we must do is take everything we do have here, whatever resources we do have here and develop them. The days of going way out front with coal, oil, nuclear are gone. The lesson we should have learned from all three instances is not to ride one hope."

Right now, New England's energy mix looks like a pie with five slices. Oil is the biggest slice. It provides 79 percent of our total energy. Nuclear power accounts for 10 percent, natural gas 9 percent and coal and hydro about 1 percent each.

"The key in this transition," said Robert Keating, the commission's energy task force director, "is to not only drop the size of the slice, but to cut the whole pie down to size."

The first way to do that, almost everyone agrees, is conservation.

"I assume conservation before anything else," said Vermont's Ron Albeeck, echoing energy office directors in all the New England states.

New England already has a good record. From 1973 to 1977, while the rest of the nation increased its energy use by 2.5 percent, New England dropped by 3.9 percent. In the aftermath of 1979, New England drivers cut gasoline use by almost 8.8 percent and homeowners—reacting to even

more than just a mild winter—reduced their heating oil consumption by some 10 percent.

In fact, if all of New England's 4.2 million housing units were fully insulated, the region's annual average heating bill would be cut by 40 percent. With a major conservation effort, New England industries and commercial establishments could cut their energy bills by 20 to 30 percent.

As another plus, that kind of full-scale multibillion dollar conservation investment by government or private sources could create up to 50,000 jobs by 1985.

But like the old saw about the farmer who conserved his horse's hay until the day the horse died, conservation can carry us just so far.

What, then, of New England's own energy resources?

The federal government now estimates there may be as much as 2.5 billion barrels of oil and 13.2 trillion feet of natural gas under Georges Bank, those fish-rich waters off the Massachusetts coast.

But all that oil would take care of the nation's needs for just five months. The natural gas could supply New England itself for 45 years. Moreover drilling has not yet begun and opponents are continuing a law suit to prevent it.

In any case, if it was a singular reliance on oil that got us into this trap, it may not seem logical that adding just a little more will get us out.

Of coal, the chances seem to be even slimmer. The Narragansett Basin has been explored since the 1840s and never developed commercially because, say experts, the veins are not thick enough for large scale mining. If it could be mined, all the coal there would supply merely the equivalent of 310 million barrels of oil. New England used that much in the first nine months of 1979.

Realistically, of the energy resources already in New England, the two best bets for the intermediate term seem to be wood and water.

Eighty percent of New England, more than 36 million acres, is forested. Obviously, we can't burn it all for energy. If we did New England would be a desert in 12 years—if we hadn't all died of air pollution or been burned to death in house fires.

If properly harvested, however, wood could provide as much as 14 percent of New England's annual energy needs.

The 300 hydroelectric dams already operating provide about 6 percent of the region's electricity. Several more are under reconstruction. Some studies estimate that as many as 6,000 dams could be developed to produce enough electricity to save some 40 million barrels of oil a year, about 10 percent of the petroleum we use now.

Unlike virtually every other energy resource, almost all the technological difficulties of hydro-electric power are solved and no new dams need be built. However, reconstructing the existing dams would cost billions of dollars.

After those two best bets are such renewables as solid waste, wind, tidal power, exotics such as hydrogen fuel and, of course, the sun.

We produce lots of trash in New England, 49 million pounds of refuse and solid trash every day. Most of it is buried somewhere or burned in open air. We waste waste.

If all that trash could be burned in a way to run electrical generators or produce steam heat or make methane gas, New England could save 13 million barrels of oil a year, about 3 percent of our current consumption. There are a few trash generators working now and more are in the works.

The tidal power along Maine's coast—if tapped for electricity—could displace 13.7 million barrels of oil a year.

The wind industry in the United States began about 1850 and was becalmed a cen-

tury later with the advent of cheap oil. Large-scale wind machines face problems of sitting, machine size, wind speed and direction, and storage for calm days.

There are experimental large scale wind machines planned for Rhode Island's Block Island and Cuttyhunk Island off Cape Cod. A few small wind mills have begun to dot the hills in western Massachusetts.

The technique is so little developed, however, that few have dared to predict how much wind power could add to the region's energy mix. One study estimates wind could provide 3 percent of electrical demand by 2000.

"Exotics" such as fuel cells and hydrogen fuel drawn from sea water are far less fantastic now than they were just five years ago, but the technology is still years from full scale use.

Finally, there is the source of all energy—the sun.

There are two kinds of solar power—passive and active. The first is virtually free; the other costs a small fortune.

There is no way to measure how many people in New England use passive solar energy to reduce their heating bills. After all it amounts to little more than opening the southern side of a building to the sun during the day and closing it off at night to preserve the heat.

Solar activists want to go one step further and replace most or all of a home's conventional heat sources with active solar systems. But in most cases, that is prohibitively expensive.

There already are dozens of solar systems used to heat water circulating through collector panels on the roof. But even the best occasionally must be backed up by conventional fuel. Nonetheless, there are an estimated 6000 homes in New England—out of 4.1 million—drawing at least some of their hot water from the sun.

The problem, of course, is that some homes—especially in dense cities—are not sited to catch the sun properly and the systems are expensive. Even with federal and state tax credits it will take about 10 years for the average hot water system to pay itself off. Still, if all of New England's homes could convert to solar power to get just half of their hot water, the region would save 6.5 million barrels of oil a year, about 1.5 percent of our current oil consumption.

If New England's homes could use the sun for heat, though, we could eliminate more than a fourth of all the oil we use now and almost all the natural gas. The best potential technology for converting the sun to household heat is the photovoltaic cell.

Those cells, composed of such materials as selenium or arsenic, convert solar heat directly to electricity. But photovoltaics currently cost at least 20 times more than conventional electricity, about \$10 per peak watt.

But even that price is half of what it was five years ago and there are those who predict photovoltaics will easily be competitive with oil by the end of the century. There are dozens of firms—including several in New England—working on the project.

What all of these transition steps imply—from conservation to renewables to solar—is that the energy dilemma is not insoluble.

We have already taken the first steps—tax credits, government subsidies and incentives, policy shifts and greater public understanding of the problem.

"In five years all the institutional and legal mechanisms will be in place to solve the problems of the next 20 years," says Massachusetts Energy Secretary Joseph S. Fitzpatrick. "Ours will be a more stable picture because of our flexibility and variety."

"Other parts of the country will go through a wrenching adjustment. We've already begun ours," he said.

Indeed, if there is such a thing as a New England character, it is marked by resilience. We could not farm rocks, so we farmed the sea. And when that passed, we found the mills and looms and transistors, and exported ideas and ingenuity across the nation. Now the energy dilemma poses another test of that resilience.

The Chinese word for "crisis" is composed of two characters, one for "danger," the other for "opportunity." If we can recognize the danger and seize the opportunity, we can solve the energy dilemma. ●

PROBLEMS OF AFRICA

● Mr. McGOVERN. Mr. President, the end of the war in Zimbabwe has eased one of Africa's most pressing problems, but as the recent coups in both Liberia and Uganda so clearly demonstrate, Africa remains a continent beset with grave political and economic problems.

Two recent articles shed light on the challenges which the United States now faces in Africa—and the challenges which Africans face among themselves.

The first, David Halberstam's "The Fire to Come in South Africa," appears in the May issue of the Atlantic. In the best analysis that I have recently read on this subject, Mr. Halberstam describes the divergent demands of white and black politics which have evolved in South Africa in the wake of the 1976 Soweto riots. For blacks, Mr. Halberstam finds a disturbing trend away from belief in political dialog and toward the politics of despair and alienation. For whites, he sees an equally disturbing tendency toward increased reliance upon tightened security, dispersal of black populations, the accumulation of great wealth, and the increase in defense expenditures and arms procurement. Through his attention to the human details of this political drama, Mr. Halberstam succeeds in presenting a compelling picture of a country he characterizes as "no longer at peace and not yet at war."

The second article, Michael Kaufman's "Reporting from Africa," was published in the April issue of Harper's. Mr. Kaufman, until recently with the New York Times bureau in Nairobi, Kenya, offers a strikingly thoughtful series of observations on the dilemmas faced so frequently in Africa between growing economic dependence and an urgent need for self-sufficiency and national pride.

Mr. President, I ask to have these two articles printed in the RECORD.

The articles follow:

THE FIRE TO COME IN SOUTH AFRICA

(By David Halberstam)

The once unthinkable came to pass in March in a country to the north of the Union of South Africa. The white minority, after decades of suppressive rule, gave over to the black majority and Rhodesia became Zimbabwe. What does it portend for South Africa, where the white 17 percent of the population wields seemingly unassailable power and vows never to give equality to the 19 million blacks? Very little for the foreseeable future, believes an experienced reporter who spent several weeks studying the South African scene. But, as evidenced by last year's trial of the Soweto Eleven, a new generation of blacks—angry, rebellious,

and determined—is rising, and with it, the prospect of growing terrorism and violence.

Kempton Park is a small suburb between Johannesburg and Pretoria. It is very near Jan Smuts Airport and many of its residents—middle-class whites—are employed in the aircraft industry. In a society where neighborhood style is often dramatic and revealing (much of Johannesburg plush and affluent, like a Beverly Hills in the African subcontinent, and Soweto, the black township of Johannesburg, an endless, sprawling Harlem), Kempton Park is so middle-class as to be invisible. It could be picked up and made part of Queens tomorrow. But that is precisely why last year the state, which is white, chose Kempton Park for the trial of eleven young blacks. It is some thirty miles from Soweto, and had the trial been held closer to home, the daily sight of Soweto's children in the dock might have inflamed passions—something the state, in a society where so much black anger rests just beneath the surface—was anxious not to do.

It was an important event, the trial of the Soweto Eleven. The eleven, ten boys and one girl, then ranging in age from sixteen to twenty-one, were among the leaders of the black student uprising of 1976, which shook Soweto, white South Africa, and, if not the world, at least foreign capital. They were charged with sedition, which, in a society given over to uncommonly harsh security laws, often harshly interpreted, is a relatively light charge. They could as easily have been tried under the state's terrorism law (under it, for example, a black cannot tell anyone that he or she thinks America should not invest in South Africa). And, if the state willed it, they could easily have been found guilty. But the state, in a gesture of unusual caution, chose to downgrade the charges. It did this not for the benefit of the accused but rather for its own sake, reflecting its pragmatic ambivalence, a desire to be secure, to keep the blacks in place, but not to do it so openly, so nakedly, as to offend the West. For the economic future of South Africa is always paramount, and foreign investment is vital. That matters more than the lives of eleven young blacks.

This trial, I think, made a break with the past. For these youths, however desperate their condition, however great their anger and their awareness of the risk they were taking, were trying to reach their government through legitimate means of protest. In 1976, many blacks already felt that the government could not be reached. Nonetheless, they went ahead, taking most of Soweto's youths with them. Of the leadership of the 1976 protests, many are dead and many more fled the country to take up military training and study elsewhere. Those on trial were the leaders who remained, some of them deliberately deciding against leaving so that on the inevitable day when they were picked up, and when they were tried, the best of that leadership would be represented.

In those heady days of June 1976, almost all of Soweto's children marched and protested a variety of grievances. The protests of those young blacks, carrying placards, demanding better education, demanding an end to the teaching of Afrikaans in their classrooms ("If we learn Afrikaans, Vorster must learn Zulu," said one placard), were based on the assumption that the rulers of South Africa could hear, and hearing, could care, and caring, could act. The children began with their anger and their grievances and their placards; later they threw rocks; and finally, as the police used automatic weapons, they reciprocated with Molotov cocktails. In Soweto alone some 600 young people were killed; in the entire country perhaps 1000 died. Perhaps more.

Both sides have learned their lessons from those days and they are ominously very

different lessons; the blacks, that it was innocent to believe that the state would listen; the whites, that they met the black challenge with too little, not too much, force. Government officials boast of how little firepower they actually used to crush Soweto. "Only the police, not even the army," they say. Their mistake, they now believe, was that they moved too slowly with too little force. Perhaps, they say, they were too aware of foreign opinion. Next time they will not be so soft. They will teach the bloody kaffirs a real lesson.

The trial was a reminder of those days, and of how far apart the two sides are. It was the case of the state versus Wilson Welle Chief Twala, Daniel Sechaba Montsisi, Seth Sandile Mazibuko, Mafison Marobe, Jefferson Khotso Wansi Lengane, Suusan Sibongile Mhthembu, Ernest Edwin Thabo Nda-beni, Kennedy Kgotsietsile Mogami, Reginald Tebogo Mngomezulu, Michael Sello Khiba, and George Nkosinati Yami Twala. As the trial wound down, the prosecution deliberately tried to avoid drama. A true right of assembly, the prosecutor said, exists in South Africa, but it has limits. How much can a state take? Freedom of speech has limits as well. These people must learn that we will set the limits.

The trial became in its own way a window to South Africa, a way of seeing how little whites know of black life, innocence helping to sustain evil. The judge, Hendrik van Dyk, is not by Afrikaner standards a cruel man, although he ruled against virtually every defense motion. But he seemed to reflect Afrikaner naiveté about the lives of South African blacks. Once, early in the trial, a black witness was talking about the festering conditions in Soweto. A defense attorney pressed in: "Don't most blacks in Soweto think they are oppressed?" The judge was shocked. How could someone, he demanded, say something like that in open court? Later Dr. Franz Auerbach, an educational expert, was testifying about the causes of resentment in the black schools. One very basic reason, he said, was that the average primary school class for whites contained twenty-five children; a comparable class for blacks had an enrollment of about eighty children. The judge interrupted to say he did not understand why that was a problem. Why, he said, his own son was at the University of Pretoria, and 100 students were in his first-year Latin class. Later, when Manas Buthelezi, a black bishop of Soweto, was describing the semi-prison life of men, taken from their wives and families, who live in Soweto work hostels, the judge interrupted him. I don't understand, he said. I lived in a hostel myself when I was at the university, and it was quite pleasant. Buthelezi heard him and patiently tried to explain: My Lord, you were a student then and that was quite voluntary. These are grown men who desperately need jobs, but in order to find work they are separated from their wives and families, and they are very bitter about it. They live, My Lord, he said, in a very different kind of hostel.

This is what the Kempton Park trial was all about: the attempt of a generation to escape from a future that the state tries to impose on them and which the young blacks reject. As the defendants saw it, the entire idea of Soweto, the black servants' quarters of Johannesburg, was on trial. The student leaders, elected from each school by their classmates, were the cream of a generation. They saw themselves as a community on trial, nothing less. In the beginning, when Ernest Wentzel and Shun Chetty, the defense attorneys, first talked to them, they explained that the defendants represented something larger than themselves, the very condition of a community, and as such they would have fewer options than they would have in a normal trial; that their own comfort and ease, perhaps their own freedom,