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THE WHITE HOUSE

THE PRESIDENT'S STATE OF THE UNION ADDRESS  
TO THE SECOND SESSION  
OF THE 96TH CONGRESS

The Floor of the U.S. House of Representatives

(AT 9:00 P.M. EST)

THE PRESIDENT: Mr. President, Mr. Speaker, Members of the 96th Congress, fellow citizens.

This last few months has not been an easy time for any of us. As we meet tonight, it has never been more clear that the state of our union depends on the state of the world. And tonight, as throughout our own generation, freedom and peace in the world depend on the state of our union.

The 1980s have been born in turmoil, strife, and change. This is a time of challenge to our interests and our values and it is a time that tests our wisdom and our skills.

At this time in Iran 50 Americans are still held captive, innocent victims of terrorism and anarchy.

Also at this moment, massive Soviet troops are attempting to subjugate the fiercely independent and deeply religious people of Afghanistan.

These two acts -- one of international terrorism and one of military aggression -- present a serious challenge to the United States of America and indeed to all the nations of the world. Together, we will meet these threats to peace.

I am determined that the United States will remain the strongest of all nations, but our power will never be used to initiate a threat to the security of any nation or to the rights of any human being. We seek to be and to remain secure -- a nation at peace in a stable world. But to be secure we must face the world as it is.

Three basic developments have helped to shape our challenges: the steady growth and increased projection of Soviet military power beyond its own borders; the overwhelming dependence of the western democracies on oil supplies from the Middle East; and the press of social and religious and economic and political change in the many nations of the developing world -- exemplified by the revolution in Iran.

Each of these factors is important in its own right. Each interacts with the others. All must be faced together, squarely and courageously. We will face these challenges and we will meet them with the best that is in us and we will not fail. (Applause.)

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In response to the abhorrent act in Iran, our nation has never been aroused and unified so greatly in peacetime. Our position is clear. The United States will not yield to blackmail. (Applause.)

We continue to pursue these specific goals: First, to protect the present and long-range interests of the United States. Secondly, to preserve the lives of the American hostages and to secure, as quickly as possible, their safe release. If possible, to avoid bloodshed which might further endanger the lives of our fellow citizens. To enlist the help of other nations in condemning this act of violence which is shocking and violates the moral and the legal standards of a civilized world. And also to convince and to persuade the Iranian leaders that the real danger to their nation lies in the north, in the Soviet Union, and from the Soviet troops now in Afghanistan, and that the unwarranted Iranian quarrel with the United States hampers their response to this far greater danger to them.

If the American hostages are harmed, a severe price will be paid. (Applause.)

We will never rest until every one of the American hostages are released. (Applause.)

But now we face a broader and more fundamental challenge in this region because of the recent military action of the Soviet Union.

Now, as during the last 3-1/2 decades, the relationship between our country, the United States of America, and the Soviet Union is the most critical factor in determining whether the world will live in peace or be engulfed in global conflict.

Since the end of the Second World War, America has led other nations in meeting the challenge of mounting Soviet power. This has not been a simple or a static relationship. Between us there has been cooperation, there has been competition, and at times there has been confrontation. In the 1940s we took the lead in creating the Atlantic Alliance in response to the Soviet Union's suppression and then consolidation of its East European empire and the resulting threat of the Warsaw Pact to Western Europe.

In the 1950s, we helped to contain further Soviet challenges in Korea, and in the Middle East, and we rearmed to assure the continuation of that containment.

In the 1960s, we met the Soviet challenges in Berlin, and we faced the Cuban missile crisis, and we sought to engage the Soviet Union in the important task of moving beyond the cold war and away from confrontation.

And in the 1970s, three American Presidents negotiated with the Soviet leaders in an attempt to halt the growth of the nuclear arms race. We sought to establish rules of behavior that would reduce the risks of conflict, and we searched for areas of cooperation that could make our relations reciprocal and productive, not only for the sake of our two nations, but for the security and peace of the entire world.

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In all these actions, we have maintained two commitments: To be ready to meet any challenge by Soviet military power, and to develop ways to resolve disputes and to keep the peace.

Preventing nuclear war is the foremost responsibility of the two superpowers. That is why we have negotiated the strategic arms limitation treaties -- SALT I and SALT II. Especially now, in a time of great tension, observing the mutual constraints imposed by the terms of these treaties will be in the best interest of both countries, and will help to preserve world peace. I will consult very closely with the Congress on this matter as we strive to control nuclear weapons. That effort to control nuclear weapons will not be abandoned. (Applause.)

We superpowers also have the responsibility to exercise restraint in the use of our great military force. The integrity and the independence of weaker nations must not be threatened. They must know that in our presence they are secure.

But now the Soviet Union has taken a radical and an aggressive new step. It is using its great military power against a relatively defenseless nation. The implications of the Soviet invasion of Afghanistan could pose the most serious threat to the peace since the Second World War.

The vast majority of nations on earth have condemned this latest Soviet attempt to extend its colonial domination of others and have demanded the immediate withdrawal of Soviet troops. The Moslem world is especially and justifiably outraged by this aggression against an Islamic people. No action of a world power has ever been so quickly and so overwhelmingly condemned.

But verbal condemnation is not enough. The Soviet Union must pay a concrete price for their aggression. (Applause.) While this invasion continues, we and the other nations of the world cannot conduct business as usual with the Soviet Union.

That is why the United States has imposed stiff economic penalties on the Soviet Union. I will not issue any permit for Soviet ships to fish in the coastal waters of the United States. I have cut Soviet access to high-technology equipment and to agricultural products. I have limited other commerce to the Soviet Union, and I have asked our allies and friends to join with us in restraining their own trade with the Soviets, and not to replace our own embargoed items. And I have notified the Olympic Committee that with Soviet invading forces in Afghanistan, neither the American people nor I will support sending an Olympic team to Moscow. (Applause.)

The Soviet Union is going to have to answer some basic questions: Will it help promote a more stable international environment in which its own legitimate, peaceful concerns can be pursued? Or will it continue to expand its military power far beyond its genuine security needs, and use that power for colonial conquest?

The Soviet Union must realize that its decision to use military force in Afghanistan will be costly to every political and economic relationship it values. (Applause.)

The region which is now threatened by Soviet troops in Afghanistan is of great strategic importance: It contains more than two-thirds of the world's exportable oil. The Soviet effort to dominate Afghanistan has brought Soviet military forces to within 300 miles of the Indian Ocean and close to the Straits of Hormuz -- a waterway through which most of the world's oil must flow. The Soviet Union is now attempting to consolidate a strategic position, therefore, that poses a grave threat to the free movement of Middle East oil.

This situation demands careful thought, steady nerves, and resolute action -- not only for this year but for many years to come. It demands collective efforts to meet this new threat to security in the Persian Gulf and in Southwest Asia. It demands the participation of all those who rely on oil from the Middle East and who are concerned with global peace and stability. And it demands consultation and close cooperation with countries in the area which might be threatened.

Meeting this challenge will take national will, diplomatic and political wisdom, economic sacrifice and, of course, military capability. We must call on the best that is in us to preserve the security of this crucial region.

Let our position be absolutely clear:

An attempt by any outside force to gain control of the Persian Gulf region will be regarded as an assault on the vital interests of the United States of America -- (applause) -- and such an assault will be repelled by any means necessary, including military force. (Applause.)

During the past three years you have joined with me to improve our own security and the prospects for peace -- not only in the vital oil producing area of the Persian Gulf region, but around the world.

We have increased annually our real commitment for defense, and we will sustain this increase of effort throughout the Five Year Defense Program. It is imperative that Congress approve this strong defense budget for 1981, encompassing a five percent real growth in authorizations, without any reduction. (Applause.)

We are also improving our capability to deploy U.S. military forces rapidly to distant areas.

We have helped to strengthen NATO and our other alliances and recently we and other NATO members have decided to develop and to deploy modernized intermediate range nuclear forces to meet an unwarranted and increased threat from the nuclear weapons of the Soviet Union.

We are working with our allies to prevent conflict in the Middle East. The peace treaty between Egypt and Israel is a notable achievement which represents a strategic asset for America and which also enhances prospects for regional and world peace. We are now engaged in further negotiations to provide full autonomy for the people of the West Bank and Gaza to resolve the Palestinian issue in all its aspects and to preserve the peace and security of Israel. (Applause.)

Let no one doubt our commitment to the security of Israel. In a few days we will observe an historic event when Israel makes another major withdrawal from the Sinai and when ambassadors will be exchanged between Israel and Egypt. We have also expanded our own sphere of friendship. Our deep commitment to human rights and to meeting human needs has improved our relationship with much of the third world. Our decision to normalize relations with the People's Republic of China will help to preserve peace and stability in Asia and in the Western Pacific.

We have increased and strengthened our naval presence in the Indian Ocean and we are now making arrangements for key naval and air facilities to be used by our forces in the region of Northeast Africa and the Persian Gulf.

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We have reconfirmed our 1959 agreement to help Pakistan preserve its independence and its integrity. The United States will take action consistent with our own laws to assist Pakistan in resisting any outside aggression. And I am asking the Congress specifically to reaffirm this agreement. I am also working, along with the leaders of other nations, to provide additional military and economic aid for Pakistan. That request will come to you in just a few days.

In the weeks ahead, we will further strengthen political and military ties with other nations in the region.

We believe that there are no irreconcilable differences between us and any Islamic nation. We respect the faith of Islam, and we are ready to cooperate with all Moslem countries.

Finally, we are prepared to work with other countries in the region to share a cooperative security framework that respects differing values and political beliefs, yet which enhances the independence, security and prosperity of all.

All these efforts combined emphasize our dedication to defend and preserve the vital interests of the region and of the nation which we represent and those of our allies -- in Europe and the Pacific, and also in the parts of the world which have such great strategic importance to us, stretching especially through the Middle East and Southwest Asia.

With your help, I will pursue these efforts with vigor and with determination. You and I will act as necessary to protect and to preserve our nation's security.

The men and women of America's armed forces are on duty tonight in many parts of the world. I am proud of the job they are doing, and I know you share that pride. I believe that our volunteer forces are adequate for current defense needs. And I hope that it will not become necessary to impose a draft. However, we must be prepared for that possibility. For this reason, I have determined that the Selective Service System must now be revitalized. (Applause.) I will send legislation and budget proposals to the Congress next month so that we can begin registration and then meet future mobilization needs rapidly if they arise.

We also need clear and quick passage of a new charter to define the legal authority and accountability of our intelligence agencies. We will guarantee that abuses do not recur, but we must tighten our controls on sensitive intelligence information and we need to remove unwarranted restraints on America's ability to collect intelligence. (Applause.)

The decade ahead will be a time of rapid change, as nations everywhere seek to deal with new problems and age-old tensions. But America need have no fear. We can thrive in a world of change if we remain true to our values and actively engaged in promoting world peace.

We will continue to work as we have for peace in the Middle East and Southern Africa. We will continue to build our ties with the developing nations, respecting and helping to strengthen their national independence which they have struggled so hard to achieve. And we will continue to support the growth of democracy and the protection of human rights.

In repressive regimes, popular frustrations often have no outlet except through violence. But when peoples and their governments can approach their problems together through open, democratic methods, the basis for stability and peace is far more solid and far more enduring.

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That is why our support for human rights in other countries is in our own national interest as well as part of our own national character. (Applause.)

Peace -- a peace that preserves freedom -- remains America's first goal. In the coming years as a mighty nation, we will continue to pursue peace.

But to be strong abroad we must be strong at home. And in order to be strong, we must continue to face up to the difficult issues that confront us as a nation today.

The crises in Iran and Afghanistan have dramatized a very important lesson: Our excessive dependence on foreign oil is a clear and present danger to our nation's security. (Applause.)

The need has never been more urgent. At long last, we must have a clear, comprehensive energy policy for the United States.

As you well know, I have been working with the Congress in a concentrated and persistent way over the past three years to meet this need.

We have made progress together. But Congress must act promptly now to complete final action on this vital energy legislation.

Our nation will then have a major conservation effort, important initiatives to develop solar power, realistic pricing based on the true value of oil, strong incentives for the production of coal and other fossil fuels in the United States, and our nation's most massive peacetime investment in the development of synthetic fuels.

The American people are making progress in energy conservation. Last year we reduced overall petroleum consumption by eight percent and gasoline consumption by five percent below what it was the year before.

Now we must do more. After consultation with the governors, we will set gasoline conservation goals for each of the 50 states, and I will make them mandatory if these goals are not met.

I have established an import ceiling for 1980 of 8.2 million barrels a day -- well below the level of foreign oil purchases in 1977. I expect our imports to be much lower than this, but the ceiling will be enforced by an oil import fee if necessary. I am prepared to lower these imports still further if the other oil consuming countries will join us in a fair and mutual reduction. If we have a serious shortage, I will not hesitate to impose mandatory gasoline rationing immediately.

The single biggest factor in the inflation rate last year, the increase in the inflation rate last year, was from one cause: the skyrocketing prices of OPEC oil. We must take whatever actions are necessary to reduce our dependence on foreign oil -- and at the same time reduce inflation.

As individuals and as families, few of us can produce energy by ourselves. But all of us can conserve energy -- every one of us, every day of our lives.

Tonight I call on you, in fact, all of the people of America, to help our nation. Conserve energy. Eliminate waste. Make 1980 indeed a year of energy conservation. (Applause.)

Of course, we must take other actions to strengthen our nation's economy.

First, we will continue to reduce the deficit and then to balance the Federal budget.

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Second, as we continue to work with business to hold down prices, we will build also on the historic national accord with organized labor to restrain pay increases in a fair fight against inflation.

Third, we will continue our successful efforts to cut paperwork and to dismantle unnecessary government regulation. (Applause.)

Fourth, we will continue our progress in providing jobs for America, concentrating on a major new program to provide training and work for our young people, especially minority youth. It has been said that "a mind is a terrible thing to waste." We will give our young people new hope for jobs and a better life in the 1980s.

Fifth, we must use the decade of the 1980s to attack the basic structural weaknesses and problems in our economy, through measures to increase productivity, savings and investment.

With these energy and economic policies, we will make America even stronger at home in this decade -- just as our foreign and defense policies will make us stronger and safer throughout the world.

We will never abandon our struggle for a just and a decent society here at home. That is the heart of America -- and it is the source of our ability to inspire other people to defend their own rights abroad.

Our material resources, great as they are, are limited. Our problems are too complex for simple slogans or for quick solutions. We cannot solve them without effort and sacrifice.

Walter Lipmann once reminded us, "You took the good things for granted. Now you must earn them again. For every right that you cherish, you have a duty which you must fulfill. For every good which you wish to preserve, you will have to sacrifice your comfort and your ease."

"There is nothing for nothing any longer."

Our challenges are formidable. But there is a new spirit of unity and resolve in our country. We move into the 1980s with confidence and hope -- and a bright vision of the America we want: An America strong and free, an America at peace, an America with equal rights for all citizens and for women guaranteed in the United States Constitution -- (applause) -- an America with jobs and good health and good education for every citizen, an America with a clean and bountiful life in our cities and on our farms, an America that helps to feed the world, an America secure in filling its own energy needs, an America of justice, tolerance and compassion. For this vision to come true, we must sacrifice, but this national commitment will be an exciting enterprise that will unify our people.

Together as one people, let us work to build our strength at home, and together as one indivisible union, let us seek peace and security throughout the world.

Together let us make of this time of challenge and danger a decade of national resolve and of brave achievement.

Thank you very much. (Applause.)

END

(AT 9:39 P.M. EST)

OVERVIEW

# Energy In Transition 1985-2010

Final Report  
of the  
Committee on Nuclear and Alternative Energy Systems  
National Research Council

NATIONAL ACADEMY OF SCIENCES  
Washington, D.C. 1979



## MEASURING ENERGY

Energy is used in a wide variety of forms, with different physical and thermal qualities and different capacities for mutual substitution. It is often convenient, however, to specify the quantity of energy in terms of a common unit. For this study, and most others undertaken in the English-speaking world, that unit is the British thermal unit, or Btu (the amount of energy required to raise the temperature of 1 pound of water 1°F from 39.2°F to 40.2°F). A barrel of crude oil, for example, contains about 5.8 million Btu; petroleum as consumed averages about 5.5 million Btu per barrel. When very large amounts of energy are discussed, it is convenient to use the unit quad, defined as one quadrillion (1,000,000,000,000) Btu.

The following table puts these quantities into perspective.

U.S. Energy Consumption in 1978

Energy Source	Consumption		Conversion Factor (values are equivalent to 1 quad)
	Standard Units	Quads	
Coal <sup>a</sup>	623.5 million short tons	14.09	44.3 million short tons
Natural gas	19.41 trillion cubic feet	19.82	0.979 trillion cubic feet
Petroleum <sup>b</sup>	6838 million barrels	37.79	181 million barrels
Hydropower <sup>c</sup>	301.6 billion kilowatt-hours	3.15	95.7 billion kilowatt-hours
Nuclear power <sup>c</sup>	276.4 billion kilowatt-hours	2.98	92.9 billion kilowatt-hours
Geothermal and other <sup>c,d</sup>	3.3 billion kilowatt-hours	0.07	46.3 billion kilowatt-hours
Net imports of coke	5.0 million short tons	0.13	38.5 million short tons
<b>TOTAL<sup>e</sup></b>		<b>78.01</b>	

<sup>a</sup>Includes bituminous coal, lignite, and anthracite.

<sup>b</sup>Includes natural gas plant liquids and crude oil burned as fuel, as well as refined products.

<sup>c</sup>The conversions from kilowatt-hours to Btu's are necessarily arbitrary for these conversion technologies. The hydropower thermal conversion rates are the prevailing heat-rate factors at fossil-steam electric power plants. Those for nuclear power and geothermal energy represent the thermal conversion equivalent of the uranium and geothermal steam consumed at power plants. The heat content of 1 kilowatt-hour of electricity, regardless of the generation process, is 3412 Btu.

<sup>d</sup>Includes wood, refuse, and other organic matter burned to generate electricity.

<sup>e</sup>Details do not add to total due to rounding.

NOTICE: The project that is the subject of this report was approved by the Governing Board of the National Research Council, whose members are drawn from the Councils of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine. The members of the committee responsible for the report were chosen for their special competences and with regard for appropriate balance.

This report has been reviewed by a group other than the authors according to procedures approved by a Report Review Committee consisting of members of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine.

This study and report were supported under Contract EX-76-C-10-3784 between the Energy Research and Development Administration and the National Academy of Sciences.

25 December 1979

The Honorable Charles W. Duncan, Jr.  
Secretary of Energy  
Washington, D.C.

Dear Mr. Secretary:

I have the honor to transmit a report entitled Energy in Transition, 1985-2010 prepared by the Committee on Nuclear and Alternative Energy Systems (CONAES) of the National Research Council (NRC) and supported by Contract EX-76-C-10-3784 with the Energy Research and Development Administration (ERDA).

On April 1, 1975, Dr. Robert C. Seamans, then Administrator of ERDA, wrote to me to request that the NRC undertake "a detailed and objective analysis of the risks and benefits associated with alternative conventional and breeder reactors as sources of power." After due deliberation, the Governing Board of the NRC indicated that it would prefer "a comprehensive and objective study of the role of nuclear power in the context of alternative energy systems." These expanded terms of reference proved acceptable to ERDA, and the resultant contract between ERDA and the National Academy of Sciences so specified. Administrative management of the study within the NRC was assigned to the Assembly of Engineering.

The charge to our committee was nothing less than a detailed analysis of all aspects of the nation's energy situation. The dimensions of this charge were without precedent in the NRC. Our committees, consisting of highly qualified, public-spirited experts who serve without fee, have generally been called on to address much more narrowly circumscribed questions. The breadth of compass in this instance constituted a staggering challenge.

Harvey Brooks, then Dean of Engineering and Applied Physics at Harvard University, and Edward L. Ginzton, Chairman of the Board of Varian Associates, accepted our invitations to serve as co-chairmen of the study. The balance of the committee was then appointed after wide consultation with appropriate individuals and organizations. It was evident that the ultimate credibility of their report would rest upon public perception of the committee as balanced in composition and, in that sense, impartial. In

discussing the NRC committee appointment process, my introduction to the Annual Report of the NRC for 1978 described CONAES as follows:

An illustration of this art is afforded by the Committee on Nuclear and Alternative Energy Systems, engaged in the most complex task ever attempted by the National Research Council. It is co-chaired by an applied physicist who is a university professor and an industrial engineer whose company manufactures scientific instruments, both of whom had previously chaired major NRC committees with great success. In all, 10 members are from academic institutions, 1 from a government laboratory, 1 from the research arm of an oil company, 1 from an instrument manufacturer, 1 from a utility company, 1 from a bank, and 1 from a law firm. From a disciplinary standpoint, there are 5 engineers, 3 physicists, 1 geophysicist, 2 economists, 1 sociologist, 1 banker, 1 physician-radiobiologist, 1 biological ecologist, and 1 "public interest" lawyer....In a general way, by my appraisal when the study began, about one-third were negative, perhaps 3 were positive, and the others were genuinely open-minded concerning nuclear energy.. At this writing, it is clear that the ideas that have come to be uppermost in the committee's collective thinking were central to the views of few if any of the committee members when they first met.\*

The routine procedures of the NRC demand, as a condition of appointment, that each committee member file with us a disclosure of "Potential Sources of Bias" and that, at the first committee meeting, each member reveal to his colleagues the substance of that disclosure as well as the sense of his current views of the subject to be considered by the committee. That first meeting of CONAES was remarkable; the tension seemed almost physical; profound suspicion was evident; first names were rarely used; the polarization of views concerning nuclear energy was explicit. Four years later, that polarization persists, and many of the same positions are still regularly defended. But the committee

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\*In the time since, two of the original members have found it necessary to withdraw from the committee.

has developed its own dynamic, the antagonists are personally friendly, and a very substantial measure of consensus has been achieved.

Patently, no single committee such as CONAES could embrace full competence and knowledge of all the many technical matters that would demand consideration. To provide that competence, CONAES, as described in the preface, brought into being a set of 4 major panels supported by 22 resource groups and a number of consultants, thereby acquiring the knowledge and insights of about 300 additional individuals of highly diverse backgrounds. (See Appendix C.) During January and February 1976, CONAES conducted public hearings in five major cities across the nation to test its plans for conduct of the study and to listen to approximately 100 witnesses who asked to testify. No complete summary of those hearings is available, nor did they prove particularly fruitful, but this process began the education of the CONAES members in attendance at these hearings. On 1 August 1976, CONAES adopted a Work Plan and on 12 January 1977 transmitted an Interim Report to ERDA, a planning document that remains a landmark statement of the kinds of understandings that must be obtained if the nation is to formulate a successful energy policy.

Conduct of the study over this four-year period has been complicated by numerous developments in the nation's turbulent energy situation:

There were gasoline shortages and price rises, electricity blackouts, natural gas shortages, public debate over power plant sitings, large negative balances of payments for petroleum and for technology. Growing environmental concern was paralleled by concern that regulation is inhibiting industrial innovation and productivity. Rising prices and the debate over decontrol were accompanied by growing public distrust of the energy industries and of statements concerning the magnitude of hydrocarbon reserves. Political instability in nations on which we depend for petroleum imports made all too obvious the precariousness of the flow of imported oil. Three Mile Island revealed both the resilience designed into nuclear plants and the significance of the human factor in the operation of such plants. Established energy companies began to develop capabilities in new energy technologies, and a host of new, smaller companies entered the market for such technologies as solar heating, windmills, biomass utilization, insulation, etc.

President Carter, particularly concerned that nuclear

weapons should not proliferate, took action to defer reprocessing of spent nuclear materials and to delay commercialization of a breeder reactor, while the pace of the much debated Clinch River breeder project was deliberately slowed. The President also presented to the nation energy messages emphasizing conservation, decontrol of petroleum and natural gas prices, vigorous exploration for new domestic sources, as well as a substantial synthetic fuels program to be financed from a windfall profits tax.

During this period, CONAES resource groups and panels were variously reporting that domestic uranium will be less plentifully available than had earlier been suggested, and that the linkage between growth of the energy supply and real growth of the GNP is more flexible than many had previously considered. A panel of the NRC Geophysics Research Board flagged attention to the fact that continuing buildup of atmospheric CO<sub>2</sub>, thought to be largely due to fossil fuel combustion, would drastically alter climate, although the timing and manner of change are not yet reliably predictable. The CONAES Risk and Impact Panel reported its comparison of risks associated with various energy technologies. The work of the NRC Committee on Biological Effects of Ionizing Radiation (BEIR III) revealed the controversy concerning the biological effects of low level ionizing radiation, although, as a guide to policy makers, the differences between contending factions would appear to be rather small. The problem of planning for disposal of radioactive wastes assumed greater urgency and increasingly claimed public attention. An ad hoc committee under the aegis of our Committee on Science and Public Policy presented an independent analysis of the risks inherent in the nuclear fuel cycle, an analysis that highlighted, inter alia, the fact that uranium mining and the mine tailings are, day by day, the most hazardous elements of the system, rather than accidents at power plants or the disposal of high level waste. Numerous analyses of various aspects of our energy situation were reported by diverse groups and individuals under several auspices. And, since CONAES finished its work, an ad hoc conference convened by the NRC in early October concluded that use of western oil shales must be a major contributor if the President's goals for a synthetic fuels program are to be met.

ERDA was phased out and the Department of Energy was created. The new Department, not quite responsible for initiation of this effort and concerned about the lengthy time that had already elapsed, placed a ceiling on its

financial support of the CONAES endeavor. During September 1978 the funds provided by ERDA and the Department were exhausted. Since then, this effort has been supported by the private funds of NAS, in a total amount of about \$300,000.

Through all of these events, CONAES labored on through draft after draft. Preparation of chapter 1, in effect a short version of the report, took on the character of negotiation of a treaty; individual words and phrases were debated at wearying length. The penultimate draft of this report was sent to our Report Review Committee during the summer of 1979. A specially appointed review panel of 22 highly qualified individuals, largely members of NAS and NAE, read it with utmost care and returned to CONAES a lengthy, extremely detailed critique. CONAES responded equally carefully, accepting much of the criticism and amending the report accordingly in many cases, preferring its own position or language in others.

Most reports of this length offer a brief, explicitly designated "summary." Determined to complete its task and nearing exhaustion, CONAES eschewed preparation of such a statement. However, an equivalent of such a summary will be found in the attached letter of transmittal, to me, by the two co-chairmen, a statement which closely coincides with that which concludes chapter 1. Readers will find it helpful to study that statement before addressing the body of the report.

Most importantly, the report is addressed to a great challenge, management of the medium-term future of our energy economy, viz., the turbulent period of transition from major dependence on fossil hydrocarbons, domestic and imported, to a more stable era of utilization of energy sources that are either renewable or available on a scale sufficient for centuries. While most current public and governmental concern is necessarily focussed on the energy difficulties of the day, it is the period of this transition that must be the principal subject of major energy policy. The present report offers no prescription for such policy but does provide an analytical base and a description of alternate future scenarios that should be of considerable assistance to those who must formulate such policy.

One aspect of the CONAES exercise was the development by various panels and resource groups of a series of models of conceivable national energy and economic futures. Whereas much of the report would retain its validity in the absence of these models, their implications significantly affected the committee's thinking as it engaged in the numerous

evaluations to be found in the report. Since the validity of these models rests on the validity, completeness, and consistency of their underlying assumptions, some of them quite dramatic, and since, patently, the energy futures so described flow from these premises, the reader will be well advised to examine those assumptions carefully. The variety of alternate energy futures here contemplated and their consequences for the national economy and life-style are impressive features of this report.

The report stresses the necessity to reduce national dependence on imported petroleum, to be accomplished by both conservation and switching to alternate technologies. The opportunities for conservation, and their scale and timing, are presented in some detail. Public decision concerning the major opportunities for non-petroleum-based energy production is constrained by concern for their attendant risks and environmental impact. A major feature of this report is its analysis of the state-of-the-art of these alternate technologies and a comparative assessment of their associated risks and impacts.

An unusual aspect of this report is its conclusion that future decisions concerning nuclear energy will be determined by public perceptions of risks and benefits at least as much as by rigorous conclusions drawn by scientists on the basis of scientific analysis. That circumstance places an unusually heavy burden of objectivity on those whose statements help to fashion public opinion. Excessive attention to either the risk or the benefit side of the equation, or failure to consider the alternatives, could seem to lead, on the one hand, to denial to the nation of all major energy sources or, on the other, to a false sense of security.

By design, the composition of CONAES reflected a wide spectrum of opinion concerning most aspects of the nation's energy problems, although, to be sure, none were advocates of the most extreme positions. Members frequently offered the special viewpoints expected from their places in society, as utility company executive, environmental advocate, investment banker, regulator, ecologist, physician, economist, etc., speaking on behalf of their own constituencies, as it were. Hence, the present report is unique in the growing literature concerning energy. It is particularly noteworthy precisely because it emerges from a reasonably representative microcosm of the conflicting relevant interests and viewpoints abroad in the land, rather than from a more homogeneous group with a unifying ideology.

To the extent possible, CONAES sought genuine consensus. But where the committee was significantly divided, both points of view are presented in the text. In addition, all members were invited to offer personal comments when they wished to clarify or to take exception to statements in the text that otherwise reflect the preponderance of CONAES opinion. These statements, some quite eloquent, will be found in footnotes and in Appendix A. The divisions of opinion indicated in the text and the disagreements noted in footnotes and in Appendix A, while by no means trivial, should not be permitted to lessen appreciation of the force of the analysis here presented or of the general agreement achieved on some of the most critical questions considered.

Despite the long time required to complete this effort (in large measure a consequence of the initial polarized composition of CONAES) the report could not have been more timely than it is today. Some readers may find themselves disappointed by the absence of a set of crisp recommendations for federal policy and programs. But such was not our purpose. It is the thorough analysis of almost all aspects of our energy circumstances and the detailed consideration of the possible alternatives available to the nation that constitute the principal contribution of this report. The major decisions yet to be taken must occur in the political arena and in the marketplace. It is our hope that, by illuminating our circumstances and future prospects, this report will increase the likelihood that those future decisions will be rational and based on the longer-term national interest rather than on the painful exigencies of any given moment.

Much of the material earlier available to CONAES, i.e., the reports of several of its panels and resource groups, has already been published. Several more remain to be published. Appendix D is a compilation of these titles. Each has been carefully considered and used by CONAES, but they have not been put through the normal review procedures of the NRC.

In all, about 350 individuals have contributed to various aspects of this exercise. There may well be no participant who agrees with the entirety of the CONAES report, but most participants will find themselves in substantial agreement with most of this report. An unanticipated value of this endeavor may well prove to be the educations that all participants received; the insights and understandings so gained have already found their way into the national debate as these now even more knowledgeable scientists have also participated in a multiplicity of other committees,

Congressional hearings, reports, classroom teaching, and boardroom discussions. Thus, by this avenue, also, the CONAES exercise will have contributed constructively to future national energy policy.

One intrinsically political aspect of our national energy circumstance is not fully discussed by CONAES, the fact that the great uncertainty concerning our energy future has, in turn, generated innumerable other public uncertainties. These uncertainties constrain decisions by energy-producing and energy-utilizing industry; they affect personal decisions concerning housing and transportation; they inhibit foreign policy formulation and, in general, cast a pall on life in these United States. The challenge to the nation is to avoid taking, prematurely, those decisions that CONAES suggests be deferred until they can be taken with greater understanding and wisdom while, as soon as possible, enunciating and beginning to follow a stated course that will hold open as many options as possible. It is our hope that Energy in Transition, 1985-2010 will be of assistance in that regard.

Allow me to take this opportunity to make public acknowledgment of our great debt to Harvey Brooks, who, more than any other, fashioned this report through endless hours of devoted effort and attention to all of its facets. His co-chairman, Edward L. Ginzton, earned our gratitude both by his considerable substantive contributions and by his determined drive to push the task to completion. And I am pleased to acknowledge the huge contribution of all the members of CONAES, who attended several dozen meetings and read reams of reports and drafts, who individually wrote innumerable drafts of paragraphs, pages, and chapters, and who maintained their goodwill and good humor during this prolonged exercise. Finally, let me express our profound appreciation to the panels, resource groups, consultants, and dedicated staff, without whom this report would not have been possible.

Mr. Secretary, the National Research Council is pleased, proud, and considerably relieved, to make this report available to the Department of Energy and to all Americans seriously concerned for the health of our nation's future energy economy.

Sincerely yours,

PHILIP HANDLER  
Chairman, National Research Council  
President, National Academy of Sciences

Enclosure

November 6, 1979

Dr. Philip Handler  
Chairman  
National Research Council  
2101 Constitution Avenue, N.W.  
Washington, D.C. 20418

Dear Dr. Handler:

It is our pleasure to submit to you for transmittal to the Department of Energy the final report of the National Research Council Committee on Nuclear and Alternative Energy Systems (CONAES).

The purpose of the CONAES study is indicated by its title: to assess the appropriate roles of nuclear and alternative energy systems in the nation's energy future, with a particular focus on the period between 1985 and 2010. The study is intended to assist the executive and legislative branches of the government, as well as the American people as a whole, in formulating energy policy by illuminating the kinds of options the nation may wish to keep open in the future, by considering the attendant problems, and by describing the actions that may be required to do so.

Because it was central to the study's charter to assess the need and direction for nuclear power developments, the various nuclear options are considered in considerable detail. However, the decisions regarding the proper role of nuclear energy and of the several alternatives cannot be made in a contextual vacuum. We found that neither the prospective growth of our population nor other social and economic factors rigidly determine the needs of the nation for energy in the future. The study, therefore, tried to describe and relate the many economic, social, and technical factors that bear on the country's energy development and the options that must remain open to our society until ultimate decisions need to be made. Many of these decisions are not yet timely and could well be strategically in error if made too soon and based on insufficient knowledge.

This committee has studied at length the many factors and relationships involved in our nation's energy future and offers in chapter 1 some technical and economic observations that decision makers may find useful as they develop energy policy in the larger context of the future of our society.

Because of their significance it seems appropriate to bring them to the reader's attention at this point, while noting that chapter 1 records also, in footnotes, the comments and reservations of individual members of CONAES concerning these major conclusions.

Our observations focus on (1) the prime importance of energy conservation, (2) the critical near-term problem of fluid fuel supply, (3) the desirability of a balanced combination of coal and nuclear fission as the only large-scale intermediate-term options for electricity generation, (4) the need to keep the breeder option open, and (5) the importance of investing now in research and development to ensure the availability of a strong range of new energy options sustainable over the long term.

Policy changes both to improve energy efficiency and to enhance the supply of alternatives to imported oil will be necessary. The continuation of artificially low prices would inevitably widen the gap between domestic supply and demand, and this could only be made up of increased imports, a policy that would be increasingly hazardous and difficult to sustain.

The most vital of these observations is the importance of energy demand considerations in planning future energy supplies. There is great flexibility in the technical efficiency of energy use, and there is correspondingly great scope for reducing the growth of energy consumption without appreciable sacrifices in the growth of GNP or in nonenergy consumption patterns. Indeed, as energy prices rise, the nation will face important losses in economic growth if we do not significantly increase the economy's energy efficiency. Reducing the growth of energy demand should be accorded the highest priority in national energy policy.

In the very near future, substantial savings can be made by relatively simple changes in the ways we manage energy use, and by making investments in retrofits of existing capital stock and consumer durables to render them more energy efficient.

The most substantial conservation opportunities, however, will be fully achievable only over the course of two or more decades, as the existing capital stock and consumer durables are replaced. There are economically attractive opportunities for such improvements in appliances, automobiles, buildings, and industrial processes at today's prices for energy, and as prices rise, these opportunities will multiply.

This underscores the importance of clear signals from the

economy about trends in the price of energy. New investments in energy-consuming equipment should be made with an eye to energy prices some years in the future. Without clear ideas of the replacement cost of energy and its impact on operating costs, consumers will be unlikely to choose appropriately efficient capital goods. These projected cost signals should be given prominence and clarity through a carefully enunciated governmental pricing policy. They can be amplified where desirable by regulation; performance standards, for example, are useful in cases (such as the automobile) where fuel prices are not strongly reflected in operating costs.

Although there is some uncertainty in these conclusions because of possible feedback effects of energy consumption on labor productivity, labor-force participation, and the propensity for leisure, calculations indicate that, with sufficiently high energy prices, an energy/GNP ratio one half of today's could be reached, over several decades, without significant adverse effects on economic growth. Of course, so large a change in this ratio implies large price increases and consequent structural changes in the economy. This would entail major adjustments in some sectors, particularly those directly related to the production of energy and of some energy-intensive products and materials. However, given the slow introduction of these changes, paced by the rate of turnover in capital stock and consumer durables, we believe neither their magnitude nor their rate will exceed those experienced in the past owing to changes in technology and in the conditions of economic competition among nations. The possibility of reducing the nation's energy/GNP ratio should serve as a stimulus to strong conservation efforts. It should not, however, be taken as a dependable basis for foregoing simultaneous and vigorous efforts on the supply programs discussed in this report.

The most critical near-term problem in energy supply for this country is fluid fuels. World supplies of petroleum will be severely strained beginning in the 1980s, owing both to the expectation of peaking in world production about a decade later and to new world demands. Severe problems are likely to occur earlier because of political disruptions or cartel actions. Next to demand-growth reduction, therefore, highest priority should be given to the development of a domestic synthetic fuels industry, for both liquids and gas, and to vigorous exploration for conventional oil and gas, enhanced recovery, and development of unconventional sources (particularly of natural gas).

As fluid fuels are phased out of use for electricity generation, coal and nuclear power are the only economic alternatives for large-scale application in the remainder of this century. A balanced mix of coal- and nuclear-generated electricity is preferable to the predominance of either. After 1990, for example, coal will be increasingly required for the production of synthetic fuels. The requirements for nuclear capacity depend on the growth rate of electricity demand; this study's projections of electricity growth between 1975 and 2010 (for up to 3 percent annual average GNP growth) are considerably below industry and government projections, and in the highest conservation cases actually level off or decline after 1990. Such projections are sensitive also to assumptions about end-use efficiency, technological progress in electricity generation and use, and the assumed behavior of electricity prices in relation to those of primary fuels. They are therefore subject to some uncertainty.

At relatively high growth rates in the demand for electricity, the attractiveness of a breeder or other fuel-efficient reactor is greatest, all other things being equal. At the highest growth rates considered in this study, the breeder can be considered a probable necessity. For this reason, this committee recommends continued development of the LMFBR breeder, so that it can be deployed early in the next century if necessary. Any decision on deployment, however, should be deferred until the future courses of electricity demand growth, fluid fuel supplies, and other factors become clearer.

In terms of public risks from routine operation of electric power plants (including fuel production and delivery), coal-fired generation presents the highest overall level of risk, with oil-fired and nuclear generation considerably safer, and natural gas the safest. With respect to accidents, the generation of electricity from fossil fuels presents a very low risk of catastrophic accidents. The projected mean number of fatalities associated with nuclear accidents is probably less than the risk from routine operation of the nuclear fuel cycle (including mining, transportation, and waste disposal), but the large range of uncertainty that still attaches to nuclear safety calculations makes it difficult to provide a confident assessment of the probability of catastrophic reactor accidents. The spread of uncertainty in present estimates of the risks of both coal and nuclear power is such that the ranges of possible risk overlap somewhat. High-level nuclear

waste management does not present catastrophic risk potential, but its long-term low-level threat demands more sophisticated and comprehensive study and planning than it has so far received, particularly in view of the acute public sensitivity to this issue.

The problem of nuclear weapons proliferation is real and is probably the most serious potentially catastrophic problem associated with nuclear power. However, there is no technical fix--even the stopping of nuclear power (especially by a single nation)--that averts the nuclear proliferation problem. At best, the danger can be delayed while better control institutions are put in place. There is a wide difference of opinion about which represents the greater threat to peace: the dangers of proliferation associated with the replacement of fossil resources by nuclear energy, or the exacerbation of international competition for access to fossil fuels that could occur in the absence of an adequate worldwide nuclear power program.

Because of their higher economic costs, solar energy technologies other than hydroelectric power will probably not contribute much more than 5 percent to energy supply in this century, unless there is massive government intervention in the market to penalize the use of nonrenewable fuels and subsidize the use of renewable energy sources. Such intervention could find justification in the generally lower social costs of solar energy in comparison to alternatives. The danger of such intervention lies in the possibility that it may lock us into obsolete and expensive technologies with high materials and resource requirements, where greater reliance on "natural" market penetration would be less costly and more efficient over the long term. Technical progress in solar technologies, especially photovoltaics, has accelerated dramatically during the last few years; nevertheless, there is still insufficient effort on long-term research and exploratory development of novel concepts. A much increased basic research effort should be directed at finding ways of using solar energy to produce fluid fuels, which may have the greatest promise in the long term.

Major further exploitation of hydroelectric power, or of biomass through terrestrial energy farms, presents ecological problems that make it inadvisable to count on these as significant future incremental energy sources for the United States. (Marine biomass energy farms could have none of these problems, of course.) There is insufficient information to judge whether the large-scale exploitation of hot-dry-rock geothermal energy or the geopressured brines will ultimately

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## PREFACE

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In June 1975 the National Research Council, at the request of the Energy Research and Development Administration, undertook a comprehensive study of the nation's energy future, with special consideration of the role of nuclear power among alternative energy systems. The Committee on Nuclear and Alternative Energy Systems (CONAES) was formed to carry out the study.

The study, in assessing the roles of nuclear and alternative energy systems in the nation's energy future, focuses on the period between 1985 and 2010. Its intent is to illuminate the kinds of options the nation may wish to keep open in the future and to describe the actions, policies, and research and development programs that may be required to do so. The timing and the context of these decisions depend not only on the technical, social, and economic features of energy supply technologies, but also on assumptions about future demand for energy and the possibilities for energy conservation through changes in consumption patterns and improved efficiency of the supply and end-use systems.

The committee developed a three-tiered functional structure for the project. The first tier was CONAES itself, whose report embodies the ultimate findings, conclusions, and judgments of the study. To provide scientific and engineering data and economic analyses for the committee, a second tier of four panels was appointed by the committee to examine (1) energy demand and conservation, (2) energy supply

and delivery systems, (3) risks and impacts of energy supply and use, and (4) various models of possible future energy systems and decision making. Each panel in turn established a number of resource groups--some two dozen in all--to address in detail an array of more particular matters. (The members of each resource group are listed in Appendix C, along with contractors and consultants to the study.)

It should be emphasized that this report, although it embodies the contributions of several hundred individuals, is solely the responsibility of the committee. However, the committee was chosen to represent a wide range of viewpoints and backgrounds, and in such a group, covering so broad a topic, it is impossible to reach consensus on every issue. Committee members were encouraged, at the conclusion of the study, to submit individual statements on subjects with whose treatment in the report they were especially dissatisfied. These statements are indicated in the report by footnotes, the longer statements appearing as Appendix A.

The National Research Council customarily publishes only the final reports of its committees. However, many of the panel and resource group reports, prepared to provide information for the committee, are valuable energy documents in their own rights. They are therefore also being published. The panel reports were reviewed by designated members of CONAES under procedures approved by the Report Review Committee of the National Research Council. The resource group reports, published as supporting papers, were reviewed by less formal procedures. The findings expressed in the panel and resource group reports are those of the authors and are not endorsed by CONAES or the National Research Council; some of the conclusions are inevitably at variance with those of the CONAES report. Appendix D lists the currently available and forthcoming publications of the CONAES study.

## ACKNOWLEDGMENTS

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While the fourteen members of the Committee on Nuclear and Alternative Energy Systems are solely responsible for this report, many other individuals and groups contributed information and analyses. Volunteer members of the panels and resource groups were the main contributors to the body of information compiled during the study. In most cases these groups were assisted by consultants and staff assistants. The panels and resource groups in addition commissioned a number of papers and studies.

Several individuals made especially important contributions to producing the committee report. Staff officers Leroy Colquitt, Jr., Brian Crissey, and Richard Silberglitt worked closely with the committee and individual panels (with whom their names are listed) between 1975 and 1977.

The editorial staff began its work in 1977 and carried through to the completion of the study; particular acknowledgment is due Duncan Brown and Aurora Gallagher, who were the principal editors for the committee from June 1977 to report completion. Leonard S. Cottrell III helped with background research and analysis.

All of these efforts were guided by the study director, Jack M. Hollander, who served while on leave of absence from the Lawrence Berkeley Laboratory between 1975 and December 1977, and by John O. Berga, who coordinated staff efforts in 1978 and 1979.

The staff was ably supported in processing the many manuscript drafts during most of this period by Vivian Scott, Karen Laughlin, and Sandra Jones and is particularly grateful for their efforts. Important and timely assistance was provided by the administrative units of the National Academy of Sciences, especially the Copying Service, the Manuscript Processing Unit, and the Office of Publications.

A list of individuals who made significant contributions to the work of the committee and panels is printed as Appendix C of this volume. This list is by no means complete, and the committee expresses appreciation to all the others whose efforts furthered the work of this study.

OVERVIEW

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The energy problem now faced by the United States began to be recognized 10 years or more ago. Still, the occasional symptoms (the oil embargo of 1973, the natural gas shortage of 1976-1977, and the gasoline lines of the summer of 1979) are frequently mistaken for the problem itself. As each symptom is relieved, the public sense of crisis fades. The seeds of future crisis, however, remain.

Resolution of the problem demands a systematic examination of energy supply and demand in the context of existing policies, and articulation of a coherent set of policies for the transition to new sources of energy and new ways of using it. The essential difficulty is that these policies must be as consonant as possible with other, often conflicting, national objectives--protecting the environment and public health and ensuring national security, economic growth, and equity among different regions and classes.

The nation's energy problems are exemplified by two simple facts: stagnant domestic production and rising demand. Total energy production in the United States in 1978 was about 3 percent less than in 1972, the last full year before the oil embargo and OPEC price rise of 1973-1974 (Figure 1-1). In the same period, energy consumption rose by 9 percent (Figure 1-2). The difference is made up by increasing oil imports at continually rising prices. Imports now provide about half of all the oil consumed in the United States, up from about 30 percent in 1972. The total cost has jumped from \$4.77 billion in 1972 to \$41.46 billion in 1978.<sup>1</sup>

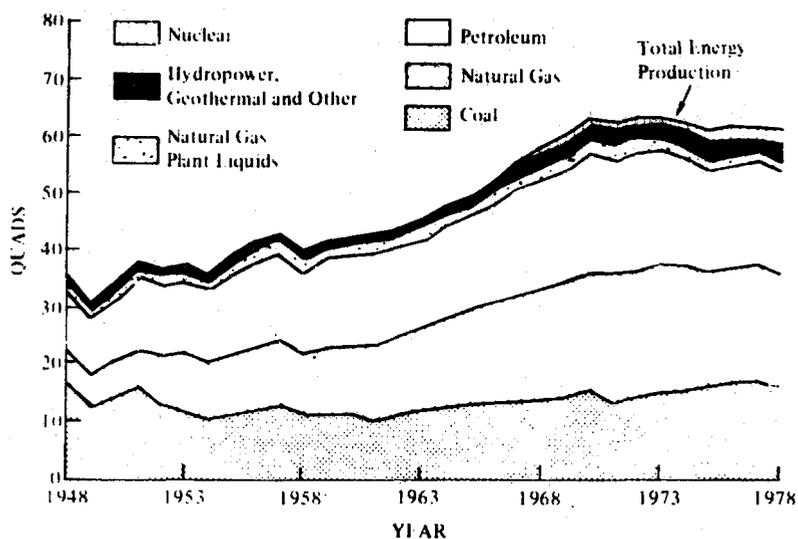


FIGURE 1-1 Energy production in the United States from 1948 to 1978, by energy source (quads). Source: U.S. Department of Energy, Energy Information Administration, Annual Report to Congress, 1978, vol. 2, Data (Washington, D.C.: U.S. Department of Energy (DOE/EIA-0173/2), 1979).

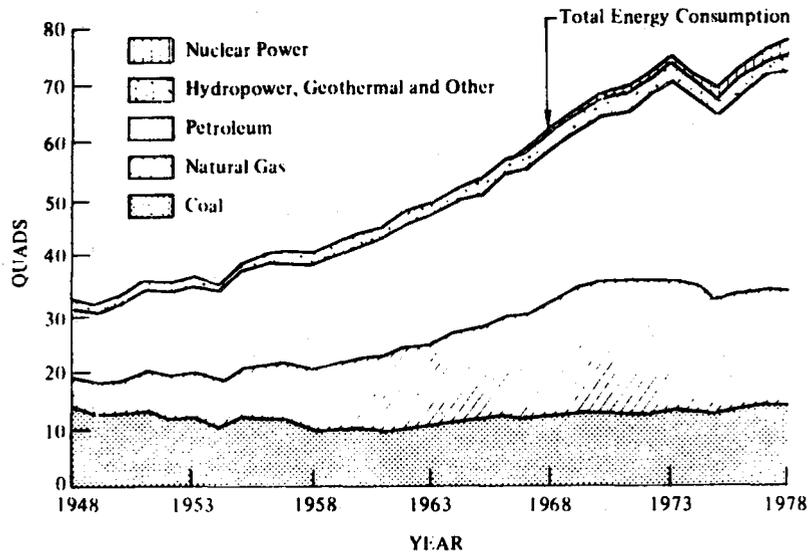


FIGURE 1-2 Energy consumption in the United States from 1948 to 1978, by energy source (quads). Source: U.S. Department of Energy, Energy Information Administration, Annual Report to Congress, 1978, vol. 2, Data (Washington, D.C.: U.S. Department of Energy (DOE/EIA-0173/2), 1979).

In the meantime, total world demand for oil has risen even more rapidly<sup>2-4</sup> while exporting nations, with an eye to the ultimate depletion of what is in many cases the sole source of wealth, have exercised strict control over production. Thus, the United States is forced to compete for supplies in an increasingly tight world market. The inevitable result is upward pressure on prices and enhanced opportunities for the control of prices by cartel.

The United States is a key factor in the world oil situation. U.S. oil consumption is huge, amounting to almost 30 percent of world consumption. At the same time, its domestic production is declining, probably irreversibly (except for some temporary help from Alaskan production, which will peak in the 1980s). Natural gas production is also on a downward trend. These production trends might be arrested by higher prices and favorable public policies, but any increase above current production levels is likely to be small and to decline after the year 2000. The only readily available large-scale domestic energy sources that could even in principle reverse the decline in domestic energy production over the next three decades--coal and nuclear fission\*--face a variety of technical, political, and environmental obstacles, and will be difficult (though not impossible) to expand very rapidly.

The implications are serious. First of all, rising dependence on increasingly costly foreign oil tends to degrade the value of the dollar and exacerbates inflation. The heavy and growing involvement of the United States in the world oil market not only worsens the domestic problem, but puts less affluent importing countries at a growing disadvantage in competing for supplies. The foreign policy consequences of this strained situation are twofold: Oil-producing countries find it increasingly feasible to exact political concessions from importers, and U.S. relations with other oil importers are weakened.

The United States has been a net importer of energy since the early 1950s. Energy was cheap, and it grew cheaper throughout the 1950s and 1960s; little concern was expressed as consumption more and more outpaced domestic production. In constant 1948 dollars, the price per barrel of crude oil

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\*See statement 1-1, by H. Brooks, Appendix A.

See statement 1-2, by J. P. Holdren, Appendix A.

at the wellhead fell from \$2.50 in 1948 to \$1.85 in 1972; imported oil was even cheaper. Most other forms of energy-- notably electricity and coal--declined even more in price than oil. Net energy imports rose on the average more than 10 percent annually throughout the 1960s, more than doubling in that decade. Sources of supply became increasingly concentrated in the Middle East and Africa.

In 1970 domestic oil production peaked, and growth in imports accelerated. From 1970 until the fourfold OPEC price rise in 1973-1974, oil imports rose at rates exceeding 30 percent annually--almost doubling again in 3 years. The price rise brought in its wake a serious economic recession; energy consumption, and therefore imports, dipped in response. They rebounded sharply afterward, though rates of increase are now less than in the early 1970s. The nation now imports more than a fifth of its primary energy in the form of foreign oil.

The solution to this problem is not simply to produce more energy, and not simply to conserve, but rather to find a new economic equilibrium between supply and demand.\* Higher prices are inevitable, and the nation must take advantage of the resulting new opportunities for both enhanced supply and greater efficiency in energy use.

Ordinary market forces will play important roles here. In some cases, however, such as the international oil market, they will be relatively ineffective and must be supplemented by government incentives to conserve and by federal aid in developing new technologies that can allow wider use of domestic resources such as coal, to allay the growth in demand for oil.

All in all, conservation deserves the highest immediate priority in energy planning. In general, throughout the economy it is now a better investment to save a Btu than to produce an additional one. On the supply side, the most

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\*Statement 1-3, by R. H. Cannon, Jr.: This is too weak. Energy production increases of major proportions and vigorous conservation are both crucial to national economic viability and security. Neither alone can suffice.

\*Statement 1-4, by R. H. Cannon, Jr.: Generalization unwarranted. It is often true but often not, for many energy inefficiencies have already been corrected.

important short-term measure is to enhance domestic oil and gas production by exploiting unconventional sources and enhanced-recovery techniques. The most important intermediate-term measure is developing synthetic fuels from coal, and perhaps from oil shale, to serve where coal and nuclear power (which are most suitable now for electricity production) cannot directly replace oil and gas, as in transportation. Perhaps equally important is the use of coal and nuclear power to produce electricity for applications such as space heating, where such replacement is possible.

While these measures are being taken, the research and development necessary to bring truly sustainable energy sources--nuclear fission, solar energy, geothermal energy in places, and perhaps fusion--into place for the long term must receive continued attention. The relative merits of the principal long-term choices, and the timing of their execution, are discussed in subsequent sections of this chapter and in the body of the report.

#### MODERATING DEMAND GROWTH

Slowing the growth of energy demand will be essential, regardless of the supply options developed during the coming decades. In fact, the demand element of the nation's energy strategy should be accorded the highest priority. Some reduction in growth will inevitably result from rising energy prices, and this reduction could be accelerated by such explicit government policies as taxes and tariffs on energy and standards for the performance of energy-using equipment. In any event, studies by the CONAES Demand and Conservation Panel indicate that the growth of demand for energy in this country could be reduced substantially--particularly after about 1990--by gradual increases in the technical efficiency of energy end-use and by price-induced shifts toward less energy-intensive goods and services.<sup>5</sup>

In this analysis the Demand and Conservation Panel explored the dynamics and determinants of energy use by performing detailed economic and technological analyses of the major energy-consuming sectors: buildings, industry, and transportation. The projected energy intensities for each sector were based on (1) expected economic responses to price increases and income growth and (2) technical changes in energy efficiency that would be economical at the prices assumed and would minimize the life cycle costs of automobiles, appliances, houses, manufacturing equipment, and

so on. No credit was taken for major technological breakthroughs; only advances based on currently available technology were considered.

A major conclusion from this analysis is that technical efficiency measures alone could reduce the ratio of energy consumption to gross national product (for convenience, the energy/GNP ratio) to as little as half\* its present value over the next 30-40 years. (This conclusion is sensitive to the prices assumed in the analysis, and a result of this magnitude is attained only if prices for energy increase more rapidly than is probable in a market at equilibrium.) Similar conclusions were reached by the CONAES Modeling Resource Group,<sup>6</sup> whose work suggests that such reductions are possible without appreciable impacts on the consumer market basket.

In some cases the price increases necessary to reach such reductions in demand would have to be secured by taxes that would open up a wedge between consumer prices and the costs of producing and delivering energy. Whether this would be politically tolerable or not may be open to question. It is possible, however, that if such price increases are not imposed domestically, they will be imposed by the international oil market with considerably greater abruptness.

These findings are embodied in the panel's "scenarios," or estimates of energy demand under a range of different assumed circumstances involving the price of energy and the consequent technological responses in terms of energy consumption. (A scenario is a kind of "what if" statement, giving the expected results of more or less plausible assumptions about future events, according to some self-consistent model.) The Demand and Conservation Panel's scenarios are intended to project--given certain unvaried assumptions about population growth and income growth, labor productivity, and the like--the effects on energy demand between 1975 and 2010 of various price schedules for

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\*Statement 1-5, by R. H. Cannon, Jr.: It would be wrong to depend on so large an improvement. Calculations using other models and assumptions predict severe economic impact for smaller energy/GNP reductions.

<sup>6</sup>See statement 1-6, by E. J. Gornowski, Appendix A.

delivered energy. The assumed prices range from an average quadrupling by 2010 to a case in which the average price of delivered energy actually decreases by one third. Table 1-1 lists the generalized assumptions and postulated prices for each of these demand scenarios. (The specific assumed prices for individual fuels in each of these demand scenarios can be found in Table 11-2 of chapter 11.) Obviously, high-priced energy evokes greater efficiency in use and thus lower consumption.

One of the key assumptions in the panel's scenarios is that the U.S. gross national product grows at an average rate of 2 percent between 1975 and 2010\*; a variant of one scenario explores the implications of 3 percent growth. More rapid economic growth, as might be expected, implies higher energy consumption.

The panel found that the economically rational responses of consumers to this range of energy prices would result in a broad range of energy consumption totals for the year 2010.\*\* Figures 1-3 and 1-4 illustrate the width of this range. Chapters 2 and 11 explain more about the assumptions and methods used in making these projections.

#### A Word About the Study's Projections

The Demand and Conservation Panel's scenarios are only one of a variety of scenarios developed and used in this study to aid in visualizing the complex interplay among policies, prices, and technologies in the supply and demand of energy. Table 1-2 summarizes the main features and purposes of each

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\*Statement 1-7, by R. H. Cannon, Jr.: Over the entire 33-yr period 1946 to present, 3.4 percent GNP growth, not 2 percent, has been consistent with a healthy economy and reasonably low unemployment.

\*See statement 1-8, by H. S. Houthakker and H. Brooks, Appendix A.

\*\*Statement 1-9, by R. H. Cannon, Jr.: Assuming 3.4 percent GNP growth would make the 2010 quad figures (roughly) for scenario A 125, for scenario B 160, for scenario C 230, and for scenario D 270.

**TABLE 1-1 Essential Assumptions of Demand and Conservation Panel Scenarios**

Scenario	Energy Conservation Policy	Average Delivered Energy Price in 2010 as Multiple of Average 1975 Price (1975 dollars)	Average Annual GNP Growth Rate (percent)
A*	Very aggressive, deliberately arrived at reduced demand requiring some life-style changes	4	2
A	Aggressive; aimed at maximum efficiency plus minor life-style changes	4	2
B	Moderate; slowly incorporates more measures to increase efficiency	2	2
B'	Same as B, but 3 percent average annual GNP growth	2	3
C	Unchanged; present policies continue	1	2
D	Energy prices lowered by subsidy; little incentive to conserve	0.66	2

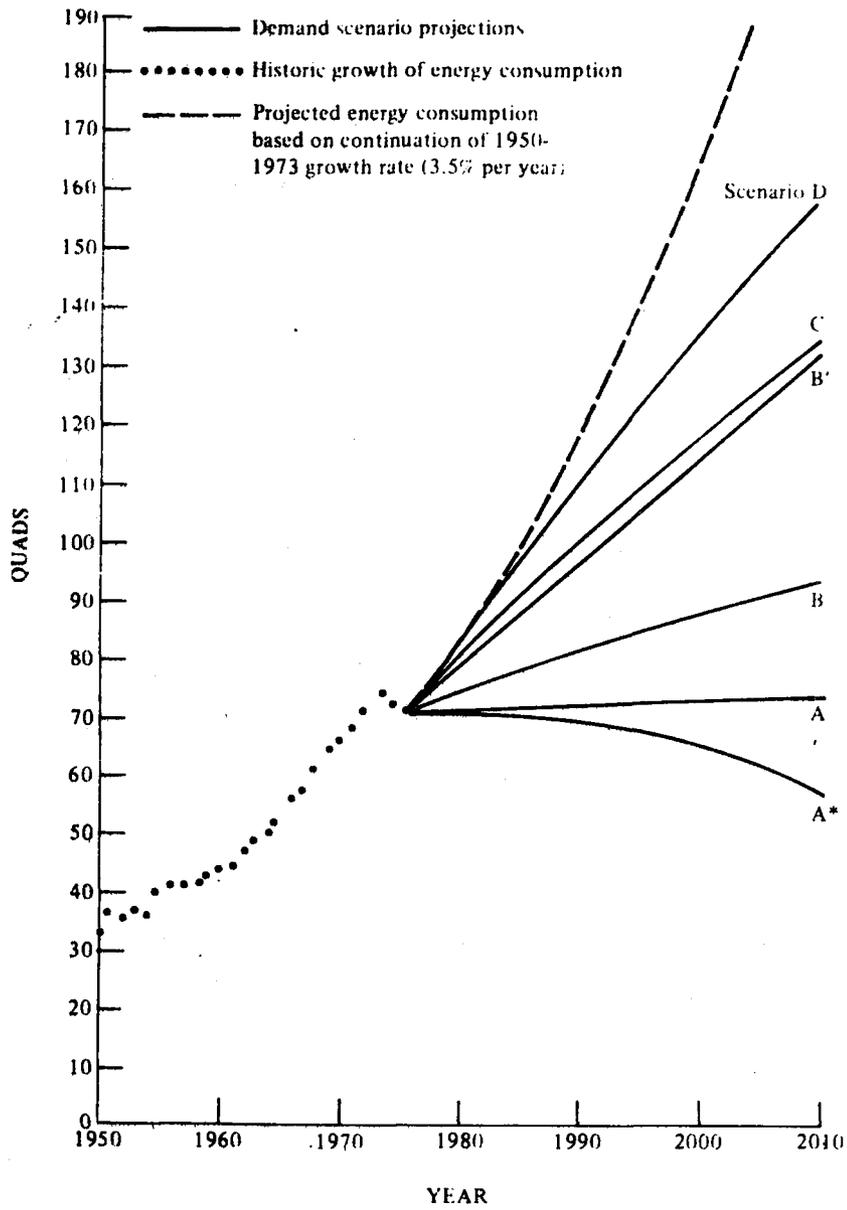


FIGURE 1-3 Demand and Conservation Panel projections of total primary energy use to 2010 (quads).

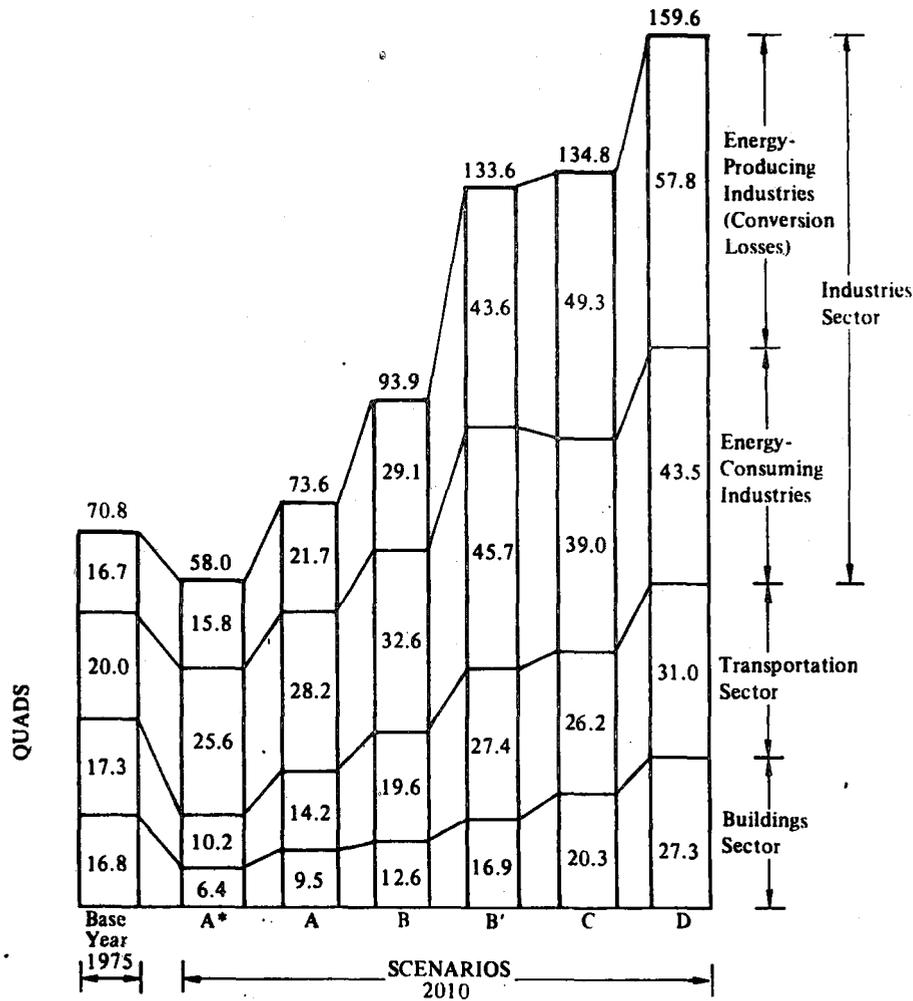


FIGURE 1-4 Demand and Conservation Panel projections of primary energy use by energy-consuming sectors to 2010 (quads). Energy demand projections for different assumptions about GNP or population growth can be roughly estimated by scaling the scenario projections. For example, for a crude idea of the effect of 3 percent average annual GNP growth (rather than the 2 percent assumed in constructing the scenarios), one would multiply the demand total by  $3/2$ .

TABLE 1-2 Scenario Projections Used in the CONAES Study

Scenario	Source	Description
Demand scenarios: A*, A, B, B', C, D	Demand and Conservation Panel	A, B, C, and D explore the effects of varied schedules of prices for energy at the point of use, from an average quadrupling between 1975 and 2010 (scenario A) to a case (scenario D) in which the average price of energy falls to two thirds of its 1975 value by 2010. Basic assumptions include 2 percent annual average growth in GNP, and population growth to 280 million in the United States in 2010. Scenario A* is a variant of A that takes additional conservation measures into account. Scenario B' is a variant of B, projecting the effect on energy consumption of a higher annual average rate of growth in GNP (3 percent).
Supply scenarios: Business as usual, enhanced supply, and national commitment	Supply and Delivery Panel	Projections of energy resource and power production under various sets of assumed policy and regulatory conditions. Business-as-usual projections assume continuation without change of the policies and regulations prevailing in 1975; enhanced-supply and national-commitment projections assume policies and regulatory practices to encourage energy resource and power production.
Study scenarios: I <sub>2</sub> , I <sub>3</sub> , II <sub>2</sub> , II <sub>3</sub> , III <sub>2</sub> , III <sub>3</sub> , IV <sub>2</sub> , IV <sub>3</sub> (correspondence between study scenarios and demand scenarios: I <sub>2</sub> = A*, II <sub>2</sub> = A, III <sub>2</sub> = B, III <sub>3</sub> = B', IV <sub>2</sub> = C; scenario D was not used)	Staff of the CONAES study	Based on the demand scenarios; integrations of the projections of demand from the demand scenarios and projections of supply from the supply scenarios. A variant of each price-schedule scenario was projected for 3 percent annual average growth of GNP.
MRC scenarios	Modeling Resource Group	Estimates of the economic costs of limiting or proscribing energy technologies in accordance with various policies.

set. Chapter 11 deals in some detail with all the scenario projections made in this study, but brief descriptions of the most important ones will be vital to an understanding of much of what follows.

The Supply and Delivery Panel, in its scenarios, estimated the availabilities of various energy forms between 1975 and 2010 under three progressively more favorable sets of assumed financial and regulatory conditions. These are denoted "business as usual," "enhanced supply," and "national commitment." This exercise provided the committee with an idea of the problems and potentials of the nation's major energy supply alternatives. Table 1-3 lists, as an example, the supplies of energy that might be made available if all energy sources could be accorded the incentives implied by the panel's enhanced-supply assumptions.

With the scenarios of these two panels as a basis, the staff of the study attempted to develop a self-consistent set of projections for the consumption of the various energy forms between 1975 and 2010; the method in brief was to use the demand scenarios as a framework, and to fill the demands thus established by entering the available supplies of each major energy form as given by the Supply and Delivery Panel's scenarios. Some interfuel substitutions were made, and the resulting differences in conversion and distribution losses and the like cause the projected totals to vary somewhat from the Demand and Conservation Panel's framework. These scenarios offer a 3 percent GNP growth variant for each of the Demand and Conservation Panel's scenarios. Figure 1-5, showing the primary energy totals for these scenarios, illustrates the difference varying GNP growth assumptions might make.

Yet another set of scenarios was developed by the CONAES Modeling Resource Group in its econometric investigation of various determinants of energy supply and demand. Unlike the three sets of scenarios thus far described, those of the Modeling Resource Group do not proceed from prices (or, equivalently, policies) given at the outset. They are based instead on equilibration of supply and demand, so that prices come as outputs, rather than being given as inputs. Generally speaking, these scenarios contain much less sectoral detail than the other scenarios used in the study; in exchange for this simplification, they permit a more extensive exploration of different policies (including special constraints or moratoria on particular technologies).

It should always be borne in mind, in dealing with scenarios and other projections, that they cannot pretend to

**TABLE 1-3 Supply of Major Energy Forms Under Supply and Delivery Panel's Enhanced-Supply Assumptions (quads)<sup>a</sup>**

Energy Form	Annual Supply			
	1977	1990	2000	2010
Crude oil	19.6	20.0	18.0	16.0
Natural gas	19.4	15.8	15.0	14.0
Oil shale	0	0.7	1.0	1.5
Synthetic liquids <sup>b</sup>	(0)	(0.4)	(2.4)	(8.0)
Synthetic gas <sup>b</sup>	(0)	(1.7)	(3.5)	(4.8)
Coal	16.4	26.6	37.2	49.5
Geothermal	0	0.6	1.6	4.1
Solar	0	1.7	5.9	10.7
Nuclear	2.7	13.0	29.5	41.7
Hydroelectric	2.4	4.1	5.0	5.0

<sup>a</sup>For specific assumptions underlying estimates, see the report by the National Research Council, *U.S. Energy Supply Prospects to 2010*, Committee on Nuclear and Alternative Energy Systems, Supply and Delivery Panel (Washington, D.C.: National Academy of Sciences, 1979) and Chapter 11, Table 11-14.

<sup>b</sup>Synthetic fuels are produced from coal and oil shale and are not included in totals.

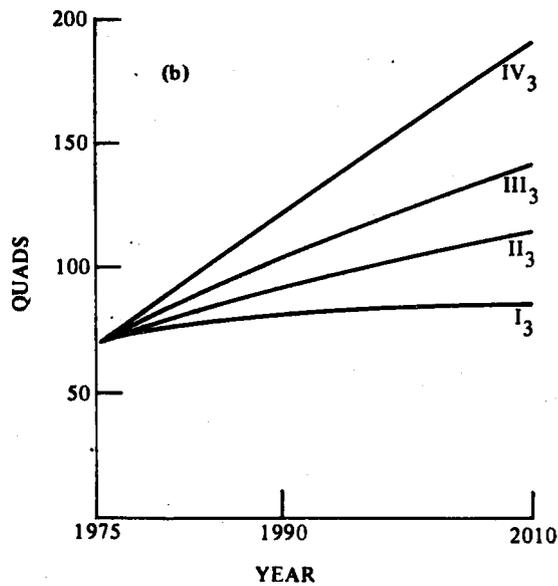
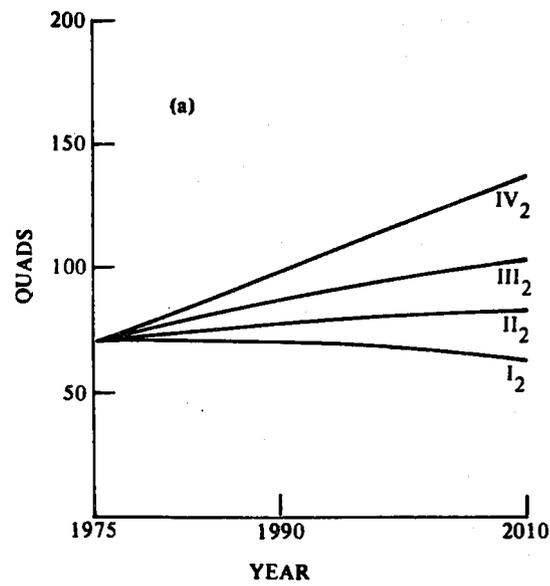


FIGURE 1-5 Projections of total primary energy consumption for CONAES study scenarios to 2010 (quads), with assumed (a) 2 percent GNP growth and (b) 3 percent GNP growth.

predict the future. All scenarios require great oversimplification of reality, and many judgments enter into their assumptions. The value of scenarios is in their self-consistency, which allows an approximate view of relationships between supply and demand, trade-offs among different energy sources, and the possible impacts of broadly defined policies.\* The temptation to take this kind of projection too literally should be resisted, but as means of illustrating certain gross features of the nation's energy system and its possible evolution, this study's scenarios have value.

#### The Economic Effects of Moderating Energy Consumption

According to the analyses of the Demand and Conservation Panel, the kinds of energy conservation that offer the greatest promise of substantially moderating in the growth of energy consumption involve replacing equipment and structures with those that are more energy efficient. To avoid economic penalties, the rate of replacement must generally depend on the normal turnover of capital stock--about 10 years for automobiles, 20-50 years for industrial plants, and 50 years or more for housing--though rising energy prices will accelerate this turnover in most cases. The effects of conservation will become evident only over the long term, but these long-term benefits require many actions that must be begun immediately, and sustained consistently over time.

As Table 1-1 and Figure 1-3 illustrate, the panel found that any of a range of primary energy consumption totals (varying by a factor of more than 2) could be compatible with the same rate of growth in GNP. Thus, energy consumption may exert less influence on the size of the economy than often has been supposed.

These findings were borne out by the work of the Modeling Resource Group<sup>7</sup>--work undertaken by different methods and for

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\*See statement 1-10, by E. J. Gornowski, Appendix A.

<sup>7</sup>Statement 1-11, by J. P. Holdren: An oversimplification. Many approaches to conservation--such as retrofitting existing equipment--produce big short-term gains.

different purposes. This group sought, among other aims, a first approximation of the cost of limiting the energy available from specific technologies, the cost being measured as the size of the resulting effect on cumulative GNP. The group also assessed the feedback effect on GNP of imposing a blanket tax on all primary sources of energy to reduce energy consumption to specific levels below a base case.

The group found this feedback surprisingly small, assuming that the economy is given time to adjust by shifting capital and other resources from the processes of energy production and use to less energy-intensive processes, activities, and products. Subsequent work<sup>8</sup> has tended generally to confirm these conclusions.\*

The size of the feedback depends critically, however, on the parameter that describes the quantitative effect of all these substitutions taken together: the long-term price elasticity of demand for primary energy. This value is the ratio of the percentage change in demand to the percentage change in price that evokes it. For example, if demand falls 5 percent in response to a 10 percent increase in price, the price elasticity of demand is equal to  $-5 \div 10$ , or  $-0.5$ .

The Modeling Resource Group reports that for the case in which primary energy consumption is reduced by 58 percent below the market-equilibrium "base case," cumulative GNP between 1975 and 2010 decreases just 2 percent if the price elasticity of demand for primary energy is  $-0.5$ , but 29 percent if the value of this parameter is  $-0.25$ . The elasticity parameter thus is a key source of uncertainty in the Modeling Resource Group's work, because its true value is not well known. A more detailed discussion can be found in chapter 2.

It should be noted that even for the higher elasticity value, achieving this reduction is estimated by the Modeling Resource Group to require a tax on electricity rising by 2010 to 126 mills per kilowatt-hour (kWh) and a tax on oil and gas rising to \$8.90 per million Btu (both measured in 1975 dollars). This implies a price for oil of more than 4 times the 1978 OPEC price. For electricity it implies about an

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\*Statement 1-12, by R. H. Cannon, Jr.: Hogan confirms the trend but finds quantitatively larger GNP impact, due to less simplistic assumptions about labor productivity and capital availability.

eightfold increase over 1975 prices.\* (See notes to Table 11-38.)

The work of the Demand and Conservation Panel and the Modeling Resource Group points up the importance of allowing the economy sufficient time to make the substitutions and institute the changes necessary to accommodate higher prices for energy or limitations on supply (or both). Sudden supply curtailments or changes in energy prices can disrupt the economy. The same changes introduced gradually over several decades may have only minor economic effects.

#### DOMESTIC ENERGY SUPPLIES FOR THE NEAR TERM

The supply of fluid fuels--gas and oil--which together provide about 75 percent of the nation's energy, will be critical in the 1980s and 1990s. Petroleum supplies worldwide will be severely and increasingly strained as world production approaches its probable peak near the end of the century. This probably would be true even if there were no OPEC; the possibilities of politically controlled prices and production cutbacks are greatly enhanced by such a situation. Domestic production of oil and natural gas has already peaked and begun to decline, and U.S. demand for imports already imposes rather serious strains on the world oil market. Oil production from Prudhoe Bay in Alaska will provide only temporary relief before beginning to fall off in the 1980s. Even the most optimistic projections of the CONAES Supply and Delivery Panel<sup>10</sup> show irreversible declines in domestic oil and natural gas production in the future.

Coal and nuclear power are the only large-scale alternatives to oil and gas in the near term (before about 2000), as the use of fluid fuels begins to wane.\*\* Both are best suited to the generation of electricity in this period. As such they are limited as replacements for fluid fuels, but will have uses in other applications.

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\*See statement 1-13, by J. P. Holdren, Appendix A.

•See statement 1-14, by E. J. Gornowski, Appendix A.

\*\*Statement 1-15, by J. P. Holdren: My longer dissenting view, statement 1-2, Appendix A, also applies here.

A balanced combination of coal- and nuclear-generated electricity is preferable, on environmental and economic grounds, to the predominance of either. The principal points that favor nuclear electricity in its present form (light water reactors (LWR's) operated with a once-through fuel cycle without fuel reprocessing) are as follows.

- In most regions, the average cost of nuclear electricity is less than that of coal-generated electricity, and the difference is likely to continue in the future.\*
- The cost of nuclear energy is less sensitive than that of coal to future increases in fuel prices and to changes in environmental standards. Because of this, the use of nuclear power could reduce future regional disparities in electric power costs.
- Nuclear fuel supplies are more readily stockpiled than coal, and nuclear electricity is thus less subject to interruption by strikes, bad weather, and transportation disruptions.
- The environmental and health effects of routine operation of nuclear reactors are substantially less than those of coal per unit of electric power produced.
- If the effect of carbon dioxide (CO<sub>2</sub>) accumulation on climate becomes a major global environmental issue in the early years of the twenty-first century, it will be aggravated by utility commitments to the use of coal, because power plants have lives of 30-40 years.

The principal points in favor of coal are the following.

- Coal power plants and the coal fuel cycle are not subject to low-probability, high-consequence accidents or sabotage, which are inherently uncertain and unpredictable. The hazards of coal can be made relatively predictable, given sufficient research on such matters as the health effects of coal-derived air pollutants. (This research will take perhaps 15-20 years to complete, however.)
- Coal burning in utilities has no major foreign policy implications, as does nuclear power via the problems of nuclear weapons proliferation and safeguards. The outlook.

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\*Statement 1-16, by J. P. Holdren: This point and the next one may well depend on a lower incidence of safety-related nuclear plant shutdowns than is likely.

for political acceptance of coal may thus be more favorable than that for nuclear energy.

- Coal is better adapted to generation of intermediate-load power, and in this sense is complementary to base-load nuclear plants. In addition, the lead time for planning coal-burning power plants is less than that for nuclear plants.

- Coal-generated electricity has a much larger resource base than light water reactors operated on a once-through fuel cycle, which will be important if fuel reprocessing and the development of more resource-efficient reactor systems and fuel cycles are further delayed.

- In the absence of a demonstrated, licensable plan for high-level waste management, the nuclear fuel cycle may be considered an incompletely proven technology, which is therefore subject to uncertainties as to whether its continued growth will be permitted. To the degree that this is so, nuclear energy runs a greater risk than coal of future capacity shortfalls due to unexpected technical developments.

After 1990, coal will likely be increasingly demanded for conversion to synthetic fuels, and nuclear generation may thus be required for continued growth in generating capacity. The amount of nuclear capacity needed is sensitively dependent on the profile of electricity growth after 1990, and especially after 2000. The several issues surrounding coal- and nuclear-generated electricity are discussed in chapters 4, 5, and 9. Chapter 11 compares various rates of installation for both coal-fired and nuclear power plants under assumed rates of growth for electricity consumption.

Electricity can be provided from almost any primary fuel and thus adds a good deal of flexibility to energy supply. However, probably even in comparison with synthetic liquids and gases, it has high capital costs.<sup>11</sup> There is a complex trade-off between fuel flexibility, which favors electricity, and cost, which favors fluid fuels in applications such as heating and cooling buildings and providing most industrial heat. Electricity prices are considered likely to rise less rapidly than the prices of oil, gas, and synthetic fuels, owing to technological progress in the generation of electricity and to the large fraction of electricity cost attributable to fixed capital charges, which remain constant once a plant is built but for future plants tend to increase at the same rate as the general price level. The CONAES Demand and Conservation Panel, however, assumed delivered electricity prices would rise nearly as quickly as other fuel

prices. These differences may result in underestimated electricity growth in the CONAES projections.\*

For the intermediate term, conservation of fluid fuels is an urgent necessity. Even in the projections embodying vigorous energy conservation, limited supplies of fluid fuels could lead to rapid price rises, especially if imports are constrained or subject to cartel pricing. If prices rise too rapidly, there will be insufficient time for development and investment to adjust, and economic dislocation will result.

The constraints on supplies of fluid fuels could probably not be fully relieved by a high-electrification policy depending on coal and nuclear fission, except at a considerably increased total cost. However, accelerated electrification could contribute significantly to relieving future fluid fuel problems. Commitment to rapid nuclear development, for example, could be regarded as fairly expensive insurance against rapid increases in fluid fuel prices, but domestic oil and gas exploration and development of a strong synthetic fuel industry\*\* should be accorded the most urgent priorities in energy supply (next in importance to conservation).

#### Domestic Oil and Gas

Production of both petroleum and natural gas in the United States is on the decline, and according to the analysis of this study, will continue to decline. Oil production in this country peaked in 1970 at 3.5 billion barrels, and by 1978

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\*Statement 1-17, by J. P. Holdren: There is no more reason to suppose the Demand and Conservation Panel underestimated future electricity growth than to believe they overestimated it.

Statement 1-18, by J. P. Holdren: It is completely implausible that electrification could fully relieve the fluid fuel problem in the study's time frame even at greatly increased cost.

\*\*Statement 1-19, by D. J. Rose and H. Brooks: An important warning has been omitted: The timing of global environmental problems from overuse of fossil fuels is uncertain, but their possible severity demands caution.

had fallen to 3.2 billion barrels. Domestic natural gas production shows a similar pattern; production peaked in 1973 at 21.7 trillion ft<sup>3</sup>, and by 1978 stood at 18.9 trillion.

These trends reflect the fact that domestic oil and gas are rapidly becoming more difficult and expensive to find and produce, as development moves toward deeper wells and the exploitation of deposits in such relatively inaccessible locations as the Alaskan North Slope and the Outer Continental Shelf. Reserves of both oil and natural gas have been falling since about 1970, though exploration has expanded rapidly in that time. Reserves now equal about 10 times annual production--the lowest level since the Prudhoe Bay field was added to reserves in 1970.

Under the policies prevailing until recently, the CONAES Supply and Delivery Panel projected that domestic production of oil would fall from 20 quadrillion Btu (quads) in 1975 to only 6 quads in 2010 (production in 1977 was 17.5 quads). Moderately enhanced conditions for oil production (including removal of price controls, accelerated offshore leasing, and somewhat advanced exploration and production technology) would bring production in 2010 to 16 quads, according to the projections, and a national commitment (relaxation of some environmental standards and permit requirements, along with federal priorities on labor and materials for oil development) might raise this to 18 quads in 2010. Under no plausible conditions does it appear possible even to maintain current domestic oil production, much less increase it.\*

Gas production projections of the Supply and Delivery Panel show an even more severe decline than the oil projections. Under prevailing policies, extrapolated to 2010, gas production falls from a 1975 total of 19.7 quads to 5 quads in 2010. Moderately enhanced conditions yield a 2010 production level of 14 quads, and a national commitment results in 16 quads of gas production in 2010. Not all experts (including several participants in the CONAES study) agree with these conclusions, however. There is a considerable body of opinion that the potential for new natural gas sources, including several types of "unconventional" sources, is much higher than the study's

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\*Statement 1-20, by H. S. Houthakker: An increase in domestic oil production, while unlikely, cannot be ruled out if prices are high enough and new petroleum provinces are opened up.

supply projections indicate. This opinion has gained a considerable number of new adherents since 1976, when the supply projections were made.

In the light of the Demand and Conservation Panel's projections for liquid and gaseous fuels<sup>12</sup> (which suggest that demand is likely to continue rising until at least 2010), this outlook for production is disturbing. It suggests that the nation will become increasingly dependent on imports of oil from a world market that is already strained and that the oil situation will worsen before improving.

The situation for natural gas is not so serious, because there is a large amount of unmarketed (flared or reinjected) gas in the world. However, even sustaining current domestic natural gas consumption will probably require imports larger than the current 1 quad/yr. Most of these imports are likely to come by pipeline from Canada and possibly from Mexico, but the remainder may have to be in the form of liquefied natural gas (LNG), the landed price of which reflects the costs of liquefaction, transportation, and storage. World supplies of gas are larger compared to demand than those of oil, and their production can be expanded more readily. The international implications of importing gas are correspondingly less severe. However, the cost, and its effect on our trade balance, will not be negligible. It would be obviously unwise for the nation to become as dependent on imported gas as it now is on imported oil.\*

The response of the United States to this challenge must be two-sided. Every reasonable effort must be made to conserve both oil and natural gas by using them more efficiently, by substituting alternative domestic energy forms (initially coal and conventional nuclear power for the most part, and later synthetic liquids and gases, solar energy, breeder reactors, and other long-term energy sources), and by reducing growth in overall energy demand. An equally determined effort must be made to sustain and encourage domestic production to the extent consistent with environmental protection.

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\*See statement 1-21, by H. Brooks, Appendix A.

Statement 1-22, by J. P. Holdren: I reject the implication of this wording that the need to replace oil and gas justifies the use of every alternative, including breeders.

This committee does not believe that oil shale, despite the huge energy content of the domestic resource, will be a major source of energy.\* First, the resource is concentrated in a very small and relatively primitive region, where large-scale development is likely to face resistance on environmental grounds. Second, water supplies are a serious constraint.<sup>13</sup> Third, the amount of solid waste that must be handled is very large relative to the energy extracted, even with in situ processing. However, these conclusions should not be interpreted as justifying the neglect of oil shale development. Every new source helps, and oil from shale will probably become economically competitive earlier than other synthetic fuels.

These efforts to deal with the problem of fluid fuels--it must be stressed--deserve high national priority in energy policy. The longer a commitment is delayed, the more likely it will be that pressures for hasty and ill-considered crash programs will build up. Such programs would involve high technological risks and possibly compromise of environmental and safety standards.

#### Prospects for Coal

Coal is the nation's (and the world's) most abundant fossil fuel. Domestic recoverable reserves amount to 6,000 quads, part of a total domestic resource of about 80,000 quads and world resources crudely estimated at 300,000 quads. Of this huge supply, we consume about 14 quads each year in the United States, or less than 0.3 percent of domestic recoverable coal reserves. In contrast, the nation extracts almost 10 percent of its 420-quad recoverable reserves of oil and natural gas each year.

The substitution of coal for natural gas and oil on a large scale, either directly or through synthetic coal-derived substitutes, would on these grounds seem a ready-made solution to the nation's energy problems. The simple arithmetic of availability, however, does not tell the whole story. Doubling or tripling the use of coal will take time,

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\*Statement 1-23, by R. H. Cannon and E. J. Gornowski:  
Despite the problems foreseen, we believe that the huge oil shale reserves in the United States will be developed to produce very large quantities of fluid fuel.

investments amounting over the years to hundreds of billions of dollars, and coordinated efforts to solve an array of industrial, economic, and environmental problems.

Unlike oil and gas consumption, coal use is limited not by reserves or production capacity, but by the extraordinary industrial and regulatory difficulties of mining and burning it in an environmentally acceptable, and at the same time economically competitive, manner. Coal is chemically and physically extremely variable, and it is relatively difficult to handle and transport. Its use produces heavy burdens of waste matter and pollutants. Even at its substantial price advantage, Btu for Btu, it cannot compete with oil and natural gas in many applications, because of the expense of handling and storing it, disposing of ash and other solid wastes, and controlling emissions to the air. Only in very large installations, such as utility power plants and large industrial boilers, is coal today generally economic and environmentally suitable as a fuel. Domestic coal production capacity today exceeds domestic\* demand, and this may well remain true until the end of the century.<sup>14</sup>

The health problems associated with coal affect both its production and its use. The health of underground miners presents complex and costly problems, for example, and is in need of better management; black lung is the notable instance. At the other end of the fuel cycle, the evolving state of air pollution regulations to deal with the emissions of coal combustion complicates planning for increased demand and thus in turn inhibits investment in mines, transportation facilities, and coal-fired utility and industrial boilers.

The future is obscured also by a number of more speculative problems, which may result in further regulatory restrictions on the use of coal. Chief among these is the risk that before the middle of the next century, emissions of carbon dioxide, an unavoidable (and essentially uncontrollable) product of fossil fuel combustion, may produce such concentrations in the atmosphere that large and virtually irreversible alterations may occur in the world's climate. (See chapter 9.) Also worrisome is the water-supply situation, which could limit synthetic fuel production or

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\*Statement 1-24, by H. S. Houthakker, D. J. Rose, and B. I. Spinrad: By the end of the century the United States may be a large exporter of coal, especially if the growth of nuclear power is impeded.

electricity generation unless large-scale and possibly expensive measures are taken to minimize water consumption and manage water supplies. The location of these industrial activities, even in the East, will require regional hydrological studies to determine where they can best be supported, with due attention to the needs of other water consumers, including ecosystems. Water shortage in the West is already a well-known difficulty. Both of these problems deserve very high research priorities.

Over the coming 10-20 years, some of these obstacles will weaken as new technologies increase the efficiency and convenience of coal use, and as the prices of oil and gas rise while their reliability of supply declines. Current expectations for some of these technologies are indicated in Table 1-4.

A number of the advanced electric power cycles for coal, now under development, would be suitable for smaller installations, and their relatively clean environmental characteristics would make it possible to locate them near users of their power. For smaller industrial users, fluidized-bed combustion and synthetic fuels could provide additional new markets for coal.

Department of Energy regulations under the Powerplant and Industrial Fuel Use Act of 1978 (Public Law 95-620), when implemented and enforced, will further improve the outlook for coal by banning oil and natural gas use in most new power plants and large industrial heating units.

This is not to imply that all the problems of coal use are solvable or that coal can become the mainstay of the domestic energy sector over the long term. Its environmental costs will remain high; mining and burning 2-3 times the present coal output, even if done efficiently and with care, will be difficult (and increasingly expensive) if the contributions of this energy source to air and water pollution and land degradation are to be kept from increasing.

With the foregoing in mind, we see the following as the prime objectives of national coal policy in the coming decades.

1. Provide the private sector with strong investment incentives to establish a synthetic fuel industry in time to compensate for declining domestic and imported oil supplies (probably some time near 1990).
2. Continue the broad federal research and development program in fossil fuel technology to widen the market for

coal by increasing the efficiency and environmental cleanliness with which it can be used.

3. Improve health in the mines by strengthening industrial hygiene and by performing the necessary epidemiological research. The black lung problem especially should be clarified. (See chapter 9.)

4. Devote the necessary resources to supporting long-term epidemiological and laboratory studies of the public health consequences of coal-derived air pollutants, thus putting air quality regulation on a firmer scientific basis that allows more confident and efficient setting of standards, on which industry can depend in its long-range planning. (See chapter 9.)

5. Develop a long-range plan, recognizing that coal presents some serious environmental and occupational health and safety problems, and that it does not relieve the nation of its need to develop truly sustainable energy sources for the long term.

By 1985, given reasonably coherent policy and successful research and development, domestic demand for coal should approach 1 billion tons/yr (about 20-25 quads). Some new synthetic fuel and direct combustion technologies will be on the verge of commercialization. Knowledge of the environmental and public health effects of coal production and use should be improved to the point that the current regulatory uncertainties can be reduced.

As the year 2010 is approached, coal use in the United States may reach 2 billion tons annually.\* Some of the cleaner, more efficient coal-use techniques now being developed should attain full commercialization. Knowledge of the environmental and public health characteristics of coal may be sufficient for confident standard setting. At the same time, however, water supply will be increasingly critical, and, if the hypothesis of climatic change due to carbon dioxide accumulation proves correct, the first signs of climatic effects from carbon dioxide emissions may be appearing. But it is possible that at about this time indefinitely sustainable energy sources may begin to become available.

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\*Statement 1-25, by H. S. Houthakker: Exports may be of the order of 500 million tons/yr.

TABLE 1-4 Advanced Technologies for the Use of Coal

Technology	Characteristics	Status of Development	Possible Date for Introduction at Commercial Scale
Atmospheric fluidized-bed combustion	Applicable to small power plants and small-scale industrial uses	Pilot plants now operating	1980s
Pressurized fluidized-bed combustion	Applicable to larger units than atmospheric version, more efficient, better control of nitrogen and sulfur oxide emissions	13-MWe pilot plant planned	1990s
Gasification combined-cycle (gas and steam turbines) generating units	Burn medium-Btu gas produced from coal at generating site; require operation at high temperatures	Demonstration plant now being built to generate and burn low-Btu gas	1990s
Molten-carbonate fuel cells	Essentially noiseless, pollution-free, and efficient; could possibly use low- or medium-Btu gas as source of hydrogen ions for fuel	5-10 years from demonstration with synthetic gas from coal	Late 1990s; lags other fuel cell development by 5 years
Magnetohydrodynamics	Potential 50 percent conversion efficiency from coal to electricity; sulfur can be separated out in operation; high-temperature exhaust could be used directly or to generate steam	Pilot plant in U.S.S.R., fueled by natural gas; coal system still experimental	2000 or later
Synthetic gas	Low- and medium-Btu gas from coal now technically feasible, but expensive; High-Btu gas (methane) also feasible, but even more expensive today; new processes now being developed	Second-generation technologies now being tested in pilot plants Third-generation technologies in design stage	1990s for second-generation processes
Synthetic oil	Indirect liquefaction technology; complicated, expensive, and inefficient	Used commercially in South Africa	

TABLE 1-4 (continued)

Technology	Characteristics	Status of Development	Possible Date for Introduction at Commercial Scale
	Pyrolysis: range of products, including refinable heavy high-sulfur oils and char (for which there is no ready market); not favored in current program	Small experimental unit operating since 1971	1980s
	Solvent extraction and catalytic hydrogenation: catalysts expensive; burden of hazardous wastes and control of nitrogen	Pilot plants now testing several processes	1990s

For now, however, there is little room for maneuver. Coal must be used in increasing quantities, and mainly with current technologies, until at least the turn of the century, regardless of what happens with respect to such alternatives as nuclear fission or solar energy. However, because of the variety of environmental and social problems it presents, it cannot indefinitely provide additions to energy supply. To keep these problems under control until truly sustainable energy sources can be deployed widely, it would be wise to approach coal as conservatively as possible under the circumstances, with an eye especially to its environmental risks.

#### Prospects for Nuclear Power

Nuclear power could serve as both an intermediate- and long-term source of energy. Its prospects and problems are unique. For example, energy that can be extracted from the available nuclear fuel depends extremely heavily on the fuel cycle used. The light water reactors now in use in the United States, with their associated fuel cycle, make very inefficient use of uranium resources, and could exhaust the domestic supply of high-grade uranium in several decades. By contrast, if breeder reactors were to be developed and used, the domestic nuclear fuel supply could last for hundreds of thousands of years. An intermediate class of reactors and fuel cycles--advanced converters--could, under certain circumstances, extend domestic nuclear fuel supplies for perhaps a half century. These subjects are taken up in chapter 5 under the heading "Availability of Uranium."

Decisions about nuclear power have precipitated debate about the role of citizen participation in technological policy. Opposition to nuclear power in the United States has been expressed in legal and political challenges to the siting and licensing of specific power plants, and in protests over the lack of a waste disposal program and alleged deficiencies in federal regulation and management of nuclear power.<sup>15</sup> The resulting delays and uncertainty have contributed to rapid escalation of the capital costs of nuclear installations and to considerable difficulty in predicting their future costs and availability.

While many of these protests have centered on specific issues, social scientists suggest that the sources of public concern with the technology are broader and deeper, and thus that concern is unlikely to subside with the resolution of

specific issues.<sup>16</sup> The technical and scientific community is itself divided, and debates among experts have heightened public awareness of the uncertainty surrounding many of the technical issues bearing on nuclear power.

Very briefly, the principal issues for nuclear power as an intermediate-term energy source are as follows.

- The future role of nuclear energy, in general, and the relative roles of different nuclear options, in particular, depend on the extent of domestic and worldwide uranium resources, and on the rates at which these resources could be produced at reasonable levels of cost.

- The choice between a breeder reactor and an advanced converter reactor and the timing of development and introduction depend on a complicated integration of a number of technical factors. Most prominent among these are the rate of growth of electricity use, the supply of fuel, and the relative costs of advanced converters and breeders. Relatively low electricity growth rates and large supplies of low-cost uranium would generally favor the advanced converter.\* It should not be forgotten, however, that the breeder and its fuel cycle are probably in a more advanced state of development worldwide than any high-conversion-ratio converter alternative, and that moderate to high electricity growth rates and/or rather limited supplies of uranium would favor the breeder alternative.

- There is a need for early action on a workable program of nuclear waste management, which has until very recently been neglected by the federal government. Adequate technical solutions can probably be found, but some particularly difficult political and institutional problems will have to be solved.

- Public appraisal of nuclear power is of vital importance. Among the most important public concerns are the potential connection of commercial nuclear power with international proliferation of nuclear weapons, the safety of the nuclear fuel cycle (a concern heightened by the recent nuclear reactor accident near Harrisburg, Pennsylvania), and the question of nuclear waste treatment and disposal.

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\*Statement 1-26, by R. H. Cannon, Jr.: Both low electricity growth rates and large supplies of low-cost uranium are highly uncertain, as noted later.

## Uranium Resources

According to the CONAES Supply and Delivery Panel's Uranium Resource Group,<sup>17</sup> only those uranium deposits considered, technically, "reserves" or "probable additional resources" should be taken as a basis for prudent planning. They further state that the availability of uranium ore at estimated forward costs (the costs of mining and milling once the ore has been found) of more than \$30/lb, is known with such little certainty that it cannot be used for planning. They estimate at about 1.8 million tons the uranium available in these categories at forward costs below \$30/lb. This committee believes that estimates of reserves and probable additional resources at forward costs of up to \$50/lb are reliable enough to plan on; according to the U.S. Department of Energy,<sup>18</sup> the quantity of uranium in these categories and at this forward cost is about 2.4 million tons. If, however, less reliably known uranium supplies (listed as "possible" or "speculative" additional resources) are included, the estimate would rise to about 4 million tons.

A typical 1-gigawatt (electric) (GWe) light water reactor with once-through fueling requires about 5600 tons of fuel for a 30-yr useful life. Thus, only about 400 such reactors could be built before the estimated 2.4-million-ton resource base of uranium would be completely committed. The limits on capacity could be extended somewhat (without major alterations in the fuel cycle such as recycling spent fuel) by optimizing the design of light water reactors for fuel efficiency (up to 15 percent improvement in uranium oxide ( $U_3O_8$ ) consumption), and by lowering the uranium-235 ( $^{235}U$ ) concentration in enrichment plant tails. The additional reactor capacity that could be available in 2000 as a result of these measures depends on how soon they could be introduced. The most optimistic estimate would probably not exceed 500 GWe (insufficient for the highest-growth projections of the CONAES study but adequate for other projections).

In brief, if the pessimistic estimates of the Uranium Resource Group are borne out by experience, more efficient reactors and fuel cycles probably will be needed in the United States by the first decade of the next century. Otherwise, the use of nuclear fission will have to be curtailed, beginning at about that time. This will occur when coal demand for synthetic fuels could be increasing rapidly to offset the decline in domestic oil and gas

production, and when the first evidence of climatic change (due largely to CO<sub>2</sub> emissions from fossil fuel combustion) may be appearing. Unless various solar options could be introduced and spread very rapidly, this phasing out of nuclear energy would come therefore at a particularly awkward time.

#### Alternative Fuel Cycles and Advanced Reactors

Light water reactors with the current once-through fuel cycle use only 0.6 percent of the energy potential in uranium as mined. By contrast, breeder reactors are capable of converting the abundant "fertile" isotope <sup>238</sup>U to fissile plutonium-239 (<sup>239</sup>Pu), and of regenerating more plutonium than they use. They can eventually make use of more than 70 percent of the energy potential of uranium ore. There are also conceptual reactors and fuel cycles capable of converting fertile thorium-232 (<sup>232</sup>Th) to another fissile isotope of uranium, <sup>233</sup>U. These could in principle make use of nearly 70 percent of the energy in thorium, which is believed to be 4 times as abundant as uranium in the earth's crust.

Thus, the ability to unlock the energy potential of the fertile isotopes <sup>238</sup>U and <sup>232</sup>Th has a tremendous multiplying effect on available resources--much more than the approximate factor of 100 implied by the numbers just quoted. This is because the use of breeder reactors reduces the contribution of resource prices to the price of electricity by a factor of 100, thus making available ores that are too low in grade, and thus too expensive, to be used as fuel for conventional reactors. For practical purposes, the resource costs for breeders make a negligible contribution to the cost of electricity. Thus, the economics of breeders are closer to those of renewable resources than to those of nonrenewable resources.

As explained earlier, the present generation of light water reactors can be relied on as an energy source only until the early twenty-first century, even if optimized for fuel efficiency. The resource base may be extended 20-30 percent by working enrichment plants harder (to recover a larger fraction of the <sup>235</sup>U in the natural uranium). Another 35-40 percent extension could be achieved by reprocessing spent fuel in a chemical separation process to recover

fissile plutonium and uranium for refabrication into new fuel elements. Either measure, however, would significantly extend the life of a nuclear industry based on light water reactors only if electricity growth leveled off after 2000.

Unfortunately, during fuel reprocessing, plutonium appears briefly in a form that can be converted into nuclear weapons much more readily than can the fissile and fertile material in the spent fuel elements themselves. This gives rise to the fear that a nation in possession of fuel reprocessing facilities might be tempted to manufacture clandestine nuclear weapons, or that a determined and well-organized terrorist group could steal enough material to manufacture a nuclear bomb. It is possible that the recycling process could be modified to make it much less vulnerable in this respect, but both the desirability and the effectiveness of such modifications are still matters of debate. (See chapter 5 under the heading "Reprocessing Alternatives.") These considerations bear heavily on decisions to deploy advanced, more efficient reactors, because all advanced reactors require reprocessing and refabrication of fuel to realize their maximum potential for more efficient resource use. (However, there are several advanced converter designs that could realize substantial, though not the greatest possible, resource savings over improved light water reactors even with a once-through fuel cycle.)

This difficulty has spurred consideration of substantial improvements in nuclear fuel use that do not require reprocessing. One option that might be available, for example, is the Canadian CANDU heavy water reactor fueled with slightly enriched uranium--perhaps 1 percent  $^{235}\text{U}$ . (The CANDU as now operated is fueled with natural, unenriched uranium.) With a once-through fuel cycle (that is, without reprocessing), this could in principle reduce the fuel requirements per unit of power by nearly 40 percent as compared to an unmodified light water reactor of existing design. Although this might be worthwhile under some circumstances, it would still not be sufficient to preserve the option of supplying electricity by nuclear power much beyond 2000, unless the rate of growth in demand for electricity diminished greatly after that date. Uranium resources could be extended an additional 20 percent if some method such as laser isotope separation is developed for stripping the fissile material from the tailings at uranium enrichment plants (though this is unlikely before the 1990s

at the soonest.) The benefits of these measures would become important, however, only if the nuclear power industry were not called upon to expand significantly; growth in capacity would otherwise consume the extra supplies within a few years.

Until recently, the nuclear research and development program in this country concentrated on the liquid-metal fast breeder reactor (LMFBR) and the plutonium-uranium fuel cycle. The advantage of this approach is that the LMFBR offers the greatest degree of independence from the continuing need for natural uranium. For times of the order of hundreds of years, the LMFBR could use as fertile material the stored tails left over from the enrichment process for weapons material and reactor fuel.

Such breeders could extend the life of the uranium resource indefinitely, for practical purposes, and they could be fueled initially with plutonium separated from the spent fuel of light water reactors, as well as with natural uranium. Thus, they offer electrical energy independence to the United States and other nations that have access to even small quantities of enrichment tails. (Nations that operate their light water reactors with fuel enriched in the United States are legally entitled to enrichment tails; these tails are worthless unless they can be used in breeder reactors or stripped for their remaining fissile content by laser isotope separation or another technique.)

Because the LMFBR generates almost 20 percent more fissile isotopes than it consumes, it can be used as the basis for a growing nuclear capacity without requiring the mining of new ore.\* For this reason, it appears attractive for a wide range of projected growth rates in electrical capacity.

Breeders, in the course of their operation, produce more fissile isotopes than they consume. Converters such as light water reactors and CANDU produce a good deal less. Advanced converters produce almost as much as they consume. If their

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\*Statement 1-27, by J. P. Holdren: Present LMFBR designs breed so slowly that capacity cannot expand rapidly without fissile material from mining-enrichment or from large numbers of LWR's.

spent fuel is reprocessed and reloaded into the reactors, they can be run with much less fresh fissile material than is needed to run light water reactors or CANDU's. There are many possible advanced converters.

The principal advanced-reactor alternatives are listed in Table 1-5, along with indications of their relative developmental maturity.

Thus, as between breeders and advanced converters, the following conditions (not all of equal weight) would favor the use of fast breeder reactors over advanced converters in the United States for nuclear-generated electricity.

- The demand for electricity in the United States grows steadily after the year 2000.
- Total domestic uranium resources are found to be at the low end of recent estimates.
- Very little intermediate-grade uranium ore that can be produced at costs in the range of \$100-\$200/lb is found.
- The world growth of nuclear capacity in conventional light water reactors exerts pressure on the United States to export some of its uranium or enriched fuel (or both) to offset the balance-of-payments deficit from oil imports, to discourage recycling of fissile isotopes or installation of breeder reactors elsewhere, or for other reasons.

The following conditions would generally favor the use of advanced converters for nuclear-generated electricity.

- The demand for electricity in the United States grows slowly, especially after 2000.
- Sufficient uranium resources are found to fuel advanced converters at their projected rate of introduction and installation, particularly intermediate-grade ores producible at costs around \$100-\$200/lb.
- Capital costs of advanced converters turn out to be significantly less than those of breeders.
- The operation of advanced converters and their fuel cycles offers advantages in safeguarding against proliferation or diversion.
- New enrichment technologies that permit economic operation at low tails assays become available early.

As has been noted, economics and the type of measures adopted by the world to slow proliferation of nuclear weapons could dominate the choice. Both are highly uncertain factors; we can only estimate future costs qualitatively, and

TABLE 1-5 Nuclear Reactors and Fuel Cycles: Development Status

Reactor Type	Fuel Cycles	Development Status	Possible Commercial Introduction in the United States <sup>a</sup>
Light water reactor (LWR)	Slightly enriched U (~3 percent <sup>235</sup> U)	Commercial in United States	1960
Spectral-shift-control reactor (SSCR)	Th-U <sup>b</sup>	Conceptual designs, small experiment run; borrows LWR technology	1990; fuel cycle, 1995 or later <sup>c</sup>
Light water breeder reactor (LWBR)	Th-U <sup>b</sup>	Experiment running; borrows LWR technology; fuel cycle not developed	1990; fuel cycle, 1995 or later <sup>c</sup>
Heavy water reactor (CANDU or HWR)	Natural uranium	Commercial in Canada, some U.S. experience	1990
	Slightly enriched U (~1.2 percent <sup>235</sup> U)	Modification of existing designs	1995
	Th-U <sup>b</sup>	Modification of designs; fuel cycle not developed	1995
High-temperature gas-cooled reactor (HTGR)	Th-U <sup>b</sup>	Demonstration running; related development in Germany; fuel cycle partly developed	1985; fuel cycle, 1995 or later <sup>c</sup>
Molten-salt (breeder) reactor (MSR or MSBR)	Th-U <sup>b</sup>	Small experiment run; much more development needed	2005
Liquid-metal fast breeder reactor (LMFBR)	U-Pu <sup>b</sup>	Many demonstrations in the United States and abroad *	1995
Gas-cooled fast breeder reactor (GCFBR)	Th-U <sup>b</sup>	Fuel cycle not developed	1995
	U-Pu <sup>b</sup>	Concepts only; borrows LMFBR and HTGR technology	2000

<sup>a</sup>Based on the assumption of firm decisions in 1978 to proceed with commercialization. No institutional delays have been considered except those associated with adapting foreign technology. On the basis of light water reactor experience, it can be estimated that it would take about an additional 15 years after introduction to have significant capacity in place.

<sup>b</sup>Indicated fuel cycles demand reprocessing.

<sup>c</sup>Thorium-uranium fuel reprocessing is less developed than uranium-plutonium reprocessing. Indicated reactors could operate for several years before accumulating enough recyclable material for reprocessing.

\*Statement 1-28, by J. P. Holdren: Fuel reprocessing with the short turnaround time, high throughput, and high plutonium recovery needed to make the LMFBR perform as advertised remains undemonstrated.

we can rely on surprises in international decision making.

This committee could not reach a consensus on whether the likelihood of the circumstances favoring advanced converters is great enough to warrant their development as insurance against difficulties and delays in LMFBR development. Nor was it able to reach agreement on how much the availability of the breeder option might be delayed by a parallel effort on advanced-converter development, and whether such a delay would be justified by a greater ultimate chance for the success of at least one advanced-reactor alternative. It did, however, reach general agreement that the LMFBR dominates the nuclear alternatives over the widest range of assumed future circumstances, provided that its cost goals and other technical objectives can be realized.

Those who believe that low growth in demand for electricity is desirable and can be achieved after 1990 argue that a U.S. program to develop the LMFBR sets a poor example to other nations whose development of the LMFBR would increase the danger of proliferation. The LMFBR, they argue, would be needed only for unnecessarily high rates of growth in electricity demand, which could be avoided in this country by sensible conservation policies.\* In this view, the advanced converter provides sufficiently improved resource efficiency over present reactors to fill the gap until sustainable nonnuclear long-term technologies become available. These arguments underscore the importance of energy demand considerations in planning energy supply systems for the United States.

#### The Demand for Electricity

It is obvious from the foregoing that the rate of growth in electricity use will largely determine how much nuclear power is needed and will govern the strategy of nuclear

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\*See statement 1-29, by H. S. Houthakker, E. J. Gornowski, and L. F. Lischer, Appendix A.

\*See statement 1-30, by L. F. Lischer and E. J. Gornowski, Appendix A.

development.\* Some pertinent quantities are set out in Table 1-6, which uses the CONAES study scenarios (described in detail in chapter 11) to indicate the trade-offs between nuclear power and other sources of electricity.

Study scenario III<sub>1</sub>, for example, shows nuclear power providing about 35 percent of the nation's electricity in 2010. Its contribution of 1670 billion kWh is about twice what the U.S. Department of Energy<sup>19</sup> forecasts nuclear power will contribute in 1990. Thus the scenario involves a modest rate of nuclear growth over the 20-yr period 1990-2010. Coal-generated electricity in this scenario is at about twice the 1978 level. Coal and nuclear power together generate some 3.8 trillion kWh.

If nuclear power were unavailable in 2010, and the entire amount of energy were generated by coal, this would represent a fourfold increase in coal-based generation over the 1978 level, approaching the threshold of serious environmental risks, and in some mining areas introducing or exacerbating problems of water supply. (See chapters 9 and 4, respectively.)

In the high-growth case represented by study scenario IV<sub>3</sub>, 3 times the present electrical capacity would be required. Assuming that 1 GWe of nuclear capacity generates 6 billion kWh in the course of 1 year's operation, 470 GWe of nuclear capacity would be required, to generate the 2810 billion kWh specified for nuclear power by this scenario. Together, nuclear power and coal generate nearly 6 trillion kWh. If coal-based generation were restricted to, say, 2 trillion (or about twice its 1978 level) and the remaining 4 trillion were supplied by nuclear power, an extraordinary national commitment to nuclear capacity additions would be necessary. With the above assumption about the productivity of 1 GWe unit of nuclear capacity, some 670 GWe of nuclear capacity would be needed, including breeders or other advanced reactors.

These examples illustrate the limited mutual substitutability of nuclear energy and coal in the high-

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\*See statement 1-31, by L. F. Lischer, E. J. Gornowski, and H. I. Kohn: This, in our opinion, is neither obvious nor a foregone conclusion.

\*See statement 1-32, by H. Brooks, Appendix A.

**TABLE 1-6 Electricity Generated, by Source  
(billions of kilowatt-hours)**

	Actual 1978 <sup>a</sup>	CONAES Study Scenarios for 2010		
		II <sub>2</sub>	III <sub>3</sub>	IV <sub>3</sub>
Nuclear	276	670	1670	2810
Coal	976	1460	2110	3140
Other	954	730	940	1080
<b>TOTAL</b>	<b>2206</b>	<b>2860</b>	<b>4720</b>	<b>7030</b>

<sup>a</sup>Source: 1978 data are from U.S. Department of Energy, *Annual Report to Congress 1978*, vol. 2, *Data*. Energy Information Administration (Washington, D.C.: U.S. Government Printing Office, 1979).

growth cases and suggest that if growth in demand for electricity is underestimated, shortages of energy may begin to appear during the first decade of the twenty-first century.\*

#### Nuclear Weapons Proliferation and Breeder Development

Two interrelated issues concerning the breeder reactor are the scale and pace of development and the relationship of breeders to the problem of nuclear weapons proliferation and diversion (chapter 5). Regarding proliferation of nuclear weapons, sharply different and irreconcilable views emerged in this study. One view holds that plutonium reprocessing would be a major step toward proliferation, and advocates that the United States forgo for a considerable period the benefits of reprocessing and the breeder to demonstrate how seriously this nation regards the proliferation problem. This view acknowledges that proliferation can thus be only delayed, not prevented, but asserts that deferral of reprocessing and breeder deployment could provide time to develop international institutions and procedures to safeguard the nuclear fuel cycle. In this view, the LMFBR should be treated primarily as a long-term technology of last resort, to be used only if research in the coming decades indicates that other long-term options are much more costly or will not be available in time to offset the phasing out of light water reactors.

The contrary view holds that the breeder has been demonstrated to be the most promising option for the long-term future, with favorable economics and minimal ecological effects, and that therefore a national commitment to large-scale development should be made now, so that LMFBR's can be available before the twenty-first century. It is argued that the commercial nuclear fuel cycle is the least likely and most expensive of several possible paths to proliferation, and that inexpensive means for producing weapons-grade material by isotope separation are likely to be widely

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\*Statement 1-33, by J. P. Holdren: The narrow emphasis on high-growth futures in this passage and the accompanying table is unwarranted and gives an unbalanced impression of the possibilities.

available by the time commercial reprocessing of plutonium becomes widespread.

The response by those favoring deferral of reprocessing is that, whereas there are indeed other routes to proliferation, they require more deliberate political decisions, while a weapons capability could be "backed into" rather easily once commercial reprocessing and refabrication facilities have been installed in a given country. The critical consideration in this view is not the availability of cheaper and less elaborate routes to weapons (which certainly exist) but the reduced warning time between a decision to divert material from the commercial fuel cycle and the production of the first weapons.\*

The view that breeder development should proceed rapidly holds that deferral would increase the potential pressures of the United States on the world petroleum market and on the limited world uranium supply for light water reactors. This would in turn stimulate other countries that are much more dependent than the United States on outside energy sources to pursue the breeder reactor--the one option close to availability that promises a degree of energy independence. Moreover, this argument asserts, world conflict over limited petroleum supplies appears more likely to lead to nuclear war than weapons proliferation resulting from reasonably safeguarded commercialization of plutonium.

#### Management of Radioactive Wastes

The current plans for managing nuclear wastes involve underground burial. The technical aspect of the problem has two parts: first, to find the best technology for packaging and isolating the wastes and, second, to secure a geological environment that would itself be proof against the failure of containers after one or two hundred years, so that migration of the waste nuclides in groundwater would be slow enough as accompanied by so much dilution, that the radioactivity of

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\*Statement 1-34, by J. P. Holdren: Equally critical is the temptation provided by the commercial plutonium cycle, offering weapons as a "fringe benefit" of facilities justified by electricity needs.

the water when it reached the biosphere would be a small fraction of the natural background.

There is no lack of potential disposal methods. There is enough knowledge about the bedded salt disposal option, for example, to warrant a full-scale engineered test of this option with an initial sample of commercial waste. The engineering of such a test would require mainly acquisition of site-specific geological and hydrological data for a few chosen sites. There is, however, no data base adequate for a final choice among the proposed solutions, nor proof that a given choice of sites and waste forms poses the lowest possible risk to the public. Waste disposal is often used as a basis for the political expression of more generalized opposition to nuclear power and to the whole decision-making mechanism for nuclear power.

Two points should be kept in mind. First, it is not necessary to look upon waste disposal as a problem to which the perfect solution must be found before any action can be taken. Caution is necessary, of course, but the risks should not be a bar to the continued use of nuclear power. The maximum hazard resulting from inadequate waste disposal is much smaller than that which could be postulated as the result of a reactor accident or sabotage. Indeed, the maximum exposures involved can almost certainly be kept below those associated with routine exposures to radioactivity in nuclear operations, which are themselves very small compared to exposure to natural background radiation. Caution is dictated not by the magnitude of the risks but by their long duration. The principal risks extend for about a thousand years, and the presence of actinides in the wastes adds a very small continuing risk for millions of years. In this respect, however, nuclear waste disposal is not entirely unique. Elevated CO<sub>2</sub> concentrations in the atmosphere, once established, will persist for many hundreds of years, and over this extended period could have devastating effects, if the hypothesis of climatic changes due to CO<sub>2</sub> accumulation proves correct.

The following specific conclusions and recommendations represent the consensus view of CONAES.

- The nature of the risks from geological disposal of nuclear waste must be clearly spelled out and publicized. The only credible mechanisms by which wastes, once emplaced, could reach the environment involve the slow return of highly dilute radioactive materials, rather than the sudden return

of concentrated ones.\* This could lead to small increases of environmental radiation over previous background levels, lasting for a long time and covering a large area. It could not lead to severe or acute radiation exposures.

- The federal government should immediately proceed to set criteria for geological waste disposal. These should be (1) performance criteria (i.e., leach rates, heat rates) on waste forms in categories that take account of the risks from different types of wastes and (2) site criteria (i.e., groundwater standards, seismic stability standards, resource and mining restrictions).

- The problem of disposal must be separated from the problem of spent fuel storage.

- The problem of military wastes must be settled, and the issue separated from that of commercial wastes. It may well be that long-term entombment is appropriate. If so, it should be effected. Military wastes consist mostly of fission products, and their period of high risk is therefore relatively short.

- The federal government should accept full responsibility for any radioactive wastes in existence, leaving the question of joint state-federal responsibility to be resolved for wastes generated in the future.

- Standards must be set and enforced for the treatment of abandoned mines and of tailings from mines and mills. These standards should permit disposal of low-level alpha-active wastes (i.e., alpha-active wastes which, if blended with the tailings, would not significantly increase their risk) in tailings piles. This will require collaboration between the federal government and the uranium-mining states.

- While retrievability of waste after emplacement is a desirable feature of a test facility, and such a facility would be useful for a research and development program, retrievability ought not to be a consideration in designing a repository for actual waste disposal.

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\*Statement 1-35, by J. P. Holdren: To say "only credible mechanisms" bespeaks a confidence in our knowledge of the possibilities that I cannot entirely share. I would accept "most plausible mechanisms." (H. I. Kohn: I concur with the general intent of this remark.)

•See statement 1-36, by J. P. Holdren, Appendix A.

These recommendations agree substantially with those of the American Physical Society's "Report to the American Physical Society by the Study Group on Nuclear Fuel Cycles and Waste Management."<sup>20</sup>

Putting these recommendations into effect may involve serious political difficulty.\* Most states and communities would like nuclear wastes to be disposed of elsewhere, and some have imposed virtual bans on waste treatment and other fuel cycle operations. This raises important legal and constitutional questions about the limitations of federal power to overrule state and municipal land-use laws. This committee did not consider itself competent to judge these issues.

#### Public Appraisal of Nuclear Power

The principal sources of public concern with nuclear power are not merely technical, but institutional and social as well. Questions about technical approaches to proliferation control, reactor safety, and waste management are largely expressions of concern about whether human beings and institutions can be relied on over the long term to manage radioactive wastes, ensure reactor safety, and secure weapons-usable material.

The accident at the Three Mile Island plant in Pennsylvania has heightened this concern. It occurred late in this committee's deliberations, and it is still too early for final judgments in detail. However, what the committee has learned about it thus far has not led it to change its assessment of the physical risks of nuclear power; chapter 9, in the section on the health impacts of energy production and use, discusses this event and its likely impact on human health (which is very small). Public opinion of the accident and its implications, however, is vital, and it is probably too early to know how that will be expressed. Major studies of the accident and its consequences are underway

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\*Statement 1-37, by L. F. Lischer: True. But I would state the waste disposal issue thus: It is not a technical problem, it is a political problem.

\*Statement 1-38, by H. I. Kohn: The adjective "small" is incorrect. Substitute "negligible."

throughout the world; notable in this country are an investigation by a specially appointed Presidential commission and one by the Electric Power Research Institute's newly formed Nuclear Safety Analysis Center. The Nuclear Regulatory Commission, in reaction to the accident, may impose additional safety requirements on nuclear reactors.

Other aspects of the appraisal of nuclear power reflect individual views of the social impacts of this technology. Nuclear power, for example, has become for some a symbol of large-scale, centralized technology over which citizens have surrendered control to experts who cannot be held accountable. Some feel that nuclear power, and particularly the breeder, promotes the continuation of a high-growth materialistic society that will ultimately prove disastrous to the physical and social environment. Some see nuclear power as competing for capital resources with energy systems that are more subject to local control, and thus excluding patterns of social organization that are based on such local autonomy. Many\* fear that the level of social discipline necessary for adequate management and safeguarding of nuclear power will prove incompatible with democratic institutions and will erode civil liberties. They point to the growth of alienation, terrorism, and crime and to the associated vulnerability of centralized sociotechnical systems.

Others, of course, see nuclear power as essential if people are to have enough energy to meet basic needs, live in reasonable comfort, and look forward to improving their own lives and those of their children and the underprivileged. It is clear that even in controversies over technical issues, judgments are influenced by the social and institutional values of the individuals involved. The greater the technical uncertainties, the more room there is for interpreting whatever knowledge exists to support one's subjective preferences. Not uncommonly, decisions among technological options will have to be reached--if only in the form of postponements of action--before the technical uncertainties can be fully resolved. To a great extent,

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\*Statement 1-39, by H. I. Kohn: "Some" is a better estimate than "many."

See statement 1-40, by B. I. Spinrad, H. Brooks, and D. J. Rose, Appendix A.

therefore, technical questions as well as social and institutional ones will be decided by political processes.\*

#### INDEFINITELY SUSTAINABLE ENERGY SOURCES

Four energy sources--nuclear fission with breeding, solar energy in various forms, controlled thermonuclear fusion, and geothermal energy--offer the potential for indefinitely sustainable energy supply. That is, each could supply up to 10 times our present energy requirements for thousands of years (or much more). They differ widely in their readiness for use, in their probable side effects, and in their economics. Present knowledge is insufficient for meaningful economic comparisons and permits only limited comparisons by other criteria, such as environmental and safety risks or the likelihood of successful technical development. The degree of risk associated with a technology often depends on details of engineering design and on compromises between safety and economics that cannot be foreseen until the technology has been translated into full-scale designs with considerable practical operating experience to back up assessments of component reliability and the like. A technology in the conceptual stage often appears less risky than it will after the practical engineering questions have been faced.

The government's program in long-term energy supply, to allow realistic choices of long-term options, should include sustained research and development of many of these technologies. Priorities at this stage should depend more on the likelihood of significant technical progress than on economic comparisons among existing versions. New technical developments and changes in resource economics are likely to alter comparative cost assessments radically. Furthermore, a combination of long-term sources is likely to offer more flexibility and overall reliability than dependence on a

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\*Statement 1-41, by H. I. Kohn: To assist these processes, the widespread dissemination of factual information must be promoted.

\*See statement 1-42, by L. F. Lischer, H. Brooks, and D. J. Rose, Appendix A.

single system. The ultimate total cost of deploying a new energy technology on a broad scale is so much larger than the research and development costs that maintaining an array of options in the development stage is fully justified. A cost advantage of a few percent in a deployed system would easily pay for all the research and development that produced it.

### The Breeder Reactor

The breeder reactor, in the form of the liquid-metal fast breeder reactor, has benefited from a sustained and relatively large federally financed research and development effort. It is also the choice of several other countries, including the United Kingdom, France, West Germany, the U.S.S.R., and Japan, all of which have large LMFBR development programs. Worldwide, about 3.8 GWe of LMFBR capacity is under construction or on order. Given the present state of breeder development worldwide, construction of a commercial breeder could begin somewhere in the world within 10 years, provided there are no unexpected technical developments or insurmountable political obstacles. Significant capacity could be in place by the year 2000. This will probably not take place first in the United States because this country has more energy options than most other countries, but it is not technically impossible. However, there are technical uncertainties related to reactor safety, capital costs, and fuel cycle safeguards that could still seriously delay the program.

Other types of breeder reactors, such as the gas-cooled fast breeder reactor (GCFBR) and the molten-salt breeder reactor (MSBR), are in much earlier stages of development but have some potentially attractive features (described in chapter 5). If the LMFBR is pursued vigorously and successfully and is required relatively soon, the other types of breeder may never be brought to the point at which they can compete. On the other hand, if breeders turn out not to be required early, these other types could prove to be realistic alternatives by the time a breeder is needed and might be superior to LMFBR's on a number of technical grounds.\*

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\*See statement 1-43, by B. I. Spinrad, H. Brooks, and L. F. Lischer, Appendix A.

## Solar Energy

In the long term, it should be possible for solar energy to provide each of the energy forms used by people: heat, electricity, and fuels.<sup>21</sup> In the near term, outside of hydroelectric power--included by convention with solar energy--only certain heating applications are economical.\*

Assessing the long-term potential of solar energy will require an extended period of research and development. A major issue for national solar energy policy is the balance of research and development effort among the variety of solar technologies. The federal solar energy program emphasizes technologies for producing electricity, but the most important use of solar energy in the long-term future may in fact be the synthesis of fluid fuels, which could solve the problem of energy storage and make good use of the existing distribution system developed for gas and oil.

### Direct Thermal Use of Solar Energy

Technologies for the direct use of solar heat are in general the most nearly economical today. Some of the methods--domestic space heating, domestic hot water heating, and production of hot water or low-pressure steam for industrial and agricultural processes--can be considered fairly well developed; they are among the most probable candidates for widespread commercialization in the intermediate term. Efficient and economical solar cooling remains a difficult problem.

The direct applications of solar thermal energy are generally more costly than conventional alternatives, Btu for Btu, and even more costly in terms of the initial investments in complete heating and cooling systems. (For a discussion of the economics of such systems see chapter 6 under the heading "Direct Use of Solar Heat.") It can be argued, however, that conventional economics do not reflect the full comparative advantage of solar applications when social costs are taken into account. Savings in imported oil may have a moderating effect on the rise of world oil prices which could

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\*Statement 1-44, by J. P. Holdren: Biomass (as crop, timber, and municipal wastes) is economical today for process steam and electricity generation in some U.S. localities.

generate savings elsewhere in the U.S. economy, more than offsetting the extra initial cost of solar installations. The risks of solar energy appear to be generally less than those of other energy sources, and public confidence in solar energy is strong; public controversy (which is costly in itself) can thus be avoided in deploying these technologies. These advantages strengthen the case for introducing government incentives to induce consumers to select solar systems in preference to conventional alternatives. Such measures would help solar heating for buildings and industrial processes to gain a significant market share earlier than it would otherwise. Such incentives are already widely incorporated in federal and state programs. Unfortunately, there is no agreed upon calculus by which to estimate the market penetration likely with any given level of subsidy, or with which to quantify the benefits to society of substituting solar energy for otherwise cheaper alternatives.

#### Solar-Generated Electricity

The amount of electricity that could in principle be generated by solar energy could more than provide for present demand. The main obstacle is cost; unless major technical breakthroughs occur, solar electricity will be expensive compared to alternatives. Four concepts under active development for generating electric power from solar radiation are: photovoltaic conversion (with so-called solar cells); solar thermal conversion, which involves concentrating sunshine to achieve high-temperature heat; wind power; and ocean thermal energy conversion, which would use floating power stations to exploit the temperature difference between the ocean's surface and subsurface waters to run heat engines.

Photovoltaic Conversion Photovoltaic conversion is a commercial technology used in space and in remote installations where performance, rather than cost, is the principal concern. Photovoltaic arrays have demonstrated adequate efficiency and reliability but at high costs--more than 20 times the prevailing cost of residential electricity. Costs have been coming down rapidly, however, and a number of unanticipated technical improvements have occurred. The economic outlook for photovoltaics is considerably more favorable than it was a few years ago. There is some debate about how the necessary additional cost reductions might best

be achieved--through mass production of present technology with evolutionary improvements, or through a breakthrough in materials and device configurations resulting from exploratory research. Unlike solar thermal conversion, this is a field in which fundamental research could yield dramatic returns, and recent technical progress has been very rapid. Given the high stakes in solar energy and the long-term nature of its potential benefits, the present investment in exploratory research for photovoltaics is still inadequate, though recently much improved. CONAES is in agreement with the general assessment provided in the recent study of photovoltaics by the American Physical Society, which suggests that market penetration is unlikely to exceed 1 percent before the year 2000, and advocates the exploratory development approach in preference to the mass-production strategy.<sup>22</sup>

Solar Thermal Conversion The most heavily financed system for generating electricity with thermal energy from the sun is the solar tower concept, with arrays of mirrors focusing sunlight on a boiler at the top of a tower. Although this concept appears technically feasible, there is insufficient information for reliable cost estimates. Projected costs appear to lie in the range of 5-10 times the current bus-bar cost of electricity if storage costs are included. Because so much of the cost is embodied in structural materials such as concrete and steel, which represent well-developed technologies for which large cost reductions are unlikely, reducing costs will be difficult. A 10-MWe pilot plant is being constructed in Barstow, California. Photovoltaic conversion probably offers greater long-term promise and potential for improvement.\*

Wind Power Wind generators constitute a form of solar energy that is already economic for a few sites and markets. However, integration of this highly variable power source into utility grids could increase total generating costs if a great deal of backup capacity were required. When used in small amounts, however, wind generators can save fuel without requiring additional capacity. Economic uses might be found in utility districts that have a high proportion of

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\*Statement 1-45, by J. P. Holdren: So do solar pond collectors driving low-temperature heat engines.

hydroelectric generating capacity, or extensive pumped hydroelectric storage, either of which could accommodate the variations in wind power output.

Sites for wind generation are limited by wind conditions and scenic considerations. The amount of land required per unit of electrical capacity is much larger than for most other forms of solar energy (although land used for wind generation is of course not completely excluded from other uses). Interference with communications can also be a problem, because television and microwave signals are reflected by the moving surfaces of wind turbines. A major environmental impact is likely to be from access roads for maintenance and construction and from electrical interconnections of numerous units.

The most immediate prospect for wind technology would be to develop a diversified design and manufacturing effort directed generally at machines with generating capacities of about 1 megawatt (electric) (MWe). The market potential is likely to be highly differentiated and, relative to total domestic energy demand, modest. Experience with the problems of integrating wind-generating capacity into the existing electric grid could be a valuable by-product, applicable to other solar electric technologies as they become available.

Ocean Thermal Conversion Another system of solar electricity generation is ocean thermal energy conversion (OTEC), a technology that would exploit temperature differences between surface and deep ocean water in the tropics to generate electricity at very low thermodynamic efficiency (1-3 percent). Its attractive aspect is that it would not require storage technology and thus could be directly usable for base loads. OTEC may be technically feasible, but there is not yet a basis for choice among proposed designs. Lack of knowledge and inadequate research on problems of fouling of the very large heat-transfer surfaces by marine organisms are among the uncertainties in the present program. There are also serious questions about climatic and ecological effects if OTEC stations were deployed on a scale sufficient to supply an appreciable fraction (say 10 percent) of domestic energy requirements.

#### Fluid Fuels

In the long term, whatever mix of sustainable energy sources is used will have to provide a large supply of fluid fuels.

for applications (such as transportation) that are most easily served today by oil and natural gas. The production of fluid fuels from solar energy represents a very large and promising field for basic research. Such a process would obviate the need for auxiliary energy storage, and at the same time provide fuel for the nation's existing distribution networks as natural fuels are depleted. This could provide an easier transition to the ultimate long-term energy system than a program that emphasizes electricity production alone. The federal solar energy program gives too little attention to the production of fluid fuels.

For the long term, the most attractive potential solar energy alternative for the production of fluid fuels is probably direct photochemical conversion. For example, this might involve decomposition of water to produce hydrogen, which can be used directly as a fuel or in synthesizing hydrocarbon fuels from various sources of carbon, including  $\text{CO}_2$  from the atmosphere.

Theoretical calculations indicate the possibility of photochemical conversion efficiencies of 20-30 percent, based on incident solar energy, compared to an average photosynthetic efficiency of 0.1 percent for natural ecosystems, and up to 1.0 percent for "energy farms." A level of fluid fuels approximately equal to present consumption of oil and gas (55 quads) could be provided by efficient photochemical conversion from the solar energy falling on about 50,000  $\text{km}^2$ , or about 1 percent of the land area of the United States. However, it must be emphasized that research on solar fuel production is at a much earlier stage than other solar energy research. There does not yet exist even a promising laboratory system worth scaling up to an engineering experiment. Thus, barring unexpected developments in fundamental research in the near future, the production of fuels from solar energy is probably much further in the future than even such sophisticated technologies as photovoltaics.

The production of fuels from biomass, a form of solar energy, also has promise in the relatively near term. CONAES has estimated that a total of 5 quads might be produced from organic municipal and agricultural wastes, from plants grown on otherwise useless land, and from seaweed. This would not be an inconsiderable contribution. Beyond this, the growth of biomass in land-based energy farms would use land that would require fertilization and irrigation for high, sustainable yields, and would compete for land and other inputs that could be devoted to uses of higher value, such as

growing food. The ecological costs of such a development would be high and would rise rapidly as production requirements increased, at least in the United States. (Marine energy farming could have none of these problems. Not enough is yet known, however, to assess the potential magnitude of its contribution.)

#### Some Institutional Issues

A problem for many solar energy alternatives is finding ways to introduce decentralized technology into a centralized network without disrupting the economics and reliability of the network. This problem could be reduced by the development of cheap and effective energy storage systems to absorb excess energy and release it when needed.

An important institutional issue is the degree to which regulation, taxation, and subsidies should be designed to encourage market penetration of solar technologies that are uneconomic under existing circumstances. An argument in favor of this is that the social costs of solar energy are sufficiently less than those of other energy forms so that its higher economic costs should either be offset by taxes on other energy forms that are potentially more damaging to the environment, or borne in part by special government subsidies or tax benefits.\*

The Solar Resource Group of CONAES concluded that solar energy technologies could contribute substantially to the national energy system by 2010 if there were purposeful governmental intervention in the energy market. However, with energy prices in the range considered by the CONAES study, market penetration by solar energy (apart from biomass and hydroelectric) would be only a few quads up to 2010. One scenario was explored to see how quickly solar energy could be introduced if tax policies and economic incentives were introduced to encourage its adoption in preference to other energy forms, regardless of cost. (See chapters 6 and 11.) Under these conditions, solar technologies might provide as much as 25-30 quads of total energy needs by 2010, but the total price (at today's costs) could be enormous, running to

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\*See statement 1-46, by B. I. Spinrad, Appendix A.

a cumulative total of several trillion dollars--2-3 times the cost of alternatives. These costs, of course, can be expected in the future to change relative to those of alternatives.

The following are the committee's main conclusions and recommendations.

1. The aim of the government's solar energy program should be to place the nation in the best possible position to make realistic choices among solar and other possible long-term options when choices become necessary. This requires continuing support of research and development of many solar technologies. Comparisons of the present costs of various solar technologies and other long-term technologies should not be regarded as critical at the present stage of development. Of more importance is the potential for significant technical advances.

2. In the intermediate-term future, the direct use of solar heat can contribute significantly to the nation's energy system. Solar heating technologies should be viewed, along with many conservation measures, as means of reducing domestic use of exhaustible resources. The role of the government program should be to support the development and assist the implementation of the most cost-effective solar techniques, used wisely in combination with energy conservation. In particular, the government should stimulate the integration of solar heating into energy-conserving architectural design in both residential and commercial construction through support and incentives for passive solar design. Since all solar energy technologies are capital intensive, uses that are distributed throughout the year, such as domestic water heating and low-temperature industrial process heating, are likely to be economically competitive earlier than uses for which there are large seasonal variations in demand.

3. Under present market conditions, solar heating systems are usually not competitive with other available technologies, and therefore market forces alone will bring about little use of solar energy by 2010--probably less than 6 quads even if average energy prices quadruple.<sup>23</sup> Nevertheless, important social benefits would accrue from the early implementation of these systems: they would contribute to the nation's conservation program, they are environmentally fairly benign, and they would increase the diversity of the domestic energy supply system and its

resilience against interruption. National policy should stimulate the early use of solar energy by intervening in the energy market with subsidies and other incentives.

4. Many solar energy applications require long-term development, and these technologies should properly be compared with breeder reactors or fusion. It would be unfortunate if alternatives to the breeder were rejected because too little is known about them today to count on them. It would also be wrong to assume that the choice will or should fall on a single long-term option. Diversity in the nation's long-term sources can provide valuable resilience in the face of interruptions in the supply of a single fuel or technology. Decisions that restrict the variety of our long-term options should be deferred as long as possible.

5. The cost picture for a number of solar technologies is likely to change radically in the future, with successes and failures in development. Competing technologies will display parallel trends. The costs of many factors of production are likely to change, affecting various technologies differently. In most cases, the economics of solar energy depend critically on advances in ancillary technologies, such as energy storage. It is important that the benefits of these ancillary developments be assessed for other energy technologies on the same basis as for solar, however. For example, cheap energy storage systems would benefit the economics of all systems containing capital-intensive generating technologies.

Large-scale government demonstrations of long-term solar technologies, such as the planned demonstration of a solar thermal central station power plant, could be counterproductive if undertaken prematurely. Such projects may suggest (possibly incorrectly) that the technologies could never become economically competitive, whereas waiting for additional technical developments\* could result in a considerably more favorable outlook.

6. An imbalance exists in the federal solar energy program in favor of technologies to produce electricity at the expense of those to produce fuels. Much more attention should be given to the development of long-term solar technologies for fuels production, although there is at

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\*See statement 1-47, by L. F. Lischer, Appendix A.

present no prime candidate besides biomass production (which is limited by ecological considerations).\*

7. The diversity of solar technologies is so great that it is difficult to make decisions among alternatives in a centralized way. To a great extent, the actual choice of which solar technologies to deploy should be made in as decentralized a manner as possible. In other words, the decisions should be left to private industry and individual consumers. The government's role should be development of a broad scientific and technological base in support of solar energy (much as it did for nuclear energy prior to 1960 and for aeronautics after World War I), and provision of economic incentives that favor solar alternatives.

### Geothermal Energy

Sources of geothermal energy include crustal rocks, sediments, volcanic deposits, water, and steam and other gases at usably high temperatures that are accessible from the earth's surface. These sources of the earth's heat are not indefinitely sustainable in the same sense as solar energy. However, their total energy is sufficiently large that their potential as an energy source will depend mainly on their economic producibility, not on resource considerations.

At present, the only usable geothermal resources are deposits of hot water or natural steam. In the long-term future, it may be possible to extract heat from the natural thermal gradient in the earth's crust and from unusually hot rock formations lying close to the earth's crust. As there is no demonstrated technology for using these resources, cost and producibility can be only grossly estimated. The use of dry rock depends on developing a fracture system large enough to be economical as a source of heat. The possibilities of achieving this, and the environmental effects of doing so, are speculative.

The only widespread potential geothermal resource, the natural thermal gradient, is the most speculative in

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\*Statement 1-48, by R. H. Cannon, Jr.: Marine biomass, producing methane gas in situ, does not have the inherent ecological problems (or the nutrient supply problems) of land biomass referred to here.

practical exploitability. As an indefinitely sustainable source, it also suffers the inherent disadvantage that the normal heat flux from the inside of the earth is only about one thousandth the solar energy flux falling on the same area.

One potentially large source of rather low-temperature geothermal energy is the geopressured brines of the Gulf Coast. These brines may also hold very large amounts of dissolved natural gas. If the heat and gas can be exploited simultaneously, this might be an attractive resource. Too little is known about it today. Considerable effort is justified in assessing its potential.

### Controlled Thermonuclear Fusion

As a potential source of electricity, nuclear fusion makes use of deuterium--widely found in ocean water. These resources are at least equal to those upon which fission breeders depend. (However, the most likely practical fusion system will use the deuterium-tritium reaction; this requires a source of tritium, which in turn depends on lithium--which is nowhere near so abundant--as a raw material.)

Despite many hundreds of millions of dollars spent on research in its basic science and technology, fusion has yet to be demonstrated as technically feasible. There is rising optimism that a scientific demonstration will be made within the next 5 years. Until that time, little can be said about the engineering or economic feasibility of fusion as a source of power.

There are several proposed reactor configurations, and the first to demonstrate scientific feasibility may not be the most appropriate to carry forward into engineering development. For this reason, it is much too early in the development of fusion to select any single approach. The federal program should continue work on alternative approaches to plasma confinement science before attempting to move to experiments on the scale of pilot plants.

Although fusion has some of the same problems as fission, the problem of radioactive waste management is probably less severe. (The radioactive tritium fuel can pose an occupational health problem but not a waste disposal problem.) The problems associated with commercial traffic in weapons-usable fissile materials are largely absent. However, present fusion devices are prolific sources of

neutrons and, if surrounded by a natural uranium blanket, could be used to manufacture plutonium and  $^{233}\text{U}$  for weapons (or, of course, for use in fission reactors). There is general agreement that this is one of the more difficult ways of acquiring weapons-usable material and that the risk of proliferation from fusion power is not comparable to that associated with fission power. Inertial confinement approaches to fusion, though, may have an additional proliferation liability, since they may tend to spread technical insights relevant to the design of fusion weapons. The radioactivity produced in fusion devices could be from 10 to several hundred times smaller than that from fission (depending on the choice of materials), and the troublesome problem of alpha-active actinides is avoided.

Nuclear fusion is not a technology of the twentieth century and has not reached a stage of development at which it can be counted on even as a "dark horse" in meeting future energy requirements. On the other hand, the resource base is so large, and the prospects for fewer environmental, proliferation, or safety problems than with fission breeders so promising, that we must not drop it. We cannot afford to lose the momentum that has been gained through several decades of increasingly well-coordinated international research. We have not gone into a great deal of technical detail or assessment of the fusion program because it does not promise to serve as a source of energy within the period considered by this study.

The following are the committee's main conclusions and recommendations.

1. Although the development of nuclear fusion faces considerable uncertainties, it should be pursued, and reevaluated in 5 years. By that time, large scientific break-even experiments in both magnetic and inertial confinement will have been attempted. More realistic engineering designs and guidance for further research on technological obstacles should then emerge naturally.
2. Principal attention should be directed first to the problems of pure fusion reactors, before the question of fusion-fission hybrids is considered.
3. The immature state of fusion research and development offers the opportunity to give attention to environmental and safety characteristics in the earliest stages of design. Consideration of these characteristics is so important to decisions on major investments in fusion that the opportunity must not be wasted.

4. A small effort should be directed to fuel cycles other than deuterium-tritium. Pure deuterium has a much lower reaction rate, but it presents no critical tritium-regeneration problem and wreaks less structural damage from high-energy neutrons. In the so-called neutronless fuel cycles, all particles and products are electrically charged, and in theory there is no radioactivity. Smaller devices might be built, but the required plasma temperatures are much higher, and the energy balance is probably unfavorable.

5. High priority should be given to study and testing of structural materials, and assessments of their availability must be undertaken.

6. Research and development in nuclear fusion has enjoyed singularly fruitful international cooperation. This cooperation should be encouraged and extended to speed progress and reduce the cost to each individual country.

#### RISKS OF ENERGY SYSTEMS

All energy systems entail risks to the environment and to the health and welfare of people. It is difficult to compare such risks quantitatively, however, because our information about them is subject to great uncertainties, and because there is no widely accepted common scale of measurement for aggregating or comparing different kinds of risks and adverse effects. Furthermore, especially with centralized energy production and distribution systems, risks and benefits are not shared equally; the person who receives the benefit generally does not suffer the risk. Obviously, there are important distributional issues that complicate the weighing of risks against benefits and make social decisions about acceptable risk more difficult. There are also differences of opinion on the relative valuation of statistical and catastrophic fatalities, and of value judgments about risks to the environment--particularly to natural ecosystems, where adverse effects on human beings are less obvious and immediate than threats to health and safety.

There is danger that quantitative estimates of risks will be interpreted too literally and that their apparent definiteness will tend to outweigh qualitative and esthetic considerations. Still, it is difficult to reach and articulate meaningful conclusions without using quantitative values. It is important to realize, though, that value judgments expressed as political preferences may often

predominate over quantitative technical judgments in decisions about energy systems and strategies.

Three bases for comparison of energy-related risks have been used.

1. Energy-related risks of a given kind have been compared with risks arising from background effects of the same kind; for example, the risks of cancer from the emissions of nuclear power plants can be compared to the average risk of cancer in the general population or the hypothetically estimated cancer risk associated with exposure to natural background radiation.

2. Cross comparisons have been made among alternative energy technologies, systems, or strategies with respect to similar kinds of risks; for example, comparison of the relative risks to ecosystems from coal combustion and hydropower.

3. Energy-related risks have been compared to more familiar risks; for example, fatalities from nuclear reactor accidents could be compared to fatalities from commercial airline accidents.

There are difficulties with each of these bases for comparison. In comparing energy-related risks to background effects of the same kind, the way that quantitative results are presented--in absolute or percentage terms--can influence public perception of the risk involved. If the additional risk from a particular source is very small percentagewise and the exposed population is very large, then the absolute number of deaths attributed to the source can be very large indeed, though it may constitute an infinitesimal fraction of the deaths that would have occurred anyway.

In comparing risks from different technologies, the difficulty stems from the value judgments needed in weighing the different kinds of risks. How should fatalities be compared with injury or sickness? How should immediate deaths from catastrophic events be compared to similar numbers of deaths occurring much later or in future populations? People may place quite different values on these different kinds of adverse effects, and these values may change with time.

Another problem is that the same risk is not equally acceptable under all circumstances. People accept familiar risks, such as those associated with the automobile, cigaret smoking, and industrial accidents, yet reject much smaller risks associated with new technologies. The voluntariness of

risk is also important; those who voluntarily accept high risks, such as those of motorcycles or contact sports, may strongly object to the minute involuntary risk of a nearby chemical factory. Finally, the risks of an activity that provides a unique benefit--as does, for example, the automobile--are more acceptable than the risks of a technology to which there appears to be alternatives.

A general problem that arises in connection with almost all risk assessments is the significance of dose-effect relationships at very low doses, for both radiation and chemicals. The conservative assumption of a linear dose-effect relation down to zero dose leads to very large estimates of incremental threats to large populations, but such extrapolations are very uncertain. They are likely to be overestimates, but the extent of the overestimate is unknown.

One way around the problem of low-level radiation is to compare the radiation dose with that from natural background radiation. Although the effect of neither is known, one can say that a radiation dose of, say, 1 percent of the background will have an effect, if any, that is a tiny fraction of the effect of a radiation dose that the human species has experienced throughout its history. Unfortunately, no such comparison is possible with most chemical hazards.

In this study, comparison of energy-related risks to nonenergy risks was generally avoided, because it was believed to have little pertinence to energy policy decisions.\* The first two of the above-listed three approaches to risk comparison were followed, with emphasis whenever feasible on the comparison of similar types of risks from different energy technologies and strategies.

#### Routine Industrial Accidents and Disease

Accidents are the most accurately assessed of energy-related risks. In this regard, coal is the most dangerous of major

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\*See statement 1-49, by L. F. Lischer, Appendix A.

See statement 1-50, by B. I. Spinrad, H. Brooks, L. F. Lischer, and D. J. Rose, Appendix A.

energy sources: About 10 times as many accidental deaths occur in the coal energy cycle, from mine to power plant, as in the production of an equivalent amount of power from oil, gas, or nuclear energy. Most of the accident risk with coal is associated with deep mining and rail transportation. (The latter, of course, is not uniquely associated with coal.) The health of workers in the mines has been notoriously poor in the past and has led to special congressional legislation to provide benefits that now total more than \$1 billion/yr. A conscientious program to improve mine safety and hygiene, especially by enforcing current regulations, and to improve railroad safety could materially improve the situation. The rising percentage of surface mining in the total of production should also tend to reduce the risk of accident and disease.

#### Emissions

A great variety of pollutants that may affect human health as well as plant and animal life are released from the combustion of fossil fuels, especially coal. These include sulfur and nitrogen oxides, carbon monoxide, hydrocarbons, particulates, and heavy metals (in trace amounts). Local air pollution containing these substances at high levels and in varying proportions is known to have increased the incidence of discomfort and disease (especially of the respiratory system), and even death. The intent of the national ambient air quality standards is to render negligible the morbidity and certainly mortality (or so-called "premature death") from emissions.

Whether or not the standards have been set at the most efficient levels (adequately protective of health, but not needlessly restrictive or costly), and whether all toxic substances requiring regulation have been specified are topics under very active discussion and investigation. The standards themselves must be reviewed, by law, every 5 years and revised if necessary. Current interest centers on several pollutants: sulfur and nitrogen oxides, carbon monoxide, hydrocarbons, particulates, and heavy metals. Since the particulates (now regulated) comprise a spectrum of sizes, of which only those below 2  $\mu\text{m}$  in size can reach the lungs, it is thought that respirable particulates may be the true measure of toxicity. A standard for sulfates had been proposed in addition to the current one for sulfur dioxide. Sulfate is a constituent of the particulates, however, so

that it might be an indirect measure for them. In any event, the acidity of the atmosphere does depend on its sulfate (and nitrate) content. Hydrocarbons and heavy metals are also associated with the particulates.

In setting standards, the question of whether there are thresholds (exposure levels below which there are no significant health effects from pollutants) is important. In general, standards are based on all available evidence, including that for any type of induced discomfort, promotion or induction of disease, and possible genetic effects. As a practical matter, a level at or below which measurable effects cannot be observed must be decided on, and the standard set as a matter of judgment at some level deemed to be safe. There is good reason to believe that effects, although unmeasured, do occur at levels below those set by some standards. The Clean Air Act requires that all individuals, even those unusually sensitive, be protected; other environmental statutes may have different requirements.

In discussing air pollution emissions, one should not forget that a major cause of air pollution is the automobile, which is especially responsible for carbon monoxide, nitrogen dioxide, and hydrocarbons. From a toxicological point of view, the pollutants from the automobile may interact at the biological or chemical levels with those from stationary sources such as power plants.

Standards should be regarded as reflecting the best judgment of experts at the time they are instituted, and thus subject to change (up or down) with increases in knowledge and changes in the political and social value judgments the standards reflect. In the longer term, pollution control strategies should be reassessed with a view to including greater incentives for suppliers--incentives to achieve control beyond mere compliance. The goal should be to produce the greatest environmental improvement (measured by reduction in estimated social costs) for a given overall economic cost.\*

In comparing the effects of emissions from combustion and those from nuclear power plants, principal consequences are usually considered. First consider the induction of

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\*See statement 1-51, by L. F. Lischer and H. I. Kohn, Appendix A.

discomfort and noncancer illness (for example, that of the respiratory tract). Under routine operation there is no such risk from a nuclear plant, and there should be none, or practically none, from the fossil-fueled one. As noted above, however, current standards may not be sufficiently protective. The problem is under debate and is complicated by the role of automobile emissions.

Second, it is known that cancer deaths can be caused by ionizing radiation and also by emissions from certain coal-fueled industrial operations. One year's routine operation of a 1-GWe nuclear reactor (including its associated fuel supply operations) exposes a population of about one million persons and is estimated to induce eventually less than one cancer death (based on extrapolation from much higher doses on a linear dose-effect hypothesis). This compares with an annual cancer mortality rate of 1700 per million in the United States.

The cancer induced by 1 year's operation of the coal energy cycle has not been estimated. This is not to say that such a risk does not exist, nor to suggest that it might not be comparable to that of the nuclear system. Carcinogens are present in fossil fuel emissions, particularly those from coal combustion, but there is no information on their public health effects. In the past, under less stringent occupational standards, workers exposed to coal emissions suffered increases in cancer rates. In coal-based synthetic fuel processes, many carcinogens may arise, but with careful plant design it should be possible to attain a very low occupational risk. In the products themselves, most carcinogens will remain with the heavy residues, and synthetic gas and distillates should present little cancer risk to the general public. For residual liquid fuels, including those derived from shale, close control of emissions within plants and releases to the atmosphere will be necessary. Such heavy fuels would be used in large industrial boilers and power plants, where the necessary occupational safeguards could be applied.

Coal (especially certain lignites) contains varying concentrations of uranium, and its combustion releases radioactivity into the atmosphere.<sup>24</sup> The solid wastes from coal combustion can also be a source of radiation. These radiation effects are generally thought to be less important than those from uranium mining.

Third, too little is known about the heritable genetic effects in man of either ionizing radiation or fossil fuel

emissions to permit a comparison. Both agents have demonstrable mutagenic activity in laboratory tests. By extrapolation from such results, the Risk and Impact Panel estimated that a 1-GWe nuclear plant, for each year of its operation (with the associated fuel supply) might induce 0.5 severe genetic defects, but places little confidence in the figure. No estimate is feasible for coal.\*

#### Large-Scale Accidents and Sabotage

Risks of low-probability, high-consequence accidents are associated chiefly with nuclear reactors, hydroelectric dams, and transportation and storage of liquefied natural gas (LNG). The subject of nuclear reactor accidents has been extensively studied, especially by the Reactor Safety Study (WASH-1400),<sup>25</sup> commissioned by the Nuclear Regulatory Commission. This study concluded that over the long term, the expected health damage from nuclear accidents (treated as probability of event times consequences per event) is smaller than that from radiations emitted in routine operation. This conclusion may not be decisive in the public appraisal of nuclear power, however, because some people may have a much greater fear of very infrequent but great nuclear accidents than they have of events that cause comparable totals of illnesses and deaths spread over long periods of time.<sup>26</sup>

The committee is in general agreement with the appraisals of the reactor safety study conducted by the American Physical Society study group<sup>27</sup> and more recently by the Reactor Safety Review Group.<sup>28</sup> WASH-1400 contains some estimates that are excessively conservative and others that are almost certainly too optimistic. Which way this would shift the median probabilities for accidents of various severities is uncertain. The consequences of given accidents are apparently underestimated, but probably by not more than a factor of 3. However, the uncertainties in the probability estimates are almost surely several times larger than estimated in WASH-1400. If larger uncertainties are used, the mean, or expected number of fatalities from nuclear accidents, could be higher by a factor of 10 or more than the

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\*See statement 1-52, by H. Brooks and D. J. Rose, Appendix A.

median values given by WASH-1400 (namely, 0.025 delayed deaths per reactor-year).\*

Catastrophic accidents can also occur in the case of other energy sources, especially large hydroelectric facilities. Between 1918 and 1958, an average of 40 deaths per year resulted from dam failures in the United States, though fewer in the more recent period. Some individual failures killed hundreds. Worst-case scenarios for both dams and LNG facilities lead to numbers of casualties comparable to those associated with the more severe nuclear accident possibilities. The calculated probabilities are higher, although the analyses on which they are based have been much less thorough and systematic than those for nuclear plants.

In the case of the most likely nuclear accidents, most fatalities would be delayed deaths that could not be specifically attributed to nuclear power, due to the exposure of a large population to low-level radiation (chapter 9). Casualties from dam failures and LNG accidents are immediate, with fewer delayed effects. Because such a high proportion of the reactor-related deaths are delayed, and because large populations may be at risk (even though the enhanced risk to any individual may be small), reactor accidents may create much greater apprehension than other types of catastrophic accidents that can cause the same number of fatalities.

Nuclear plants, dams, and LNG facilities are probably similarly vulnerable to sabotage, but nuclear plants are presently better guarded and may be inherently easier to guard. The consequences of sabotage of nuclear plants appear to be in about the same range as those of the severest postulated accidents discussed in WASH-1400.\*\* The possible severe consequences could be much higher, though, because saboteurs could choose times and places for maximum effect. The safety analysis techniques developed for assessing nuclear reactor accidents ought to be applied to sabotage, diversion of weapons materials by terrorists, and other

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\*See statement 1-53, by J. P. Holdren, Appendix A.

Statement 1-54, by L. F. Lischer: Critiques of WASH-1400 have emphasized that uncertainty ranges are larger than originally stated, both higher and lower.

\*\*See statement 1-55, by L. F. Lischer, Appendix A.

safeguards issues, for both nuclear power and other energy technologies.

#### Management of Waste

All energy systems produce wastes, and their management involves risks to health. Although coal ash and coal-mining wastes pose significant problems, nuclear waste management is considerably more difficult. The committee's view of the nuclear waste problem is discussed in detail in chapters 5 and 9. The committee's conclusions and recommendations are presented under "Prospects for Nuclear Power" in this chapter.

#### Ecosystem Effects

The adverse ecological consequences of energy production and use include loss of arable land, water resources, open space, wilderness areas, natural beauty, habitat, and wild populations or species. Among the public, there is wide divergence in judgments about the relative and absolute importance of these criteria. Some value them very highly, while others regard them as less vital than a number of other human economic and social needs. This may be partly because the long-range human consequences of the loss of ecological diversity are less well understood and much less widely appreciated than the more immediate consequences of energy development, such as direct damage to health.

By the particular criteria of damage to ecosystems, the Risk and Impact Panel judged that the energy source most destructive, per unit of energy output, is hydroelectric power\* (possibly including small dams on tributaries).<sup>29</sup> Hydroelectric power installations destroy natural habitats in the vicinities of dams; change the health, productivity and ecological balance of downstream areas; and accelerate siltation and eutrophication in the lakes created by the dams. Nearly as destructive is the load-based production of biomass (i.e., growing crops on energy farms to be burned or converted into fuel). Among the adverse ecological effects

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\*See statement 1-56, by H. S. Houthakker, Appendix A.

of energy farms are land use in competition with agriculture, depletion of soil nutrients and consequent additional requirements for chemical fertilizer, and the fact that the hardy fast-growing species required for economic energy production could become widespread nuisances. So long as the use of biomass is confined to organic or agricultural wastes, or to such materials as seaweed or crops raised on wastelands, the ecological effect is minimal. It becomes a serious consideration when total use exceeds this base, and may be appreciable.<sup>30</sup> Among fossil fuels, shale oil and coal-derived synthetic fuels are probably the most damaging to ecosystems. The ecological implications of oil development depend on locale; offshore development in northern regions is especially risky.

For nuclear power, direct health effects are much more important than ecological impact. Nuclear power affects ecosystems less than any other source of energy, even if one considers the whole fuel cycle. Nevertheless, if the number of light water reactors built and operated begins to exhaust supplies of high-grade uranium ore, the environmental effects of mining very low grade ores could become comparable to those of coal mining. This problem would not, of course, develop with breeder reactors.

The adverse consequences of solar energy on ecosystems are poorly known, but for most applications are probably mild.<sup>31</sup> (Chapter 9 discusses these effects in some detail.) Significant effects, comparable to those of fossil fuels, might be encountered in extracting and processing the materials required by centralized or widespread decentralized solar installations. Large-scale use of ocean thermal conversion might pose significant hazards to marine ecosystems, owing to exchange of heat and plant nutrients between deep and shallow water strata. These possibilities of ecosystem damage would probably arise only if the technologies were employed on a sufficient scale to provide 15-30 percent of the total national demand for energy.

#### Water Supply Problems

Water is potentially a limiting factor in any plan to produce and use more coal on a large scale.<sup>32</sup> Consumption of water in the production of electricity or synthetic fuels is many times greater than in the mining of the coal itself under current practice. Per unit output, today's conventional nuclear reactors require 50 percent more water than those

burning fossil fuel; more advanced reactor designs offer the opportunity to significantly reduce water consumption, however.

We infer that a 20-quad increment in coal use for electricity production (12.5 quads) and synthetic fuels (7.5 quads) would raise water supply problems unless specific attention was devoted to solving them in advance. (The National Energy Plan of 1977 projected an 18-quad increment by 1985.) Of course, the efficiency of water use in these processes can be increased (at increased cost), now-unused sources such as brackish groundwater can be developed, and interbasin transfers might be extended. (This last may appear unlikely under general conditions of water shortage.)

On the other hand, steps can be taken to find locations where water is in fact still available, and to place increased demand at these locations, insofar as that is feasible. Study of the hydrological regions of the United States shows great disparity in the amounts of water that are potentially still available. The crucial importance of siting in relation to water supply (on both a local and regional basis) has been emphasized in the report of six national laboratories that analyzed the President's National Energy Plan of 1977.<sup>33</sup>

It is clear that regional and interregional, as well as local, hydrological analysis must become an integral part of national energy planning, not only to prevent water-supply failure, but especially to obtain optimal use of our hydrological resources. We recommend that all hydrological regions be studied and that a national data bank be established. Water resources are largely under the control of the states, with the result that they are controlled by different approaches in law that have long-established historical precedents; a national policy will be consequently very difficult to construct. The energy-water problem is, in fact, a part of a much broader one of water as a general limiting factor in the activities of society.

#### Climate

Were all the world's fossil fuel resources to be burned, the CO<sub>2</sub> content of the atmosphere would increase by a factor of between 5 and 8. If the hypothesis of a "greenhouse effect" is correct, the climatic effects would almost certainly be catastrophic.<sup>34</sup> The largest uncertainties connected with the CO<sub>2</sub> problem pertain to the timing rather than to the

existence of the problem. If the worldwide combustion of fossil fuels, particularly coal, continues to increase, the problem could begin to be perceptible as early as the first few decades of the twenty-first century, or it might not become significant until the latter part of the twenty-first century if world energy growth slows or shifts to nonfossil energy sources. Even if fossil resources were consumed at no more than the present rate, the CO<sub>2</sub> problem would eventually become important, though it might be postponed for a century. A serious concern is that, owing to various positive feedback mechanisms, climatic changes due to CO<sub>2</sub> would be irreversible by the time they were detected above natural climatic fluctuations. It needs to be emphasized that the CO<sub>2</sub> problem is global, not local or regional. It depends on the total world consumption of fossil fuels and not on what happens in a single nation, even one as large as the United States.

The climatic effects of increasing atmospheric CO<sub>2</sub> might conceivably be beneficial in some areas (for example, by lengthening the growing season in agriculturally marginal northern latitudes), but the principal effect would almost certainly be to redistribute agricultural productivity. Even with net benefits, the effects in some regions could be disastrous.\*

Solar collectors could have a global effect in the far future. If they are deployed in such a way as to alter the surface reflectivity in a sufficiently large region, they could disturb global circulation patterns and thus have climatic effects beyond the regions where they are located. Worldwide reliance on ocean thermal energy conversion could induce climatic effects by changing the average surface temperature of the tropical oceans. The possible effects of solar energy have only just begun to receive careful study.<sup>35</sup> They could be of no concern unless the use of solar energy becomes very large, and, in any case, there would be plenty of time to deal with the problem as it began to become important, provided it is not altogether overlooked.

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\*Statement 1-57, by J. P. Holdren: Even in regions where the long-term effect of CO<sub>2</sub>-induced climate change is beneficial, the short-term effects are likely to be strongly negative.

\*Statement 1-58, by H. I. Kohn: This international problem involves the automobile as well as industry. International cooperation is necessary to estimate and anticipate it.

Hydroelectric and geothermal sources are likely to have less serious climatic effects, although large-scale water impoundments and irrigation can affect regional hydrologic cycles and thermal balances.

Nuclear reactors, because they do not emit CO<sub>2</sub>, will have much smaller effects on climate than fossil-fueled installations; the effects of CO<sub>2</sub> for the balance of heat radiation are much more important globally than are thermal releases. Should considerations of diversion and proliferation lead to the deployment of breeder reactors and reprocessing facilities in "energy parks" of more than 30-GWe total capacity, however, these might alter local or regional atmospheric circulation patterns, and even generate severe artificial convective storms in particular regions, under certain meteorological conditions.

#### Sociopolitical Issues

The sociopolitical aspects of energy planning need to be much more thoroughly explored. For example, conventional analysis of the risks associated with energy systems and strategies gives relatively little emphasis to the distribution of risks and benefits, although from a sociopolitical standpoint, the distribution of these risks and benefits--from class to class and region to region--may be more significant than the net effects. For example, there is considerable disagreement about the distributional effects of certain energy conservation measures, such as various forms of "energy tax." Unevenness of distribution should not be used as an excuse to forgo conservation, but it must be analyzed so that it can be dealt with by compensatory measures.

Another sociopolitical aspect of risk is that public attitudes to risks often have symbolic and institutional dimensions that relate more to confidence in the institutions that manage the technologies than to the characteristics of the technologies themselves. This is exemplified by the wide difference in attitudes toward nuclear and solar energy. To some, nuclear power symbolizes big government, big business, and an impersonal, centralized bureaucracy unresponsive to local needs and sentiments, while solar energy represents a "natural" form of energy that can be controlled by average citizens. To others, mandated conservation measures require an intrusion of government in consumer decisions that is regarded as intolerable. Decentralized solar technologies, if deployed on a scale sufficient to provide a significant

fraction of national energy needs, will require a large-scale mass production, distribution, and service industry that might not look so different from existing electric- and fuel-distribution networks. How such attitudes are likely to develop over time, or be affected by the dialog between the public and various groups of experts, is difficult to assess.

A conclusion reached in many parts of the study is that noneconomic factors will play an important, often dominant, role in influencing future energy demand and supply. Life-style, value, and welfare implications may strongly influence energy consumption patterns, and political acceptability will affect both the availability of energy resources and the conservation of energy.

Insufficient systematic attention has been given to the risks and potential consequences of energy shortages and to the vulnerability of different overall energy regimes to unexpected interruptions. Because of their importance to policy, these aspects need much more systematic study and dissemination of information to the public.

#### Some General Conclusions on Risk

##### Conservation

For the most part, conservation is the least risky energy strategy from the standpoint of direct effects on the environment and public health. The main reason that conservation cannot be the only strategy is that at some level of application, conservation would give rise to indirect socioeconomic and political effects, mostly through economic adversity, that would predominate over its direct benefits. We cannot be sure where that point is, but all the CONAES technical analyses suggest that it is a long way from where we are now, possibly at an energy/GNP ratio of about half its present values, given several decades for adjustment. The maximum conservation achievable without adverse socioeconomic effects will likely have health and environmental benefits and therefore should have highest priority in policies to reduce the risks of energy systems.

##### Fossil Fuels

Among fossil fuels, natural gas presents the smallest health and environmental risks in both production and consumption,

although there is the possibility of serious accidents in the transportation and storage of liquefied natural gas. Oil is next, and coal is much higher in risk. This ranking is likely to persist, although the gap may narrow with improvements in technology. Research is most urgently needed on the health effects of coal combustion by utilities and industry, and on the possible occupational and public health hazards of producing and using synthetic fuels.

We must be prepared for the possibility that adverse health effects, global CO<sub>2</sub> increase and associated climatic change, freshwater supply problems, and ecological considerations will eventually severely restrict continuing expansion of coal use. These problems are likely, though not certain, to become critical at about 3 times current coal output, or less.

#### Nuclear Power

The routine risks of nuclear power include the induction of cancer and genetic effects by ionizing radiation released throughout the nuclear energy cycle. These risks are very small in comparison to the overall incidence of cancer and genetic effects in the general population, and they could be significantly smaller yet if the most important source of radiation in the nuclear energy cycle--uranium mill tailings--were generally better protected. There are also risks of severe accidents, whose probabilities have been estimated with a great deal of uncertainty, but whose severities could be comparable to those of large dam failures and liquefied natural gas storage system fires. There are also risks from the disposal of radioactive waste; these are less than those of the other parts of the nuclear energy cycle, but only if appropriate action is taken to find suitable long-term disposal sites and methods.

It should be clear from the earlier general discussion of risk comparisons that any ranking of the risks of technologies as disparate as coal-fired and nuclear electricity generation is subject to very broad, and in some cases irreducible, uncertainties. However, if one takes all health effects into account (including mining and transportation accidents and the estimated expectations from nuclear accidents), the health effects of coal production and use appear to be a good deal greater than those of the nuclear energy cycle. If one takes the most optimistic view of the health effects of coal-derived air pollution and the

most pessimistic view of the risk of nuclear accidents, though, coal might have a small advantage in such a comparison.\*

Nuclear power is associated also with risks of nuclear weapons proliferation and terrorism, but the magnitude of these risks (and even whether nuclear power increases or decreases the risks) cannot be assessed in terms of probabilities and consequences.

### Solar Energy

Several solar energy technologies appear very promising from the standpoint of health and environmental risk. Hydroelectric power (classed by convention with solar energy), however, while benign with regard to air pollution, is quite destructive of ecosystems per unit of output. Energy farms are also likely to be ecologically destructive if deployed on a scale large enough to provide more than a few percent of total energy needs. For most solar technologies, the main risks are those associated with extracting and processing the requisite large amounts of construction materials.

### Public Appraisal of Energy Systems

There is an urgent need for research that will contribute to better understanding of the factors that determine public perceptions of the health and environmental risks of energy systems, and their acceptance by different subgroups within the public. No strategy for risk reduction in energy systems can be fully acceptable if it does not take into account these public perceptions and judgments, even when they are seen as irrational by experts.\*\* It is unlikely that the appraisal of risk will ever be able to avoid difficult relative value judgments between different kinds of risks, as

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\*See statement 1-59, by J. P. Holdren, Appendix A.

See statement 1-60, by H. I. Kohn and H. Brooks, Appendix A.

\*\*See statement 1-61, by H. Brooks, D. J. Rose, and B. I. Spinrad, Appendix A.

well as between risks and economic or other benefits of energy technologies. This is not to say that present methods of risk assessment cannot be improved. Nevertheless, the judgmental factor will continue to predominate in decisions among energy alternatives, and is unlikely ever to be superseded by formal analysis of risks and benefits. This underscores the importance of an informed and open public debate.

#### INTERNATIONAL ASPECTS OF THE ENERGY PROBLEM

The energy situation of the United States is materially different from those of most other noncommunist industrial countries. The U.S. per capita energy consumption and energy/GNP ratio are, respectively, 2 and 1-1/2 times the average for the rest of the Organization for Economic Cooperation and Development. The potential for conservation through greater efficiency is thus greater in the United States than in most other countries. Our indigenous energy resources are at the same time much greater. A world perspective obviously differs considerably from that of a purely domestic standpoint.

The committee has not undertaken the formidable task of making long-range projections of world energy markets consistent with the domestic scenarios used in chapters 2 and 11. It has drawn a few conclusions on global energy perspectives by assuming that the United States takes no new policy measures beyond those in effect in 1978, other than allowing existing price controls to expire. We shall discuss the effects of various national policies to ameliorate the impact of the United States on the world energy situation in the context of these conclusions.

In lieu of a formal presentation of alternative global projections, we confine ourselves to a few general remarks on global energy perspectives.<sup>36</sup>

1. The growth of world energy consumption will slow from the 5.1 percent per year recorded in 1960-1973. However, if present patterns of economic growth in the world continue, and if the aspirations of the developing countries for larger shares of economic activity are realized, the average long-term rate of energy demand growth is unlikely to fall much below 3 percent per year. Even if energy conservation in the United States accomplishes a great deal domestically, it will

be more than offset by demand growth in countries at the "takeoff" stage of development. By the year 2010, world energy consumption will probably be 3 or 4 times as large as it is now. The developing countries will then have a larger share in world energy consumption than they have at present.

2. Electricity demand will probably grow more rapidly than total energy demand for two reasons. First, a large part of electricity cost is due to capital charges, and this will become more true as more capital-intensive forms of electricity generation, particularly nuclear reactors, are introduced. This means that electricity prices are less sensitive to fuel costs. If primary fuel costs rise more than capital costs, electricity would become cheaper relative to other energy forms.\* Second, as societies become more affluent they tend to prefer more convenient energy forms, such as electricity or gas, much as they convert more and more grain to animal protein in their food demand. By 2010 world electricity consumption could be 3-5 times as large as at present. If the market is the principal determinant of relative demand, and if there are no noneconomic constraints on the rate at which nuclear capacity can be expanded, then two thirds or more of electricity would probably be supplied by nuclear power, with coal a distant second, consumed mostly in the United States. \*\* In our view, expansion of nuclear capacity at so great a rate is unlikely. Also, a breakthrough in solar electric technology, if it came soon enough, could reduce the attractiveness of nuclear power somewhat.

3. In the absence of truly spectacular discoveries elsewhere, the OPEC countries (especially those in the Middle East and Africa) will account for the bulk of the world's oil

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\*Statement 1-62, by J. P. Holdren: The opposite situation--electricity becoming more expensive relative to other energy forms--seems to me at least as likely.

Statement 1-63, by J. P. Holdren: Coal can be expected to play a major role in the Soviet Union, in China, and in both Germanies, as well.

\*\*Statement 1-64, by H. I. Kohn and H. Brooks: There is no evidence that coal would not be important to Russia, China, and Eastern Europe, nor perhaps to importing countries.

production in the early part of the twenty-first century. In addition to North America, Europe, and East Asia, even Latin America will by then probably be a large oil importer unless the Venezuelan heavy oils are fully developed. However, North American production, though smaller than at present, will still be substantial. Cumulative oil production between now and 2010 is likely to exhaust all presently proved reserves of "conventional" oil. Because of intervening discoveries, however, oil reserves should still be at least as large as they are now, but they will be high-cost reserves.

4. The Middle East and Africa will become large exporters of natural gas and uranium; U.S., Canadian, and Australian uranium will also face a considerable export demand. The degree to which these countries will be willing to satisfy this demand with political conditions acceptable to importers is difficult to foresee.

5. As oil production gradually falls more firmly under OPEC control, the opportunity for surges in oil price like those of 1973-1974 and 1979 will increase. Moreover, as OPEC's reserves of low-cost oil are depleted, the incentives to raise prices will intensify; this would be true even in the absence of a cartel. The price of uranium, increasing at an accelerating rate as the electric power industry becomes predominantly nuclear, could approach \$100/lb of  $U_3O_8$  (in 1972 dollars) by the end of this century if reprocessing is prohibited. Even with reprocessing, the uranium price may be high enough to make breeder reactors competitive with existing reactor types in some parts of the world, especially in Europe (political events and public opinion permitting). Coal and natural gas will also become considerably more expensive in real terms.

6. Because of their predominance in oil, natural gas, and uranium, the Middle East and Africa will develop an even larger surplus in their energy trades, probably running into hundreds of billions of 1972 dollars by the turn of the century. The corresponding deficits will be primarily in the industrial countries (except Canada). U.S. invisible items of trade are now quite strong and are supporting the nation's current account. A good part of this flow represents oil company earnings in the world market; this partially offsets the high costs of oil imports. In addition, new conservation efforts, new oil finds, and a high propensity to import by OPEC help keep the U.S. external position from deteriorating too much. In the United States the energy trade deficit will

be somewhat reduced by the expected growth in exports of coal or uranium if such exports are permitted. If the United States were to limit uranium exports, there would be a correspondingly larger demand for U.S. coal. The main reason uranium would normally be preferred by importers is its lower transportation cost.

These projections do not take into account the trade in nuclear power plants and related facilities (and possibly other advanced energy technologies), which may offset a large part of the industrial nations' energy trade deficits but will add to the deficits of the non-oil-producing countries. In the absence of political constraints, worldwide investment in nuclear power between now and 2010 could add up to about one trillion 1972 dollars, and much of this will be supplied by North America, Europe, and Japan. Nonenergy exports of developing countries not members of OPEC would have to expand to finance their part of these investments.

#### Consequences of Action on National Energy Policies

Conservation in the United States, beyond what is induced by higher world oil prices, would reduce the growth of demand for OPEC oil and thus reduce the cartel's power to raise the price and limit production. The more the conservation effort concentrates on oil (or natural gas in uses where the two are directly substitutable), the greater will be the benefits to the rest of the world, although the magnitude of these benefits should not be exaggerated. Promotion of domestic energy production, especially of oil and gas and directly substitutable energy forms, would be equivalent to conservation in its external economic effects.

Price controls on oil and gas, or other measures shielding domestic consumers from world energy prices, would have effects opposite to those of accelerated conservation and domestic production; they would reinforce the pressure for a higher world oil price.

A tariff on imported oil would encourage conservation and domestic output by allowing the domestic price of oil to rise to match the landed price of imported oil (assuming price controls have expired). It would also enable the importing country to reduce the monopoly profit that would otherwise go to OPEC. A tariff would be particularly effective if adopted simultaneously by other major oil-importing countries.

Import quotas, with competitive bidding for import licenses, would similarly reduce OPEC's power over oil prices.\*

Abandoning nuclear reprocessing is likely to accelerate the rise of uranium prices. This would increase the incentives for reprocessing in uranium-importing countries. To counter this tendency, the United States (possibly in agreement with Canada and Australia), would have to keep the price of enriched uranium low enough, by subsidies if necessary, to make reprocessing uneconomic. If such a policy made a major contribution to preventing nuclear war or large-scale terrorism, the probable high cost to the United States would not be considered prohibitive. However, alternative methods of controlling proliferation (for example, international safeguards programs including international surveillance of reprocessing operations) could be cheaper and more effective, and must be explored.

Beyond all this, it must be recognized that so much attention paid to the spent-fuel end of the uranium fuel cycle tends to ignore the fact that nuclear explosives can be obtained by uranium enrichment--the so-called front end of the cycle. (See chapter 5 under the heading "Uranium Enrichment.") As years pass and new enrichment technologies appear, this front-end risk of weapons proliferation increases.

Abandonment or postponement of the breeder reactor is likely to have effects similar to the avoidance of reprocessing, raising the price of uranium, and thus strengthening the interest of other countries in the development of breeders or advanced converters. Under some plausible conditions, the United States could remain a uranium exporter through the end of this century. Hence a major delay in the domestic breeder program, rather than setting an example to others, may accelerate breeder development elsewhere, if only because it would leave less U.S. uranium available for export (or increase U.S. demand for uranium imports). In any case, European work on breeders may be too far along, and too strongly supported by energy projections, to be stopped, despite growing political opposition to nuclear power in many European countries and

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\*Statement 1-65, by L. F. Lischer and D. J. Rose: OPEC, of course, could retaliate by stopping shipments.

Japan. To the extent that public distrust of nuclear power in the industrialized countries slows its growth, the pressure on uranium supplies will decrease and the above-mentioned problems will be postponed, although the problems of the international oil market will intensify.

A slowdown in the growth of U.S. GNP would help keep down our energy demand and be similar in that respect to the accelerated conservation discussed earlier. However, it would also reduce U.S. demand for nonenergy imports and thus make it more difficult for other countries, especially poor ones, to finance their energy imports.

#### The Developing Countries and the World Financial System

As we have seen, the growing demand for energy in the developing countries will make them increasingly important in the global energy picture. Some of these countries are already considerable importers of oil, and others will become so as their transportation sectors expand. Moreover, the industrialization that is an inescapable aspect of economic development will greatly increase their reliance on electric power, of which they now have very little. Their agriculture will also shift from animal and human energy to tractors, harvesters, and trucks, and from natural to industrial fertilizers. As personal incomes rise in these countries, they will want better housing with more lighting and appliances, not to mention air conditioning. The more affluent of their citizens will demand motorcycles, automobiles, and air travel. In fact, the total demand for energy in these countries could conceivably rise faster than GNP.<sup>37</sup> Furthermore, we must hope that their GNP does rise at a reasonable rate, not only in their own interest but also for the sake of global political stability.

No doubt a substantial part of the required energy can be supplied from domestic sources. Oil and gas are found in many developing countries, but most of those with large resources have already joined OPEC. While there does not appear to be much coal in the developing countries, hydroelectricity could be expanded considerably, at ecologically acceptable sites, if financing were available. Sizeable quantities of uranium presumably remain to be discovered in some regions, but uranium (or thorium, of which

India has large reserves) is only a small part of the cost of nuclear power.\*

It is clear, therefore, that a large part of the energy needed by developing countries will have to be imported. In addition, heavy investments in electric power will be necessary even if the fuel can be obtained inside the country. Electric power, of course, is generally capital intensive, but it will be even more so if oil, gas, and coal are not available, and nuclear and hydroelectric power (or, in the more distant future, solar energy) must be used. In fact, oil is likely to be preempted by transportation uses, and in most developing countries coal would have to be imported from the United States and Australia, the countries with the greatest potentials for exports. It seems likely, therefore, that the developing countries as a whole will concentrate their investments in nuclear and hydroelectric power, at least until the end of this century, and that they will have to import increasing amounts of oil and uranium.

This prospect implies further strains in the international financial system, which is already being taxed by the aftermath of the 1973-1974 oil price increase. The developing countries generally had little leeway in their balances of payments for increased oil prices; moreover, the recession in the developed countries induced by the oil price increase had severe impacts on their export earnings. The OPEC countries on the whole did not spend much of their vast new revenue on exports from developing countries. As a result, the non-oil-producing developing countries as a group (with notable exceptions such as India) suddenly found themselves with large trade deficits whose financing continues to preoccupy the international banking community.

The difficulty is not so much that the money is not available; the OPEC surpluses remain in the world banking system and could be invested elsewhere. The problem is rather that the countries with cash surpluses (principally Saudi Arabia, Kuwait, and the United Arab Emirates) have not been willing to lend large amounts directly to the developing countries, although they have made relatively small amounts available to a few selected countries and to international

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\*Statement 1-66, by J. P. Holdren: It is unfortunate that this passage ignores the great potential of renewables other than hydroelectricity, and the potential of geothermal energy, in many developing countries.

organizations. These countries with surpluses have preferred to invest in short-term assets in the United States and Europe, rather than in long-term investment projects in the developing countries. Consequently, Western banks have had to assume the credit risks of loans to countries whose debt-servicing ability is heavily dependent on continued rapid economic growth. Various international arrangements are now being worked out to diversify these risks. The stakes are high, for without adequate financing the developing countries would have to curtail economic growth, to the detriment of billions of people already close to the subsistence level, and to the detriment of the international banking system's stability. The developing countries' needs for massive investments in electric power will only magnify their financial problems.

The developed countries, preferably in consultation with the OPEC countries that have cash surpluses, should give high priority to schemes for maintaining a flow of financial resources to poor countries that fosters their economic development. This means, among other things, that they should encourage imports from the poor countries even where these imports compete with domestic production. The international institutions active in this field (particularly the International Bank for Reconstruction and Development, the International Development Association, and the regional development banks) need further strengthening. Increased public awareness of the domestic aspects of the energy problem should not lead to neglect of its far-reaching international implications.\*

#### SUMMARY

This committee has studied at length the many factors and relationships involved in our nation's energy future. It offers here some technical and economic observations that decision makers may find useful as they develop energy policy in the larger context of the future of our society.

Our observations focus on (1) the prime importance of energy conservation; (2) the critical near-term problem of

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\*See statement 1-67, by H. I. Kohn and L. F. Lischer, Appendix A.

fluid fuel supply; (3) the desirability of a balanced combination of coal and nuclear fission as the only large-scale intermediate-term options for electricity generation; (4) the need to keep the breeder option open; and (5) the importance of investing now in research and development to ensure the availability of a strong range of new energy options sustainable over the long term.

Policy changes both to improve energy efficiency and to enhance the supply of alternatives to imported oil will be necessary. The continuation of artificially low prices would inevitably widen the gap between domestic supply and demand, and this could only be made up by increased imports, a policy that would be increasingly hazardous and difficult to sustain.

The most vital of these observations is the importance of energy demand considerations in planning future energy supplies. There is great flexibility in the technical efficiency of energy use, and there is correspondingly great scope for reducing the growth of energy consumption without appreciable sacrifices in the growth of GNP or in nonenergy consumption patterns. Indeed, as energy prices rise, the nation will face important losses in economic growth if we do not significantly increase the economy's energy efficiency. Reducing the growth of energy demand should be accorded the highest priority in national energy policy.\*

In the very near future, substantial savings can be made by relatively simple changes in the ways we manage energy use, and by making investments in retrofits of existing capital stock and consumer durables to render them more energy efficient.

The most substantial conservation opportunities, however, will be fully achievable only over the course of two or more decades, as the existing capital stock and consumer durables are replaced. There are economically attractive opportunities for such improvements in appliances, automobiles, buildings, and industrial processes at today's prices for energy, and as prices rise these opportunities will multiply.

This underscores the importance of clear signals from the

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\*Statement 1-68, by L. F. Lischer and H. Brooks: To this we would add "while maintaining a healthy and growing economy."

economy about trends in the price of energy. New investments in energy-consuming equipment should be made with an eye to energy prices some years in the future. Without clear ideas of the replacement cost of energy and its impact on operating costs, consumers will be unlikely to choose appropriately efficient capital goods. These projected cost signals should be given prominence and clarity through a carefully enunciated governmental pricing policy. They can be amplified where desirable by regulation; performance standards, for example, are useful in cases (such as the automobile) where fuel prices are not strongly reflected in operating costs.

Although there is some uncertainty in these conclusions because of possible feedback effects of energy consumption on labor productivity, labor-force participation, and the propensity for leisure, calculations indicate that, with sufficiently high energy prices, an energy/GNP ratio one half\* of today's could be reached, over several decades, without significant adverse effects on economic growth. Of course, so large a change in this ratio implies large price increases and consequent structural changes in the economy. This would entail major adjustments in some sectors, particularly those directly related to the production of energy and of some energy-intensive products and materials. However, given the slow introduction of these changes, paced by the rate of turnover in capital stock and consumer durables, we believe neither their magnitude nor their rate will exceed those experienced in the past owing to changes in technology and in the conditions of economic competition among nations. The possibility of reducing the nation's energy/GNP ratio should serve as a stimulus to strong conservation efforts. It should not, however, be taken as a dependable basis for forgoing simultaneous and vigorous efforts on the supply programs discussed in this report.

The most critical near-term problem in energy supply for this country is fluid fuels. World supplies of petroleum will be severely strained beginning in the 1980s, owing both

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\*Statement 1-69, by R. H. Cannon, Jr.: It would be wrong to depend on so large an improvement. Calculations using some models and assumptions predict severe economic impact for smaller energy/GNP reductions.

to the expectation of peaking in world production about a decade later and to new world demands. Severe problems are likely to occur earlier because of political disruptions or cartel actions. Next to demand-growth reduction, therefore, highest priority should be given to the development of a domestic synthetic fuels industry, for both liquids and gas, and to vigorous exploration for conventional oil and gas, enhanced recovery, and development of unconventional sources (particularly of natural gas).

As fluid fuels are phased out of use for electricity generation, coal and nuclear power are the only economic alternatives for large-scale application in the remainder of this century.\* A balanced mix of coal- and nuclear-generated electricity is preferable to the predominance of either. After 1990, for example, coal will be increasingly required for the production of synthetic fuels. The requirements for nuclear capacity depend on the growth rate of electricity demand; this study's projections of electricity growth between 1975 and 2010 (for up to 3 percent annual average GNP growth) are considerably below industry and government projections, and in the highest-conservation cases actually level off or decline after 1990. Such projections are sensitive also to assumptions about end-use efficiency, technological progress in electricity generation and use, and the assumed behavior of electricity prices in relation to those of primary fuels. They are therefore subject to some uncertainty.

At relatively high growth rates in the demand for electricity, the attractiveness of a breeder or other fuel-efficient reactor is greatest, all other things being equal. At the highest growth rates considered in this study, the breeder can be considered a probable necessity. For this reason, this committee recommends continued development of the LMFBR, so that it can be deployed early in the next century if necessary. Any decision on deployment, however, should be deferred until the future courses of electricity

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\*Statement 1-70, by J. P. Holdren: My longer dissenting view, statement 1-2, Appendix A, also applies here.

See statement 1-71, by L. F. Lischer and H. Brooks, Appendix A.

demand growth, fluid fuel supplies, and other factors become clearer.\*

In terms of public risks from routine operation of electric power plants (including fuel production and delivery), coal-fired generation presents the highest overall level of risk, with oil-fired and nuclear generation considerably safer, and natural gas the safest. With respect to accidents, the generation of electricity from fossil fuels presents a very low risk of catastrophic accidents. The projected mean number of fatalities\*\* associated with nuclear accidents is probably less than the risk from routine operation of the nuclear fuel cycle (including mining, transportation, and waste disposal), but the large range of uncertainty that still attaches to nuclear safety calculations makes it difficult to provide a confident assessment of the probability of catastrophic reactor accidents. The spread of uncertainty in present estimates of the risks of both coal and nuclear power is such that the ranges of possible risk overlap somewhat. High-level nuclear waste management does not present catastrophic risk potential, but its long-term low-level threat demands more sophisticated and comprehensive study and planning than it has so far received, particularly in view of the acute public sensitivity to this issue."

The problem of nuclear weapons proliferation is real and is probably the most serious potentially catastrophic problem associated with nuclear power. However, there is no technical fix--even the stopping of nuclear power (especially by a single nation)--that averts the nuclear proliferation

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\*Statement 1-72, by R. H. Cannon, Jr., and H. Brooks: Since about 20 years will necessarily elapse between such a decision and the start of actual deployment, the decision cannot be delayed very long.

Statement 1-73, by J. P. Holdren: My longer dissenting view, statement 1-60, Appendix A, also applies here.

\*\*See statement 1-74, by H. Brooks, Appendix A.

Statement 1-75, by H. I. Kohn, D. J. Rose, and B. I. Spinrad: Failure of summary to mention carbon dioxide, water, and regulatory risk problems is misleading. See "Conclusions" in chapter 9.

problem. At best, the danger can be delayed while better control institutions are put in place. There is a wide difference of opinion about which represents the greater threat to peace: the dangers of proliferation associated with the replacement of fossil resources by nuclear energy, or the exacerbation of international competition for access to fossil fuels that could occur in the absence of an adequate worldwide nuclear power program.

Because of their higher economic costs, solar energy technologies, other than hydroelectric power, will probably not contribute much more than 5 percent to energy supply in this century, unless there is massive government intervention in the market to penalize the use of nonrenewable fuels and subsidize the use of renewable energy sources. Such intervention could find justification in the generally lower social costs of solar energy in comparison to alternatives. The danger of such intervention lies in the possibility that it may lock us into obsolete and expensive technologies with high materials and resource requirements, whereas greater reliance on "natural" market penetration would be less costly and more efficient over the long term. Technical progress in solar technologies, especially photovoltaics, has accelerated dramatically during the last few years; nevertheless, there is still insufficient effort on long-term research and exploratory development of novel concepts. A much increased basic research effort should be directed at finding ways of using solar energy to produce fluid fuels, which may have the greatest promise in the long term.\*

Major further exploitation of hydroelectric power, or of biomass through terrestrial energy farms, presents ecological problems that make it inadvisable to count on these as significant future incremental energy sources for the United States. (Marine biomass energy farms could have none of this problem, of course.) There is insufficient information to judge whether the large-scale exploitation of hot-dry-rock geothermal energy or the geopressured brines will ultimately be feasible or economic. Local exploitation of geothermal steam or hot water is already feasible and should be

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\*Statement 1-76, by R. H. Cannon, Jr.: Two of these are marine biomass and ocean thermal energy conversion. Not enough is yet known to assess the magnitudes of their potential contributions.

encouraged where it offers an economical substitute for petroleum.

It is too early in the investigation of controlled thermonuclear fusion to make reliable forecasts of its economic or environmental characteristics. It is not, however, an option that can be counted on to make any contribution within the time frame of this study. Nevertheless, fusion warrants sufficient technical effort to enable a realistic assessment by the early part of the next century of its long-term promise in competition with breeder reactors and solar energy technologies.

It is important to keep in mind that the energy problem does not arise from an overall physical scarcity of resources. There are several plausible options for an indefinitely sustainable energy supply, potentially accessible to all the people of the world. The problem is in effecting a socially acceptable and smooth transition from gradually depleting resources of oil and natural gas to new technologies whose potentials are not now fully developed or assessed and whose costs are generally unpredictable. This transition involves time for planning and development on the scale of half a century. The question is whether we are diligent, clever, and lucky enough to make this inevitable transition an orderly and smooth one.

Thus, energy policy involves very large social and political components that are much less well understood than the technical factors. Some of these sociopolitical considerations are amenable to better understanding through research on the social and institutional characteristics of energy systems and the factors that determine public, official, and industry perception and appraisal of them. However, there will remain an irreducible element of conflicting values and political interests that cannot be resolved except in the political arena. The acceptability of any such resolution will be a function of the processes by which it is achieved.

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28. Risk Assessment Review Group, H. W. Lewis, Chairman, The Risk Assessment Review Group Report to the U.S. Nuclear Regulatory Commission (Washington, D.C.: U.S. Nuclear Regulatory Commission (NUREG/CR/0400), September 1978).
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33. U.S. Department of Energy, An Assessment of National Consequences of Increased Coal Utilization, Executive Summary, 2 vols. (Washington, D.C.: U.S. Government Printing Office (TID-29425), February 1979).
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35. See, for example, J. M. Weingart, Systems Aspects of Large-Scale Energy Conversion (Laxenberg, Austria: International Institute for Applied Systems Analysis (RM-77-23), May 1977).
36. More detail may be found in research inspired by the CONAES study but not conducted under the study's direction; see, for example, H. Houthakker and Michael Kennedy, "Long-Range Energy Prospects," Energy and Development, Autumn 1978.
37. This possibility could be offset, however, by the fact that their capital stock will be mostly new and can be designed for efficiency at present and prospective prices for energy.

OFFICE OF THE WHITE HOUSE PRESS SECRETARY

THE WHITE HOUSE

THE PRESIDENT'S STATE OF THE UNION ADDRESS  
TO THE SECOND SESSION  
OF THE 96TH CONGRESS

The Floor of the U.S. House of Representatives

(AT 9:00 P.M. EST)

THE PRESIDENT: Mr. President, Mr. Speaker, Members of the 96th Congress, fellow citizens.

This last few months has not been an easy time for any of us. As we meet tonight, it has never been more clear that the state of our union depends on the state of the world. And tonight, as throughout our own generation, freedom and peace in the world depend on the state of our union.

The 1980s have been born in turmoil, strife, and change. This is a time of challenge to our interests and our values and it is a time that tests our wisdom and our skills.

At this time in Iran 50 Americans are still held captive, innocent victims of terrorism and anarchy.

Also at this moment, massive Soviet troops are attempting to subjugate the fiercely independent and deeply religious people of Afghanistan.

These two acts -- one of international terrorism and one of military aggression -- present a serious challenge to the United States of America and indeed to all the nations of the world. Together, we will meet these threats to peace.

I am determined that the United States will remain the strongest of all nations, but our power will never be used to initiate a threat to the security of any nation or to the rights of any human being. We seek to be and to remain secure -- a nation at peace in a stable world. But to be secure we must face the world as it is.

Three basic developments have helped to shape our challenges: the steady growth and increased projection of Soviet military power beyond its own borders; the overwhelming dependence of the western democracies on oil supplies from the Middle East; and the press of social and religious and economic and political change in the many nations of the developing world -- exemplified by the revolution in Iran.

Each of these factors is important in its own right. Each interacts with the others. All must be faced together, squarely and courageously. We will face these challenges and we will meet them with the best that is in us and we will not fail. (Applause.)

MORE

In response to the abhorrent act in Iran, our nation has never been aroused and unified so greatly in peacetime. Our position is clear. The United States will not yield to blackmail. (Applause.)

We continue to pursue these specific goals: First, to protect the present and long-range interests of the United States. Secondly, to preserve the lives of the American hostages and to secure, as quickly as possible, their safe release. If possible, to avoid bloodshed which might further endanger the lives of our fellow citizens. To enlist the help of other nations in condemning this act of violence which is shocking and violates the moral and the legal standards of a civilized world. And also to convince and to persuade the Iranian leaders that the real danger to their nation lies in the north, in the Soviet Union, and from the Soviet troops now in Afghanistan, and that the unwarranted Iranian quarrel with the United States hampers their response to this far greater danger to them.

If the American hostages are harmed, a severe price will be paid. (Applause.)

We will never rest until every one of the American hostages are released. (Applause.)

But now we face a broader and more fundamental challenge in this region because of the recent military action of the Soviet Union.

Now, as during the last 3-1/2 decades, the relationship between our country, the United States of America, and the Soviet Union is the most critical factor in determining whether the world will live in peace or be engulfed in global conflict.

Since the end of the Second World War, America has led other nations in meeting the challenge of mounting Soviet power. This has not been a simple or a static relationship. Between us there has been cooperation, there has been competition, and at times there has been confrontation. In the 1940s we took the lead in creating the Atlantic Alliance in response to the Soviet Union's suppression and then consolidation of its East European empire and the resulting threat of the Warsaw Pact to Western Europe.

In the 1950s, we helped to contain further Soviet challenges in Korea, and in the Middle East, and we rearmed to assure the continuation of that containment.

In the 1960s, we met the Soviet challenges in Berlin, and we faced the Cuban missile crisis, and we sought to engage the Soviet Union in the important task of moving beyond the cold war and away from confrontation.

And in the 1970s, three American Presidents negotiated with the Soviet leaders in an attempt to halt the growth of the nuclear arms race. We sought to establish rules of behavior that would reduce the risks of conflict, and we searched for areas of cooperation that could make our relations reciprocal and productive, not only for the sake of our two nations, but for the security and peace of the entire world.

MORE

In all these actions, we have maintained two commitments: To be ready to meet any challenge by Soviet military power, and to develop ways to resolve disputes and to keep the peace.

Preventing nuclear war is the foremost responsibility of the two superpowers. That is why we have negotiated the strategic arms limitation treaties -- SALT I and SALT II. Especially now, in a time of great tension, observing the mutual constraints imposed by the terms of these treaties will be in the best interest of both countries, and will help to preserve world peace. I will consult very closely with the Congress on this matter as we strive to control nuclear weapons. That effort to control nuclear weapons will not be abandoned. (Applause.)

We superpowers also have the responsibility to exercise restraint in the use of our great military force. The integrity and the independence of weaker nations must not be threatened. They must know that in our presence they are secure.

But now the Soviet Union has taken a radical and an aggressive new step. It is using its great military power against a relatively defenseless nation. The implications of the Soviet invasion of Afghanistan could pose the most serious threat to the peace since the Second World War.

The vast majority of nations on earth have condemned this latest Soviet attempt to extend its colonial domination of others and have demanded the immediate withdrawal of Soviet troops. The Moslem world is especially and justifiably outraged by this aggression against an Islamic people. No action of a world power has ever been so quickly and so overwhelmingly condemned.

But verbal condemnation is not enough. The Soviet Union must pay a concrete price for their aggression. (Applause.) While this invasion continues, we and the other nations of the world cannot conduct business as usual with the Soviet Union.

That is why the United States has imposed stiff economic penalties on the Soviet Union. I will not issue any permit for Soviet ships to fish in the coastal waters of the United States. I have cut Soviet access to high-technology equipment and to agricultural products. I have limited other commerce to the Soviet Union, and I have asked our allies and friends to join with us in restraining their own trade with the Soviets, and not to replace our own embargoed items. And I have notified the Olympic Committee that with Soviet invading forces in Afghanistan, neither the American people nor I will support sending an Olympic team to Moscow. (Applause.)

The Soviet Union is going to have to answer some basic questions: Will it help promote a more stable international environment in which its own legitimate, peaceful concerns can be pursued? Or will it continue to expand its military power far beyond its genuine security needs, and use that power for colonial conquest?

The Soviet Union must realize that its decision to use military force in Afghanistan will be costly to every political and economic relationship it values. (Applause.)

The region which is now threatened by Soviet troops in Afghanistan is of great strategic importance: It contains more than two-thirds of the world's exportable oil. The Soviet effort to dominate Afghanistan has brought Soviet military forces to within 300 miles of the Indian Ocean and close to the Straits of Hormuz -- a waterway through which most of the world's oil must flow. The Soviet Union is now attempting to consolidate a strategic position, therefore, that poses a grave threat to the free movement of Middle East oil.

This situation demands careful thought, steady nerves, and resolute action -- not only for this year but for many years to come. It demands collective efforts to meet this new threat to security in the Persian Gulf and in Southwest Asia. It demands the participation of all those who rely on oil from the Middle East and who are concerned with global peace and stability. And it demands consultation and close cooperation with countries in the area which might be threatened.

Meeting this challenge will take national will, diplomatic and political wisdom, economic sacrifice and, of course, military capability. We must call on the best that is in us to preserve the security of this crucial region.

Let our position be absolutely clear:

An attempt by any outside force to gain control of the Persian Gulf region will be regarded as an assault on the vital interests of the United States of America -- (applause) -- and such an assault will be repelled by any means necessary, including military force. (Applause.)

During the past three years you have joined with me to improve our own security and the prospects for peace -- not only in the vital oil producing area of the Persian Gulf region, but around the world.

We have increased annually our real commitment for defense, and we will sustain this increase of effort throughout the Five Year Defense Program. It is imperative that Congress approve this strong defense budget for 1981, encompassing a five percent real growth in authorizations, without any reduction. (Applause.)

We are also improving our capability to deploy U.S. military forces rapidly to distant areas.

We have helped to strengthen NATO and our other alliances and recently we and other NATO members have decided to develop and to deploy modernized intermediate range nuclear forces to meet an unwarranted and increased threat from the nuclear weapons of the Soviet Union.

We are working with our allies to prevent conflict in the Middle East. The peace treaty between Egypt and Israel is a notable achievement which represents a strategic asset for America and which also enhances prospects for regional and world peace. We are now engaged in further negotiations to provide full autonomy for the people of the West Bank and Gaza to resolve the Palestinian issue in all its aspects and to preserve the peace and security of Israel. (Applause.)

Let no one doubt our commitment to the security of Israel. In a few days we will observe an historic event when Israel makes another major withdrawal from the Sinai and when ambassadors will be exchanged between Israel and Egypt. We have also expanded our own sphere of friendship. Our deep commitment to human rights and to meeting human needs has improved our relationship with much of the third world. Our decision to normalize relations with the People's Republic of China will help to preserve peace and stability in Asia and in the Western Pacific.

We have increased and strengthened our naval presence in the Indian Ocean and we are now making arrangements for key naval and air facilities to be used by our forces in the region of Northeast Africa and the Persian Gulf.

We have reconfirmed our 1959 agreement to help Pakistan preserve its independence and its integrity. The United States will take action consistent with our own laws to assist Pakistan in resisting any outside aggression. And I am asking the Congress specifically to reaffirm this agreement. I am also working, along with the leaders of other nations, to provide additional military and economic aid for Pakistan. That request will come to you in just a few days.

In the weeks ahead, we will further strengthen political and military ties with other nations in the region.

We believe that there are no irreconcilable differences between us and any Islamic nation. We respect the faith of Islam, and we are ready to cooperate with all Moslem countries.

Finally, we are prepared to work with other countries in the region to share a cooperative security framework that respects differing values and political beliefs, yet which enhances the independence, security and prosperity of all.

All these efforts combined emphasize our dedication to defend and preserve the vital interests of the region and of the nation which we represent and those of our allies -- in Europe and the Pacific, and also in the parts of the world which have such great strategic importance to us, stretching especially through the Middle East and Southwest Asia.

With your help, I will pursue these efforts with vigor and with determination. You and I will act as necessary to protect and to preserve our nation's security.

The men and women of America's armed forces are on duty tonight in many parts of the world. I am proud of the job they are doing, and I know you share that pride. I believe that our volunteer forces are adequate for current defense needs. And I hope that it will not become necessary to impose a draft. However, we must be prepared for that possibility. For this reason, I have determined that the Selective Service System must now be revitalized. (Applause.) I will send legislation and budget proposals to the Congress next month so that we can begin registration and then meet future mobilization needs rapidly if they arise.

We also need clear and quick passage of a new charter to define the legal authority and accountability of our intelligence agencies. We will guarantee that abuses do not recur, but we must tighten our controls on sensitive intelligence information and we need to remove unwarranted restraints on America's ability to collect intelligence. (Applause.)

The decade ahead will be a time of rapid change, as nations everywhere seek to deal with new problems and age-old tensions. But America need have no fear. We can thrive in a world of change if we remain true to our values and actively engaged in promoting world peace.

We will continue to work as we have for peace in the Middle East and Southern Africa. We will continue to build our ties with the developing nations, respecting and helping to strengthen their national independence which they have struggled so hard to achieve. And we will continue to support the growth of democracy and the protection of human rights.

In repressive regimes, popular frustrations often have no outlet except through violence. But when peoples and their governments can approach their problems together through open, democratic methods, the basis for stability and peace is far more solid and far more enduring.

That is why our support for human rights in other countries is in our own national interest as well as part of our own national character. (Applause.)

Peace -- a peace that preserves freedom -- remains America's first goal. In the coming years as a mighty nation, we will continue to pursue peace.

But to be strong abroad we must be strong at home. And in order to be strong, we must continue to face up to the difficult issues that confront us as a nation today.

The crises in Iran and Afghanistan have dramatized a very important lesson: Our excessive dependence on foreign oil is a clear and present danger to our nation's security. (Applause.)

The need has never been more urgent. At long last, we must have a clear, comprehensive energy policy for the United States.

As you well know, I have been working with the Congress in a concentrated and persistent way over the past three years to meet this need.

We have made progress together. But Congress must act promptly now to complete final action on this vital energy legislation.

Our nation will then have a major conservation effort, important initiatives to develop solar power, realistic pricing based on the true value of oil, strong incentives for the production of coal and other fossil fuels in the United States, and our nation's most massive peacetime investment in the development of synthetic fuels.

The American people are making progress in energy conservation. Last year we reduced overall petroleum consumption by eight percent and gasoline consumption by five percent below what it was the year before.

Now we must do more. After consultation with the governors, we will set gasoline conservation goals for each of the 50 states, and I will make them mandatory if these goals are not met.

I have established an import ceiling for 1980 of 8.2 million barrels a day -- well below the level of foreign oil purchases in 1977. I expect our imports to be much lower than this, but the ceiling will be enforced by an oil import fee if necessary. I am prepared to lower these imports still further if the other oil consuming countries will join us in a fair and mutual reduction. If we have a serious shortage, I will not hesitate to impose mandatory gasoline rationing immediately.

The single biggest factor in the inflation rate last year, the increase in the inflation rate last year, was from one cause: the skyrocketing prices of OPEC oil. We must take whatever actions are necessary to reduce our dependence on foreign oil -- and at the same time reduce inflation.

As individuals and as families, few of us can produce energy by ourselves. But all of us can conserve energy -- every one of us, every day of our lives.

Tonight I call on you, in fact, all of the people of America, to help our nation. Conserve energy. Eliminate waste. Make 1980 indeed a year of energy conservation. (Applause.)

Of course, we must take other actions to strengthen our nation's economy.

First, we will continue to reduce the deficit and then to balance the Federal budget.

MORE

Second, as we continue to work with business to hold down prices, we will build also on the historic national accord with organized labor to restrain pay increases in a fair fight against inflation.

Third, we will continue our successful efforts to cut paperwork and to dismantle unnecessary government regulation. (Applause.)

Fourth, we will continue our progress in providing jobs for America, concentrating on a major new program to provide training and work for our young people, especially minority youth. It has been said that "a mind is a terrible thing to waste." We will give our young people new hope for jobs and a better life in the 1980s.

Fifth, we must use the decade of the 1980s to attack the basic structural weaknesses and problems in our economy, through measures to increase productivity, savings and investment.

With these energy and economic policies, we will make America even stronger at home in this decade -- just as our foreign and defense policies will make us stronger and safer throughout the world.

We will never abandon our struggle for a just and a decent society here at home. That is the heart of America -- and it is the source of our ability to inspire other people to defend their own rights abroad.

Our material resources, great as they are, are limited. Our problems are too complex for simple slogans or for quick solutions. We cannot solve them without effort and sacrifice.

Walter Lipmann once reminded us, "You took the good things for granted. Now you must earn them again. For every right that you cherish, you have a duty which you must fulfill. For every good which you wish to preserve, you will have to sacrifice your comfort and your ease."

"There is nothing for nothing any longer."

Our challenges are formidable. But there is a new spirit of unity and resolve in our country. We move into the 1980s with confidence and hope -- and a bright vision of the America we want: An America strong and free, an America at peace, an America with equal rights for all citizens and for women guaranteed in the United States Constitution -- (applause) -- an America with jobs and good health and good education for every citizen, an America with a clean and bountiful life in our cities and on our farms, an America that helps to feed the world, an America secure in filling its own energy needs, an America of justice, tolerance and compassion. For this vision to come true, we must sacrifice, but this national commitment will be an exciting enterprise that will unify our people.

Together as one people, let us work to build our strength at home, and together as one indivisible union, let us seek peace and security throughout the world.

Together let us make of this time of challenge and danger a decade of national resolve and of brave achievement.

Thank you very much. (Applause.)

END

(AT 9:39 P.M. EST)

**DEPARTMENT OF ENERGY  
OFFICE OF THE SECRETARY**

**DATE:** Jan 25, 1980

**TO:** Frank R. Pagnotta

**FROM:** **Frank R. Pagnotta, Director**

**For:**



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| <input type="checkbox"/> Signature          | <input checked="" type="checkbox"/> Information and Retain |
| <input type="checkbox"/> Appropriate Action | <input type="checkbox"/> Note and Return                   |
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**Remarks:** \_\_\_\_\_  
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January 21, 1980

Office of the White House Press Secretary

SK 108  
1980

THE WHITE HOUSE

TO THE CONGRESS OF THE UNITED STATES:

My State of the Union Address will be devoted to a discussion of the most important challenges facing our country as we enter the 1980's.

Over the coming year, those challenges will receive my highest priority and greatest efforts. However, there will also be many other significant areas which will receive my personal commitment, as well as that of my Administration, during the 2nd Session of the 96th Congress.

It is important that Congress, along with the public, be aware of these other vital areas of concern as they listen to my State of the Union Address. In that way, the context of the Address, and my Administration's full message for 1980, can best be understood.

For that reason, I am sending this State of the Union Message to the Congress today, several days before my State of the Union Address.

CONGRESS

During the last three years, my Administration has developed a very cooperative and productive record with Congress. Landmark legislation has been enacted; major domestic and international problems have been addressed directly and resolved; and a spirit of mutual trust and respect has been restored to Executive-Legislative relations. Indeed, in no other three-year period in our recent past has there been a comparable record of progress and achievement for the American people.

But much more remains to be done. We cannot afford to rest on our record. We cannot fail to complete the agenda begun in the 1970's; we cannot ignore the new challenges of the 1980's.

By continuing to work together, my Administration and the Congress can meet these goals. Our cooperative efforts can help to ensure stable prices and economic growth; a return to energy security; an efficient, responsive government; a strong, unsurpassed defense capability; and world peace.

The program that I have placed before the Congress since 1977, combined with the few new initiatives I will be placing before the Congress this year, will enable us to reach these goals. Our task in this Session is to complete the work on that program. I have no doubt that we can do it. There is no time to waste.

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RECORD OF PROGRESS

When I took office in 1977, our Nation faced a number of serious domestic and international problems:

- o the economy had still not recovered from the most serious recession since World War II;
- o unemployment was near 8%, and almost 8 million American workers were unemployed;
- o no national energy policy existed, and our dependence on foreign oil was rapidly increasing;
- o public trust in the integrity and openness of the government was extremely low;
- o the Federal government was operating inefficiently in administering essential programs and policies;
- o major social problems were being ignored or poorly addressed by the Federal government;
- o our defense posture was declining as a result of a continuously shrinking defense budget;
- o the strength of the NATO Alliance was at a post-World War II low;
- o tensions between Israel and Egypt threatened another Middle East war; and
- o America's resolve to oppose international aggression and human rights violations was under serious question.

Over the past 36 months, clear progress has been made in solving the challenges we found in January of 1977:

- o the unemployment rate at the end of last year of 5.9%, representing a 25% decrease in three years; 9 million jobs have been created, and more Americans, 98 million, are at work than at any time in our history;
- o major parts of a comprehensive energy program have been enacted; a Department of Energy has been established to administer the program; and Congress is on the verge of enacting the remaining major parts of the energy program;
- o confidence in the government's integrity has been restored, and respect for the government's openness and fairness has been renewed;

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- o the government has been made more effective and efficient: the Civil Service system was completely reformed for the first time this century; 13 reorganization initiatives have been proposed to the Congress, approved, and implemented, two new Cabinet departments have been created to consolidate and streamline the government's handling of energy and education problems; inspectors general have been placed in each Cabinet department to combat fraud, waste and other abuses; zero-based budgeting practices have been instituted throughout the Federal government; cash management reforms have saved hundreds of millions of dollars; the process of issuing regulations has been reformed to eliminate unneeded and incomprehensible regulations; procedures have been established to assure citizen participation in government; and the airline industry has been deregulated, at enormous savings to the consumer.
- o critical social problems, many long ignored by the Federal government, have been addressed directly and boldly: an urban policy was developed and implemented, reversing the decline in our urban areas; the Food Stamp program has been expanded and the purchase requirement eliminated; the Social Security System was refinanced to put it on a sound financial basis; the Humphrey-Hawkins Full Employment Act was enacted; Federal assistance for education was expanded by 75%; the minimum wage was increased to levels needed to ease the effects of inflation; affirmative action has been pursued aggressively -- more blacks, Hispanics and women have been appointed to senior government positions and to judgeships than at any other time in our history; the ERA ratification deadline was extended to aid the ratification effort; and minority business procurement by the Federal government has more than doubled;
- o the decline in defense spending has been reversed; defense spending has increased at a real rate of over 3% in 1979, and I am proposing a real increase in the defense spending level of more than 20% over the next 5 years;
- o the NATO Alliance has been revitalized and strengthened through substantially increased resources, new deterrent weapons, and improved coordination; increased emphasis has also been given to conventional force capabilities to meet crises in other areas of the world;
- o Egypt and Israel have ended more than 30 years of war through a Peace Treaty that also established a framework for comprehensive peace in the Middle East;
- o the commitment of our Nation to pursue human rights throughout the world, in nations which are friendly and those which are not, has been made clear to all;
- o our resolve to oppose aggression, such as the illegal invasion of the Soviet Union into Afghanistan, has been supported by tough action.

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## LEGISLATIVE PRIORITIES

In the coming legislative session, the last in this Presidential term, I am deeply committed to finishing the agenda that I have placed before the Congress. That agenda has been comprehensive and demanding, but it has also been absolutely essential for our Nation's well-being.

I do not plan to add significantly to the agenda this year. Because of the importance of enacting the proposals already before the Congress, and the relatively short Congressional session facing us, I will be limiting my major new proposals to a critical few:

- o Youth Employment;
- o General Revenue Sharing;
- o Utility Oil Use Reduction;
- o Nuclear Waste Management and Nuclear Regulatory Commission Reorganization;
- o Standby Gasoline Rationing Plan; and
- o Initiatives implementing my response to the Soviet invasion of Afghanistan.

I am convinced that these new initiatives, along with the major proposals I previously made to the Congress, can be enacted this year, if we have a dedicated, all-out effort on the part of the Administration and the Congress. I pledge such an effort on my part, and that of my Administration.

As in the previous three years, I will be working with you toward the basic goals of:

- o Ensuring our economic strength;
- o Creating energy security for our nation;
- o Enhancing basic human and social needs;
- o Making our government more efficient and effective;
- o Protecting and enhancing our rights and liberties;
- o Preserving and developing our natural resources;
- o Building America's military strength;
- o Working to resolve international disputes through peaceful means;
- o Striving to resolve pressing international economic problems;
- o Continuing to support the building of democratic institutions and protecting human rights; and
- o Preventing the spread and further development of nuclear weapons.

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My highest legislative priorities in each of these areas this year will be:

Ensuring Economic Strength

o The FY 1981 Budget - This is a responsible, restrained budget, whose enactment will help control Federal spending, significantly reduce the Federal deficit, and aid in our fight against inflation.

o Hospital Cost Containment - This long overdue legislation is a major weapon in our fight against inflation; it will save consumers more billions of dollars and is the single most important anti-inflation bill before the Congress.

o Youth Education, Training and Employment Program - This new initiative, which is designed to educate and train youth to secure and hold meaningful jobs, will provide enhanced opportunities for disadvantaged youth as well as improve the productivity of our work force.

Creating Energy Security for Our Nation

o Windfall Profits Tax - The size of this important energy and tax measure has been agreed to by the conferees, but it is imperative that final agreement on a tax reflecting sound energy policy occur at the outset of this session and that Congress act promptly on that agreement.

o Energy Mobilization Board - It is also essential that this vital measure in the effort to eliminate unnecessary red tape in the construction of needed energy facilities be agreed to promptly by the conferees and the Congress, without substantive waivers of law.

o Energy Security Corporation - The conferees and the Congress also need to act expeditiously on this legislation. This bill is critical to our Nation's beginning a serious, massive program to develop alternative energy fuels so that our dependence on foreign oil can be severely reduced. It is necessary to remove this critical national effort from the constraints which can bind government agencies.

This legislation contains, as well, vital energy conservation and gasohol provisions. They are needed if we are to move forward in our national efforts in these areas.

o Utility Oil Use Reduction - This new initiative will aid in the effort to reduce our reliance on oil by requiring our Nation's utilities to substantially convert from oil to coal-burning or other energy facilities by our Nation's utilities over a defined timetable. This bill is a key tool in our effort to increase the use of coal, our most abundant natural fuel source.

o Standby Gasoline Rationing Plan - Under the legislation enacted last year, I will propose to the Congress a Standby Gasoline Rationing Plan; its prompt approval will be required if we are to be prepared for a significant energy supply interruption.

Enhancing Basic Human and Social Needs

o National Health Plan - The time for improving the health care provided to our citizens is long overdue, and I am convinced that the health plan I proposed last year provides a realistic, affordable and beneficial way of providing our citizens with the health care they need and

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deserve. It will provide millions of low-income Americans with health coverage for the first time, improved Medicare coverage for the elderly, and protect every American against the disastrous costs of extended illness.

Our national health effort also needs prompt enactment of two other important bills -- Child Health Assurance Program, which will provide needed health care for disadvantaged children, and Mental Health Systems Act, which is needed to reform our mental health programs.

o Welfare Reform - Our nation's welfare system remains a disgrace to both the recipient and the taxpayers. It encourages family instability and encourages waste. It is a crazy-quilt of differing provisions from state-to-state. The House has approved a sound welfare reform proposal. I call upon the Senate to act rapidly on this issue so that welfare reform can become a reality this Session.

o General Revenue Sharing - I will propose a reauthorization of this important program to our state and local governments, in order to continue providing them with the funds that they depend upon to meet essential social and operating needs. This program is an essential element of the partnership I have forged with state and local governments and is critical to the continued economic health of our states, cities and counties.

o Countercyclical Revenue Sharing - I will again work with the Congress to provide the aid needed to help our most financially pressed local areas. The Senate has already acted and I urge prompt House passage early in the Session.

o Low-Income Energy Assistance - I am committed to seeking authority to continue the low-income assistance program enacted at my request last year to give the poor protection against rising energy costs.

o Economic Development - This legislation will reauthorize and improve the government's ability to provide economic development assistance. It is a key ingredient in implementing both my urban and rural policy and I urge prompt action on it by the House-Senate Conference.

#### Making Our Government More Efficient and Effective

o Regulatory Reform - I will continue to pursue efforts to eliminate unnecessary regulatory burdens, and will concentrate on seeking approval this year of my regulatory process reform bill, my trucking and rail deregulation proposals, my banking reform measures, and passage of sunset legislation and communications reform measures. Progress has been made on each of these during the First Session. Final passage should come before this Session ends.

o Nuclear Regulatory Commission Reorganization - As I stated in responding to the Kemeny Commission Report, I will propose a reorganization of the Nuclear Regulatory Commission in order to improve its management and its emergency operating capabilities. This is an essential step to the improvement of safety in the nuclear industry.

#### Protecting and Enhancing Our Rights and Liberties

o Equal Rights Amendment - While the Congress has passed the Equal Rights Amendment, and the possibility for ratification now lies with the State Legislatures, it is essential that the Members of Congress help with their State Legislatures. Toward that end, we will be working with Members from States which have not yet been ratified. We cannot stand tall as a Nation seeking to enhance human rights at home so long as we deny it to American women here at home.

o Fair Housing - I will continue to press for enactment of this important civil rights initiative; it will enable the government to enforce our fair housing laws effectively and promptly. It is the most critical civil rights legislation before the Congress in years. The promise of equal housing opportunity has been far too long an empty promise. This bill will help make that promise a reality.

o Intelligence Charters - I have already proposed a legislative charter for the FBI; I will soon be proposing a legislative charter for the intelligence community. These charters will protect our citizens' rights while enabling the agencies to meet their responsibilities.

#### Preserving and Developing Our Natural Resources

o Alaska D-2 Lands - My highest environmental priority in this Congress continues to be enactment of legislation that will preserve and protect Alaska lands. I urge the Senate to follow the House's lead in this area.

o Oil and Hazardous Wastes Superfund - This program is needed to mitigate the effects of oil hazardous substance spills and releases from uncontrolled hazardous waste dumps, which is a growing national problem.

o Nuclear Waste Management - I will propose a series of legislative and administrative initiatives to implement our Nation's first comprehensive nuclear waste program.

#### Building America's Military Strength

o Defense Department Authorizations and Appropriations - I will be proposing a defense budget containing a 3.3% real growth in outlays. It is essential that the Congress support an increase of that amount if we are to strengthen our defense capabilities.

#### Working to Resolve International Disputes

o Refugee Legislation and Funding - This legislation is necessary to improve our refugee program and to provide needed domestic assistance to refugees. Prompt House action would assure that we have a sound framework within which to accommodate the increasing flow of refugees.

#### Striving to Resolve International Economic Problems

o Bilateral and Multilateral Foreign Assistance - I will be proposing foreign assistance legislation which provides the authority needed to carry forward a cooperative relationship with a large number of developing nations. Prompt Congressional action is essential.

o China Trade Agreement - I will be seeking early approval by the Congress of the Trade Agreement reached with China; the Agreement represents a major step forward in the process toward improved economic relations with China.

#### Continuing to Support the Building of Democratic Institutions and Protecting Human Rights

o Special International Security Assistance for Pakistan - I am sending to Congress a military and economic assistance program to enable Pakistan to strengthen its defenses. Prompt enactment will be one of my highest legislative priorities.

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o Human Rights Conventions - I will continue to press the Senate to ratify five key human rights treaties -- the American Convention on Human Rights, the Convention on Racial Discrimination, the UN Covenants on Civil and Political Rights, and on Economic and Social and Cultural Rights, and the Genocide Convention.

Preventing the Spread and Further Development of Nuclear Weapons

o SALT II - I firmly believe that SALT II is in our Nation's security interest and that it will add significantly to the control of nuclear weapons. But because of the Soviet invasion of Afghanistan, I do not believe it is advisable to have the Senate consider the Treaty now.

I. ENSURING ECONOMIC STRENGTH

My economic program, since I took office, has been designed to achieve several goals:

- restore and continue economic growth;
- reduce unemployment; and
- restrain inflation.

Over the past three years, considerable progress has been made in each of these areas:

- The economy has recovered from its deepest recession since World War II; and we have had a sustained economic recovery during the last three years.
- Unemployment has been reduced by 25% and employment is at its highest level in history.
- Inflation has increased to unacceptable levels, in large part because of OPEC price increases, but a program has now been put in place which will moderate inflation in an equitable and effective way.

In 1980, we will continue the steady economic policies which have worked to date. We can only succeed in making our economy strong, however, if we have Congress' cooperation. I am confident that we can work together successfully this year to achieve our economic goals.

Inflation

Inflation continues to be our most serious economic problem. Restraining inflation remains my highest domestic priority.

Inflation at the current, unacceptably high levels is the direct result of economic problems that have been building, virtually without letup, for over a decade. There are no easy answers, or quick solutions to inflation. It cannot be eliminated overnight; its roots in our economy are too deep, its causes are too pervasive and complex. We know we cannot spend our way out of this problem.

But there is hope -- for a gradual reduction in the inflation rate, for an easing of the economic pressures causing inflation.

The hope lies in a program of public and private restraint in the short-run and a program to attack the structural causes of inflation over the longer-run. This is the policy I have pursued and will continue to pursue.

Last year was an especially difficult time for anti-inflation policies. OPEC increased its prices by more than 80% and thus added more than three points to the inflation rate. If energy price increases are excluded, inflation last year would have been nearly three percentage points lower.

The biggest challenge to anti-inflation policy is to keep energy price increases from doing permanent damage, to prevent a dangerous acceleration of the wage-price spiral. My program has been successful in accomplishing this. Inflation will slow this year. In 1981 it should be even lower. This progress is the result of our persistence in the battle against inflation on many fronts:

Budget Restraint: The budget deficit for FY 1979 was lowered to \$27.7 billion, more than 50% below the FY 1976 level.

Regulatory Reform: The flood of new, costly government regulations was slowed as our procedures to ensure that we achieve our regulatory goals in the most cost-effective manner took hold.

Wage-Price Guidelines: The guideline standards were followed by the vast majority of unions which negotiated contracts and by nearly every major corporation in the country.

Energy: The energy legislation put into place over the past two years began to reduce our dependence on foreign oil and our consumption of such important energy fuels as gasoline, thereby reducing the ability of oil-producing nations to disrupt our economy.

Productivity: We began to introduce policies to increase industrial innovation and thereby productivity; the decline in productivity growth must be reversed if we are to improve our real living standards over the long term.

In 1980, with the Congress' cooperation, we will continue our aggressive fight against inflation on each of these major fronts:

Budget Restraint: The deficit for the FY 1981 budget will be less than half of the FY 1980 budget deficit and will represent a 75% reduction from the deficit I inherited.

Regulatory Reform: We will be pursuing deregulation legislation for the trucking, rail, banking and communications industries, as well as regulatory management reform legislation; these bills will enable us to further eliminate unnecessary regulatory burdens.

Labor Accord: The Pay Advisory and Price Advisory Committees, established as a result of last year's historic Accord with organized labor will enable us to better implement, and coordinate with both labor and business, the private restraint necessary as part of our anti-inflation efforts.

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**Energy:** We expect to enact major energy legislation -- the Windfall Profits Tax, the Energy Mobilization Board, and the Energy Security Corporation -- early in this Session; this legislation, when combined with the voluntary and mandatory energy conservation measures that will take an even stronger hold this year, should enable us to further reduce our dependence on foreign oil.

**Productivity:** We will be implementing our industrial innovation program and further expanding our commitment in the budget to research and development.

#### Council on Wage and Price Stability

The Council on Wage and Price Stability has played a vital role in our anti-inflation efforts. The Council and its staff have lead responsibility within the Executive branch for implementing the voluntary wage and price monitoring program. Without the Council's continuing role, the anti-inflation effort could not begin to assess whether the private sector is cooperating with our standards.

It is therefore essential that the Council, along with its staff operation, be reauthorized early this year. The reauthorization should not contain amendments that interrupt or restrain the important and essential work of the Council or its staff.

#### The 1981 Budget

The budget I will send to the Congress for FY 1981 will meet this Nation's critical needs; and it will continue the sound budgetary policies that my Administration has pursued throughout my term in office.

No single year's budget can accurately portray the philosophy of an Administration. However, there is a clear pattern in the budgets I have proposed -- restraint in spending, coupled with careful targeting of resources to areas of greatest need. My 1981 budget continues this pattern by lowering the deficit roughly \$50 billion below what it was when I ran for office. At the same time, I will recommend increases for programs of critical national concern.

Last year, my budget was austere. I proposed eliminating some programs and reducing spending for others; and these tough decisions have proven correct and have provided the country with clear benefits. I am pleased that the Congress approved my budget in virtually the form I proposed. As a result of our actions, the rate of Federal spending growth has been slowed. Just as importantly, the widespread expectation that the Federal budget would continue its upward spiral unchecked has been proven false. We have moved on to the path necessary for achieving a balanced budget in the very near future. And we have helped the fight against inflation.

The 1981 Budget will continue my policy of restraint. Real growth in spending will be close to zero. The deficit will be cut by more than half from last year. The deficit as a percent of the budget and of GNP will be at the second lowest point in this decade. We will have the smallest deficit in seven years. And if the economy were to continue to grow at a rate which held the unemployment rate at the current level, this budget would be in surplus.

At the same time, I am proposing some vital spending increases in the 1981 Budget. Most of these increases will be in "uncontrollable" programs (those in which increases are automatically required by existing law). There will also be discretionary increases; in part, to strengthen our defense

forces and enhance our crucial investments in energy production and conservation. In addition, I will propose a major new initiative to reduce youth unemployment, and State and local governments will receive continued fiscal support from the General Revenue Sharing extension I will propose.

Developing the budget this year has been, in several respects, more difficult than in previous years. International turmoil threatens our vital interests, energy problems dampen the economy and alter our domestic priorities, and inflation erodes basic programs, all adding new pressures for Federal spending. But I am confident that this budget responds responsibly -- and with needed resources -- to our Nation's most pressing needs and positions us for responsible and effective government in the 1980's.

### Fiscal Policy

As President, I have been concerned about the tax burden on our citizens and have, as a result, worked with the Congress to enact two major tax cuts. In 1977, I proposed, and Congress passed, an \$8 billion individual tax cut as part of the economic stimulus package. In 1978, I proposed, and Congress passed, a \$21 billion individual and business tax cut. This year, those two cuts will reduce Americans' tax burden by \$31 billion.

I recognize that there is interest in another tax cut this year, but my 1981 budget proposes no tax cuts. As long as double-digit inflation continues and there is no sign of a recession, our top budgetary priority must be reduction of the deficit.

Over the long run, continued tight control over budget expenditures will hold down the share of Federal spending in GNP. Inflation, on the other hand, is raising the percentage of national income collected in taxes. Over time, because of these two developments, tax reductions will be possible while still maintaining the fiscal restraint needed to control inflation. However, the timing and structure of any tax reductions is of critical importance and must be dictated by our economic circumstances: the urgency of the anti-inflation fight requires that we defer such tax reductions at this time.

Tax reductions put into effect prematurely, and under the wrong economic conditions, could make inflation worse by overstimulating the economy. Inflation is still running at unacceptably high levels.

Virtually all economic forecasters predict the onset of a mild recession and my Administration's estimates of budget receipts and expenditures in the FY 1981 budget assume a recession. However, none of the current economic statistics yet show any overall economic decline. In recent months the economy has displayed much more strength than earlier forecasts had predicted. Forecasts of impending recession may therefore prove to be as wrong as previous ones. Employment has held up well -- in part due to unsatisfactory productivity performance. To enact tax cuts now would run a serious risk of adding inflationary demand pressures to an economy which continues to grow more strongly than predicted by the forecasts. With the present high inflation, we cannot afford that risk.

When tax reductions are timely, they should be designed insofar as possible in a way that achieves multiple objectives -- not only reducing the tax burden and stimulating growth, but raising investment and productivity and reducing inflation as well.

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In particular, a significant part of any tax reduction should be directed to the provision of incentives for increased investment, to improve productivity, expand capacity, and adjust to higher energy prices. Serious consideration should be given, in the case of tax cuts for individuals, to lowering social security payroll taxes, since half of such reductions would go towards lowering business costs and prices.

The necessities of the inflation fight require that we be very cautious about when taxes are reduced, and how it is done. But they do not require that we ignore changes in economic conditions. Should the economic situation and prospects sharply worsen, I will consider recommendations to deal with the situation. Under those circumstances, tax cuts and other measures could be taken to improve the prospects for employment and growth, to reduce business costs, and to assist those most severely damaged by recession, without threatening to set off inflationary demand pressures. However, the current economic situation does not warrant such measures and it would be inappropriate to propose them at this time.

### Employment

My Administration, working closely with Congress, has made significant progress in reducing the serious unemployment problems that existed three years ago.

- o The December unemployment rate of 5.9% represents a 25% reduction from the December 1976 rate.
- o Over 9.2 million more people have jobs than before the beginning of the Administration.
- o Total employment has reached an all-time high of 98 million in December.
- o Nonwhite employment has increased by 1.4 million persons or 15.5%.
- o Adult female employment has increased by 5 million persons.
- o Employment of black teenagers, which had actually decreased during the 1969-1975 period, has increased by more than 15% since I took office. Although unemployment rates for all youth, especially minority youth, are still too high, progress has been made.

We will continue to make progress in the 1980's as a result of the framework which has already been established and which will be strengthened this year.

- o The Comprehensive Employment and Training Act (CETA) was reauthorized in 1978 for four years.
- o The Humphrey-Hawkins Full Employment Act became law after many years of effort.
- o The Private Sector Initiatives Program, a new partnership between the government and the private sector to assist the most disadvantaged unemployed, is being successfully implemented.
- o A targeted jobs tax credit has been enacted to provide employers with the economic incentives needed to increase their hiring of unemployed low-income youth and others who historically have difficulty finding jobs.

- o. A massive effort to reduce the problems causing excessive youth unemployment rates is being strengthened and revitalized this year with a new \$2 billion youth education, training, and employment program.

This year, we will work aggressively to make certain that this framework continues to be successfully implemented. Even that effort may not be sufficient, if economic forecasts are accurate, to keep the unemployment rate from rising. We will be monitoring the economy closely. If unemployment should dramatically increase, I will be prepared to consider actions to counter that increase, consistent with our overriding concern about accelerating inflation. At this time though, when unemployment is at its lowest level in years, it would be premature and unwise to propose measures that might be helpful in a time of recession-induced high unemployment.

### Youth Employment

The fact that we have had persistently high unemployment among poor and minority youth for three decades demonstrates clearly the inadequacies of our system for teaching, training and helping young people to find and keep decent jobs.

The economic challenges of the 1980's will require the energy and commitment of the entire American work force. We cannot afford to waste anyone's talents.

If we are to become the society of our ideals, we must provide economic opportunity for all.

My Administration is committed to a renewed national effort to remove any unnecessary obstacles to a productive life for every American.

Over the past three years, we have developed a solid record. We have increased resources for youth employment and training programs from \$2.5 to over \$4 billion. We have conducted the largest experimental youth program effort ever attempted. We have reduced overall youth unemployment rates by 15%. But this is not good enough. Youth unemployment, especially for the poor and minorities, is still unacceptably high.

Based on the experience we have gained over the past three years, and on the advice of the thousands of Americans who helped the Vice President's Task Force on Youth Employment over the last nine months, my Administration has devised a new approach, which I announced two weeks ago. Under my program, the most significant new domestic initiative I will be sending to Congress this year, the Federal government will be making its most comprehensive effort ever to eradicate the causes of excessive and harmful youth unemployment.

By 1982 this new program will have increased Federal resources committed to reducing youth unemployment by \$2 billion, to a total of \$6 billion. The program will have two key components: for in-school youth, we will have a major effort through the Department of Education to teach basic skills to low-achieving youth in junior and senior high schools located in low-income communities, while providing work experience and training after school hours. For disadvantaged out-of-school youth, we will provide, through the Department of Labor, redesigned and expanded work experience and training programs, as well as basic skills programs managed by the Department of Education.

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The Department of Education's basic education and skill training program, when fully implemented, will provide basic education and employment skills to approximately 1 million low-achieving junior and senior high school students in about 3,000 of the poorest urban and rural school districts around the country. The new program will emphasize:

- basic skills for low-achieving youngsters, including help for students with limited ability in English;
- school-wide planning with the active involvement of teachers, parents, employers, and the community;
- using the link between work and classroom-learning as a way to motivate students to stay in school; and
- a major role for vocational education in preparing young people for work.

The Department of Labor's new Youth Employment Program, when fully implemented, will provide education, work experience, training, labor market information and other services to more than 500,000 additional young people in each year. The new resources, when added to current programs, will serve over 2.5 million 14- to 21-year olds each year.

The program will emphasize:

- additional training and work experience opportunities for older and out-of-school youth;
- stringent performance standards for both participants and program operators;
- financial incentives to encourage greater cooperation between CETA sponsors, local employers, and school officials; and
- consolidation of three of the existing CETA youth programs and closer coordination with the summer employment program to simplify local administration and reduce paperwork.

We have learned from the 1960's and the 1970's. We know we must concentrate on administration and management. We know that we must have tough performance standards, not merely allocation formulas. We know that the partnership between government and all elements of the private sector must be made a reality, and that focusing on basic skills now is the key to job success in the future.

We also know that the hope our young people have for their lives in this great country is our most precious resource. We must keep that hope alive.

We will be working closely and intensively with the Congress to enact and carry out this youth employment program as soon as possible.

#### Trade

This past year was one of unmatched and historic achievement for a vital component of the U.S. economy -- exports and trade. In 1979, nearly 3 million jobs in our manufacturing industries, or one out of every seven jobs in manufacturing, depended upon our export performance in overseas markets.

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Our exports were a key contributor to the growth of the U.S. economy in 1979.

Exports of agricultural and industrial goods grew by an unparalleled \$35 billion, reaching a level of \$130 billion. This represented an increase of 25% over exports in 1978. This record increase in exports, coupled with a slower rate of growth of imports, resulted in substantial improvements of \$5 billion in our balance of trade. Furthermore, a rapid growth of service exports in 1979 led to a \$13 billion improvement in the current account, bringing that account from a deficit in 1978 to near balance in 1979.

I expect that in 1980 our exports will continue to strengthen and that, if we can continue to further conserve and limit imports of oil, we will further improve our trade balance position and that of the dollar. The future for American exports is bright, and will remain so, despite the necessity of suspending certain exports to the Soviet Union.

This Administration has accomplished several goals in the last year in assuring that there will continue to be greater exports and, therefore, job possibilities for U.S. workers and farmers.

To improve the condition of access of U.S. exports to foreign markets, I signed into force in July of last year a new trade act which reflected two years of hard bargaining in the recently concluded round of multilateral trade negotiations. These negotiations, which included all major developed and lesser developed countries, resulted in agreements to strengthen the rules of conduct of international trade and open new markets to U.S. exports. These negotiations were of historic importance in their scope and accomplishment, and their success is attributable to close cooperation that existed during and after the negotiations between the Congress, the private sector and the Administration.

Our negotiating success now challenges us to take advantage of the opportunity for improving further our export performance. To meet this challenge, I proposed in 1979 a major reorganization of the government's trade policy and export promotion activities. That reorganization will strengthen government coordination in the trade field and provide an improved basis for protecting American interest in the recently negotiated trade agreements. I put this reorganization into effect, with Congressional approval, earlier this month. With the changes initiated in my trade reorganization, we will ensure that trade between the United States and its trading partners will be conducted fairly and openly.

Consistent with my decisions on suspending certain types of trade with the Soviet Union, my Administration will be seeking this year to find additional ways to foster U.S. export expansion. We are studying the possibility of further agreements on expanded trade with both traditional and newer trade partners, including China. I look forward to working with the Congress on ways we can continue to improve our trading position which, in turn, will help maintain a prosperous American economy.

#### Small Business

This year marks the high point of three years of accomplishment for small business under my Administration, and the beginning of a decade of continuing effort to strengthen this large and vital sector of our economy.

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The White House Conference on Small Business, which I convened eighteen months ago and which has just concluded its deliberations, fulfills a pledge I made in 1976 that the voice of small business would be heard in my Administration. In anticipation of the Conference, I called on the head of every executive Department and agency to propose at least one initiative of benefit to small business. Over 160 separate initiatives have been proposed and are under examination, and many of them have already been put in effect.

We have made great strides in reforming our regulatory process, cutting down Federal paperwork and developing flexible regulations which provide for minimizing or eliminating burdens on smaller businesses. The capital gains tax has been significantly reduced, and corporate taxes on small businesses have been lowered.

We have also increased Small Business Administration lending activity, from \$1.8 billion in 1976 to \$3.1 billion in 1979, an increase of 72%. Since 1977 we have more than doubled Federal purchases of goods and services from minority firms from \$1.1 billion to \$2.5 billion in 1979. I am confident that such purchases will exceed \$3.5 billion this year.

I have put into place a comprehensive policy to strengthen the role of women in business, and have directed Federal agencies to take affirmative action to include women in management assistance and other business-related programs.

SBA's advocacy role has been strengthened at my direction, and SBA has been added to the membership of the Regulatory Council and the Productivity Council, to help assure that the problems and issues facing small business are addressed wherever relevant policy decisions are made with the Federal government.

To reduce the paperwork and regulatory burdens small businesses face in raising capital, I have recently proposed a Small Business Issuers' Simplification Act. This legislation will exempt from the burdensome registration requirements of the Federal securities laws sales of securities by small businesses to institutional investors, such as banks, insurance companies and pension funds, and others making investments of at least \$100,000.

Finally, last week I sent to the Congress a Message on Small Business to emphasize the vital importance of small business and to report to you on the steps we have already taken and plan to take in 1980 to strengthen small business.

#### Minority Business

From the beginning of my term, I have worked with the Congress to increase opportunities for minority business. As a result of our efforts, enormous progress has been made in the last three years:

- o Federal procurement from minority-owned firms has increased by nearly two and a half times;
- o Federal deposits in minority-owned banks have nearly doubled;
- o minority ownership of radio and television stations has increased by 65%;
- o almost 15% of the funds spent under the Local Public Works Act of 1977 went to minority-owned firms;
- o the Section 8(a) program operated by the Small Business Administration has been reformed and strengthened.

This year, my Administration is committed to expanding upon the progress made to date. This year, I am committed to more than tripling the 1977 level of federal procurement from minority-owned firms, and I have no doubt we can meet that goal.

My 1981 budget improves the targeting of Small Business Administration loans to minority-owned businesses. We will also expand management, technical, and training assistance for minority firms and provide substantial funding increases for minority capital development under the SBA's minority enterprise small business investment company (MESBIC) program.

I will also be proposing to the Congress a minority business legislative initiative to establish in the Department of Commerce a Minority Business Development Agency. That Agency, a successor to the Office of Minority Business Enterprise, was established last year under administrative authority, but I believe Congressional authorization would strengthen its operating abilities.

#### Women in Business

Last year I announced a new policy to strengthen and foster the growth of women-owned businesses. My new budget includes funds to make this policy a reality by increasing SBA direct loans to women by 50%, by assisting women in gaining access to sources of financing, and by expanding management and technical assistance to women. By insuring that women have fuller access to opportunities to start and maintain their own enterprises, we will start a genuine momentum to take full advantage of the contribution which women can make to the growth and productivity of our economy.

## II. CREATING ENERGY SECURITY

Since I took office, my highest legislative priorities have involved the development of our Nation's first comprehensive energy policy. The struggle to achieve that policy has been difficult for all of us, but the accomplishments of the past three years leave no doubt that our country is finally serious about the problems caused by our over-dependence on foreign oil. The accomplishments can be lost, however, and the progress stopped, if we fail to move forward even further this year. There is no single panacea that will solve our energy crisis. We must rely on and encourage multiple forms of production -- coal, crude oil, natural gas, solar, nuclear, synthetics -- and conservation.

It is therefore essential that Congress enact the major energy bills I proposed last year; and their enactment will be my most immediate and highest legislative priority this year.

#### Windfall Profits Tax

My highest, most immediate legislative priority during this Session is prompt passage of a sound windfall profits tax on crude oil.

Last April, I proposed a tough windfall profits tax to recoup a portion of the unearned income that would accrue to the oil companies as a result of the phased decontrol of domestic crude oil prices and OPEC price increases. It is essential that these revenues be invested on behalf of all Americans to help us become an energy secure nation. The revenues from the tax will be used to support key national energy goals: low-income energy assistance, improved and expanded mass transit and energy supply and conservation programs.

The windfall tax that I proposed was also carefully designed to provide incentives needed to increase domestic

oil production. Under my proposal, we expect a barrel per day increase in domestic production due to decontrol and higher world prices. Without any windfall profits tax production would be only marginally higher by 1985.

The American people clearly want and our national energy needs clearly require -- a tough windfall tax. We cannot afford further delay.

The House-Senate Conference Committee has reached agreement on a tax raising \$227 billion over the next ten years. A tax at that level is acceptable, provided the components of the tax are consistent with sound energy policy. I urge the conferees and the Congress to approve forthwith a tax that I can sign. There can be no higher legislative priority.

#### Energy Mobilization Board

Last July, together with a comprehensive energy program, I asked Congress to join with me to create an Energy Mobilization Board, (EMB). The Board can cut through burdensome and unnecessary red tape and reach prompt decisions on designated priority energy projects. Decision-making can be streamlined without overriding of substantive law, which I strongly oppose. The Board is a key element of our strategy to attain energy security by cutting foreign oil imports in the coming years. Prompt passage of the EMB is one of my highest priorities this year, and I urge the Congress to complete its action on this proposal without delay.

#### Energy Security Corporation

Last year, I proposed the creation of an Energy Security Corporation to lead our national effort to develop and produce synthetic fuels, coal-based synthetics, oil shale and biomass. The Corporation would be an independent body, chartered by the government and authorized to use a variety of financing tools -- principally price guarantees, Federal purchases, and loan guarantees -- to stimulate private sector development of synthetic energy alternatives to imported oil.

I have recommended that the Corporation be given a goal to develop the capacity to produce 1.75 million barrels per day of synthetic fuels, oil shale, and biomass by 1990. With an ability to produce commercially synthetic alternatives to foreign crude oil, our Nation will have effectively capped the price which foreign oil producers can charge for crude oil.

We cannot do the job we must do for our Nation's security by operating this program from within the government. The Corporation can much more easily obtain the needed talent and operate without the constraints binding a government agency.

Enactment of the legislation containing the Energy Security Corporation is one of my highest legislative priorities for this Session. I urge the conferees to complete this work expeditiously so that the Corporation can open its doors as early as possible this year.

#### Reduction in Utility Oil Use

I will soon send to the Congress legislation which will assist utilities in the use of coal, and encourage them to retire existing oil burning plants for generating electricity. The Department of Energy and my staff have worked very closely with Congressional energy leadership over the last several months to develop a legislative proposal which can be acted upon quickly.

My proposed utility oil use reduction legislation will help us to achieve two of our basic energy goals -- decreasing our dependence on foreign oil and increasing our production

of more abundant and secure energy supplies, such as coal. For that reason, passage of this legislation will be one of my highest energy priorities this year.

#### Gasoline Rationing

I will soon be sending to Congress for its approval a standby gasoline rationing plan, under the authority of legislation I signed into law last year. In developing this plan, we have given priority attention to accommodating essential gasoline usage, bearing in mind the need to design a plan which is workable and which can be put into place quickly if a severe emergency arises.

I recognize the difficulty of developing a plan that meets the many competing State and local concerns. Last year's experience demonstrated that difficulty very well. I am determined, as I am certain Congress is, to avoid repeating it.

My Administration will work very closely with Congress on the standby plan. I hope the Congress will recognize the overriding national importance of emergency preparedness and will take action early to approve my proposed plan.

I do not intend, under our current supply conditions, to implement a rationing program. But we can no longer afford to be unprepared for the possibility of further severe interruptions in energy supplies.

#### Energy Conservation

In my very first energy address to the Nation in April 1977, I stressed the importance of conservation as the cornerstone of our national energy policy. It is the cheapest and fastest means of reducing our dependence on imported oil and it constitutes an alternative source of supply. To the extent that we conserve — in our homes, factories, cars, and public buildings — we make the task of providing secure sources of energy for the future that much more attainable.

In November, 1978, I signed into law our country's first energy conservation tax credits. These provide up to \$300 for home conservation investments, and an additional 10% investment tax credit for industrial investments in energy efficient equipment. At the same time, we put in place a requirement that utilities provide energy audits for their customers and offer to arrange financing. We also established stiff taxes on new gas guzzling automobiles. As a result of my April 1977 initiatives, we are also providing a total of \$900 million over three years to weatherize schools and hospitals across the Nation.

Last July, I proposed a program to provide \$5.8 billion over the next decade to subsidize interest rates on homeowner loans for conservation investments. This program will be targeted to low- and moderate-income homeowners and apartment owners for whom the tax credits are less effective as an incentive. Under this program it is expected that consumers' total monthly bills will decline since the financial savings resulting from lower energy use will be greater than the monthly payments on the subsidized loans.

I consider this new program to be an essential piece of my overall conservation strategy and urge the House-Senate Conference Committee now working on the bill containing this provision to complete work promptly.

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Energy conservation must also go forward at the State and local levels. To help that important effort, I am again urging Congress to pass my proposal, under the authority of the proposed Energy Management and Partnership Act, to provide grants to local governments to meet national energy conservation goals.

### Solar Energy

Last June, I sent the Congress a Message on Solar Energy outlining my Administration's solar program and setting a national goal for the year 2000 of deriving 20% of this Nation's energy from solar and renewable resources. A firm and ambitious course — not only by the Federal government but also by State and local governments, private industry, academia and private citizens — is required to reach this goal.

As part of my solar program announced in June, I proposed a number of initiatives to the Congress to assist in solar energy development. Among those were the establishment of a Solar Energy Development Bank funded at \$150 million per year to provide subsidized loans for the installation of solar equipment on homes and commercial structures, and additional tax credits for passive solar construction, wood stoves, industrial and agricultural solar applications, and gasohol. These initiatives have yet to be enacted by the Congress and I urge prompt action on these measures to help speed the penetration of solar technologies in the marketplace.

In addition, my FY 1980 program for solar energy exceeded \$1 billion government-wide. This is more than three times greater than the program in place when I took office. In FY 1981 government-wide expenditures for solar and renewable energy will be nearly \$1.4 billion and will include programs administered by the Departments of Energy, Agriculture, Interior, Defense, State, Housing and Urban Development, and the Tennessee Valley Authority. The Federal solar program has as its overall objectives, the emphasis on basic research and development of solar technologies not currently economic such as photovoltaics, where electricity is generated directly from the sun, and the provision of funding and technical information to accelerate the use of marketable solar technologies which are available now. Solar heat and hot water and wood energy are among these technologies.

We will continue to work with the Congress this session on passage of critical solar energy legislation. We are making progress on the transition away from our dependence on fossil fuels and towards the widespread use of renewable sources of energy. We must maintain an aggressive policy to achieve this transition.

### Nuclear Safety

Immediately following the accident at Three Mile Island, I established a Presidential Commission, chaired by the President of Dartmouth College, to report to me on actions needed to prevent recurrence of this kind of accident. Safety is and will remain my Administration's primary priority in the regulation and management of nuclear power. I have taken steps to correct virtually all problems identified by the Kemeny Commission and have acted to implement most of its specific recommendations, including:

- o A reorganization of the NRC to strengthen the role of the Chairman. I will soon send to Congress a reorganization plan to give the Chairman power to select key personnel and act on behalf of the Commission during an emergency.
- o Appointment of a new Chairman of the NRC from outside the agency when the next vacancy occurs. In the meantime, I have designated Commissioner Ahearne

as Chairman with a mandate to initiate changes needed to assure the safety of nuclear power plant operations.

- o Direction to the Federal Emergency Management Agency to lead all off-site emergency activities and review all emergency plans in States with operating reactors by June.
- o A request to the NRC to accelerate its program to place a resident Federal inspector at every reactor site, and to upgrade training and evaluation programs for reactor operators.

I endorsed the approach the NRC adopted to pause in licensing, but have urged the Commission to complete its work as quickly as possible, and in any event no later than June of this year.

Once we have instituted the necessary reforms to assure safety, we must resume the licensing process promptly so that the new plants which we need to reduce our dependence on foreign oil can be built and operated. Nuclear power is an option that we should keep open.

#### Gaschol

I have recently proposed a program to accelerate dramatically America's production and use of gaschol, as yet another important way on which we can wage -- and win -- our energy war.

My Administration is committed to a program which will provide between \$8.5 billion and \$12.8 billion of assistance to stimulate production of alcohol fuels over the coming decade. We will quadruple current gaschol production capacity by the end of this year. During 1981, we should be capable of producing ethanol at an annual rate of 500 million gallons -- more than six times the current rate. If this entire amount of ethanol were turned into gaschol, it would replace almost 10% of our anticipated demand for unleaded gasoline in 1981.

Our overall gaschol program will spur the investments that we together must make for a more secure energy future. We will create new markets for our farmers. We will no longer have to throw away waste materials which can be turned into profitable, essential fuels.

Our Nation's enormous agricultural and fiber resources can be used to help provide a secure source of energy for our future. By producing gaschol from fiber and agricultural by-products, we can meet fuel needs for millions of Americans, including our farmers. I am eager to work with the Congress on my alcohol fuels program, so that we can soon have legislation that will authorize and provide the funding for this important energy development.

#### Energy Impact Assistance

As new domestic energy resources are developed, particularly in rural or isolated areas of the country, we must provide for the needs of rapidly developing communities. My Administration will continue to work with the Congress to enact legislation establishing an Inland Energy Assistance program, with funding of \$150 million per year, to aid those States and local areas which are experiencing a rapid growth in population as a result

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of new energy supply development. These communities often cannot plan for or meet increased need for new public facilities or services, since the population increases occur before the new energy supply activities are fully developed and producing local revenues. This legislation is essential to ensure that the burdens associated with solving our energy problems are borne equitably by all citizens and regions of the country.

### III. ENHANCING BASIC HUMAN AND SOCIAL NEEDS

For too many years immediately preceding my Administration, too many of our Nation's basic human and social needs were being ignored or dealt with insensitively by the Federal government. Over the past three years, we have significantly increased funding for many of the vital programs in these areas; developed new programs where needs were unaddressed; targeted Federal support to those individuals and areas most in need of our assistance; and removed barriers that have unnecessarily kept many disadvantaged citizens from obtaining aid for their most basic needs.

Our efforts over the past three years have produced clear progress in our effort to solve some of the country's fundamental human and social problems. The Administration and the Congress, working together, have demonstrated that government must and can meet our citizens' basic human and social needs in a responsible and compassionate way.

But there is an unfinished agenda still before the Congress. If we are to meet our obligations to help all Americans realize the dreams of sound health care, decent housing, effective social services, a good education, and a meaningful job, we still have important legislation to enact this year. The legislation is before the Congress, and I will be working with you toward its enactment.

### HEALTH

#### National Health Plan

Last June, I proposed to Congress a National Health Plan which will enable the country to reach the goal of comprehensive, universal health care coverage. The legislation I submitted lays the foundation for this comprehensive plan and addresses the most serious problems of health financing and delivery. It is realistic, affordable, and enactable. It does not overpromise or overspend, and, as a result, can be the solution to the thirty years of Congressional battles on national health insurance. My Plan includes the following key features:

- o nearly 15 million additional poor would receive fully-subsidized comprehensive coverage;
- o pre-natal and delivery services are provided for all pregnant women and coverage is provided for all acute care for infants in their first year of life.
- o the elderly and disabled would have a limit of \$1,250 placed on annual out-of-pocket medical expenses and would no longer face limits on hospital coverage;

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- o all full-time employees and their families would receive insurance against at least major medical expenses under mandated employer coverage;
- o Medicare and Medicaid would be combined and expanded into an umbrella Federal program, Healthcare, for increased program efficiency, accountability and uniformity; and
- o strong cost controls and health system reforms would be implemented initiatives, including greater incentives for Health Maintenance Organizations.

If enacted this year, my Plan would begin providing benefits in 1983.

I urge the Congress to compare my Plan with the alternatives -- programs which either do too little to improve the health care needs of Americans most in need or programs which would impose enormous financial burdens on the American taxpayers. When that comparison is completed, I am convinced the Congress will see the need for and the benefits of my Plan and work toward prompt enactment. We cannot afford further delay in this vital area.

#### Hospital Cost Containment

Hospital Cost Containment remains the single most important piece of legislation that the Congress can pass to demonstrate its commitment to fight inflation. This legislative initiative will save billions of dollars for our Nation's consumers by eliminating unnecessary and wasteful hospital services. We can no longer allow hospital inflation to put needed health care out of the reach of the average American. In a sector where there is an absence of competitive forces, Hospital Cost Containment legislation is necessary to restrain spending, while the process of developing other effective measures proceeds. The longer we delay enacting Cost Containment, the more expensive our fight against hospital inflation will become. I am asking the Senate to move quickly on this legislation.

#### Health Promotion and Disease Prevention

Last July, the Surgeon General released Healthy People, a landmark report on health promotion and disease prevention. The report signals the growing consensus that the Nation's health strategy must be refocused in the 1980's to emphasize the prevention of disease. Specifically, the report lays out measurable and achievable goals in the reduction of mortality which can be reached by 1990.

Consistent with this report, the health strategy I will propose in my FY 1981 budget places unprecedented emphasis on prevention. This strategy includes increased funding for many new and continuing programs in the areas of environmental hazards, workplace health and safety, commercial product safety, traffic safety, community water fluoridation, and health education, promotion and information.

#### Maternal and Child Health

Ensuring a healthy start in life for children remains not only a high priority of my Administration, but also one of the most cost effective forms of health care.

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When I took office, immunization levels for preventable childhood diseases had fallen to 70%. As a result of a concerted nationwide effort during my Administration, I am pleased to report that now at least 90% of children under 15, and virtually all school-age children are immunized. In addition, reported cases of measles and mumps are at their lowest levels ever.

Under the National Health Plan I have proposed, there will be no cost-sharing for prenatal and delivery services for all pregnant women and for acute care provided to infants in their first year of life. These preventive services are recognized to have extremely high returns in terms of improved newborn and long-term child health.

Under the Child Health Assurance Program (CHAP) legislation which I have already submitted to this Congress, an additional two million low-income children under 18 will become eligible for Medicaid benefits, which will include special health assessments. CHAP will also improve the continuity of care for the nearly 14 million children now eligible for Medicaid. An additional 100,000 low-income pregnant women will become eligible for prenatal care under the proposal. We must work together this year to enact CHAP and thereby provide millions of needy children with essential health services.

For the third consecutive year, I am requesting expansion of the special supplemental food program for women, infants, and children. Under my proposal, over 2 million low-income nutritionally needy mothers, their nursing infants, and children will receive special food supplements each month. These food supplements have been shown to prevent ill health thereby reducing later medical costs.

In addition to these legislative initiatives, I will propose increased funding in the FY 1981 budget for the successful Family Planning program, which targets services on low-income women and adolescents at high risk for unwanted pregnancy. Further, the 1981 budget contains continued funding for my Adolescent Health initiative, which is designed to provide and coordinate services to pregnant teenagers as well as reduce the incidence of unwanted pregnancies, will be continued in the new budget.

#### Expansion of Services to the Poor and Underserved

My health proposals for FY 1981 will place high priority on expanding other improvements which have been made during my Administration in the access and continuity of care for medically underserved groups. I will propose substantially increased funding for the most successful programs in this area, including Community and Migrant Health Centers, and the National Health Service Corps program, which places health professionals in rural and urban medically underserved areas. In addition, I am proposing legislation to make coverage of clinics providing comprehensive primary care services a mandatory benefit under Medicaid.

#### Mental Health

Last year, I submitted a Mental Health Message to Congress and proposed the Mental Health Systems Act, which is based upon recommendations of my Commission on Mental Health. The Act is designed to inaugurate a new era of Federal and State partnership in the planning and provision of mental health services. In addition, the Act specifically provides for prevention and support services to the chronically mentally ill, to prevent unnecessary institutionalization, prevention services, and for the development of community-based mental health services.

This year, my Administration will be working intensively with the Congress for prompt enactment of this important legislation, and the First Lady will continue her substantial work in this area, as an effective spokesperson and advocate for mental health reform throughout the country.

#### Worker Health and Safety

My Administration will continue to enforce fully laws protecting worker health and safety in a sensible and efficient manner. We will be making further efforts to eliminate frivolous and unneeded rules, while concentrating greater enforcement efforts on the most dangerous and particularly the most unhealthy occupational environments. More effective management of our worker safety programs will serve the interest that both labor and management have in better working conditions.

#### Drug Abuse Prevention

At the beginning of my Administration there were over a half million heroin addicts in the United States. Our continued emphasis on reducing the supply of heroin, as well as providing treatment and rehabilitation to its victims, has reduced the heroin addict population to 380,000, reduced the number of heroin overdose deaths by 80%, and reduced the number of heroin related injuries by 50%. However, drug abuse in many forms continues to detract from the quality of life and is of great concern to us and the people of all nations.

I am particularly concerned over the increasing quantities of heroin originating in Iran and Southwest Asia and we will continue to be especially alert to this threat in 1980. During 1980, we will also strive to reduce the supply of illegal drugs, both at their overseas sources and within the United States. While continuing a comprehensive treatment program, our priority will be to reduce drug abuse among adolescents. One of the important goals of my Administration at the beginning of this decade is to change the social acceptance of drug use.

#### Food and Nutrition

Building on the comprehensive reform of the Food Stamp Program that I proposed and Congress passed in 1977, my Administration and the Congress worked together last year to enact several other important changes in the Program. These changes will further simplify administration and reduce fraud and error, will make the program more responsive to the needs of the elderly and disabled, and will increase the cap on allowable program expenditures. In this session, I will continue to work with the Congress to achieve additional improvements in the Food Stamp Program and to eliminate permanently the expenditure cap. I will also propose this year that Congress pass the Administration's Child Nutrition Amendments to target assistance under our school meal programs to those most in need.

#### EDUCATION

The stern challenges of the 80's place new demands on every sector of our society. Education is the insurance we have to provide the talent and capability to meet every demand on our National agenda. The challenge of the 80's in education is to see that quantity education becomes quality education. That is a challenge we can meet. Last year, my Administration and the Congress successfully collaborated to create a new

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Department of Education. The Department will give education a stronger voice at the Federal level, while at the same time reserving the actual control and operation of education to states, localities, and private institutions. The Department combines nearly 150 existing Federal education programs into a cohesive, streamlined organization that will be more responsive to the needs of educators and students. The Department will cut red tape and paperwork to make the flow of Federal dollars to school districts and institutions of higher education more efficient, thereby providing students and educators with more benefits per dollar of Federal funds. We are determined to work closely with the Congress this year in making certain that the Department begins on a sound basis, consistent with the purposes and hopes Congress had when creating it.

To ensure adequate financial resources for education, I have requested, since taking office, an overall increase in Federal aid to education of 75% above the previous Administration's last budget. Many programs, including those serving disadvantaged and handicapped students and those providing financial aid to students enrolled in postsecondary education, have benefited from ever larger percentage increases during my Administration.

My FY 1981 budget request in education will represent a generous increase over last year's budget. There will be particularly significant increases in a number of programs serving special populations, in addition to the major new program designed to give youth the basic skills needed to get and keep a job. I am also recommending a substantial increase in the programs which deal with international education, to improve our understanding of other nations.

In addition, proposals I submitted last July to reauthorize the Higher Education Act are still under consideration in the Congress. The centerpiece of my proposals for the student financial aid programs is a major reform of the student loan programs. My proposal would, for the first time, provide a comprehensive program of loans from the Federal government for higher education students who need them. Our proposals would eliminate much of the paperwork and confusion that have plagued students, parents, and colleges by mandating a single application form for all Federal need-based assistance.

It is essential that this reauthorization be enacted this year. But the reauthorization legislation must be consistent with my commitment to a restrained, responsible budget. We are eager to work with the Congress to achieve this goal as soon as possible.

## INCOME SECURITY

### Welfare Reform

Last year, I proposed a welfare reform package which offers solutions to some of the most urgent problems in our welfare system. This proposal is embodied in two bills -- The Work and Training Opportunities Act and The Social Welfare Reform Amendments Act. Within the framework of our present welfare system, my reform proposals offer achievable means to increase self-sufficiency through work rather than welfare, more adequate assistance to people unable to work, the removal of inequities in coverage under current programs, and fiscal relief needed by States and localities.

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Our current welfare system is long overdue for serious reform; the system is wasteful and not fully effective. The legislation I have proposed will help eliminate inequities by establishing a national minimum benefit, and by directly relating benefit levels to the poverty threshold. It will reduce program complexity, which leads to inefficiency and waste, by simplifying and coordinating administration among different programs.

Last year the House passed The Social Welfare Reform Amendments Act, which addresses the major problems in our cash assistance programs. This year, we must continue this momentum toward welfare reform. I am determined to do whatever I can to help enact the two bills needed for the most comprehensive reform of the welfare system in our history.

### Child Welfare

My Administration has worked closely with the Congress on legislation which is designed to improve greatly the child welfare services and foster care programs and to create a Federal system of adoption assistance. The work of the Congress on this legislation is now almost completed. The well-being of children in need of homes and their permanent placement are primary concerns of my Administration, and I am determined to see improvement in the system which cares for these children. This legislation will help ensure that.

### Low-Income Energy Assistance

Last year, I proposed a program to provide a total of \$2.4 billion per year to low-income households which are hardest hit by rising energy bills. With Congress' cooperation, we were able to move quickly to provide \$1.6 billion for assistance needed this winter. Of that amount \$1.2 billion was provided for grants to eligible households and \$400 million for an energy crisis assistance program. The first checks were received by eligible families and individuals in early January.

I have already proposed, and will continue to press for, legislation which provides \$2.4 billion a year for low-income energy assistance. Funding from this program will come from the Windfall Profits Tax. Continuing this assistance is one of my high priorities in this session of Congress.

### Social Security

I have been deeply committed to restoring the public's confidence and trust in the Social Security System. With the passage of the Social Security Amendments of 1977, the financial stability of the System was improved. Each month 35 million Americans receive pension and disability checks. They can rely on doing so without fear of interruption.

We must, however, address the continuing financial viability of the Social Security System in light of changing economic circumstances. We must also review the equity of the sex-related distinctions contained in the system's benefit provisions.

To help ensure the system's viability, I will propose legislation to permit borrowing among the separate trust funds. This measure will strengthen the Social Security System for current and future beneficiaries. I will also review closely the work of several major study groups, and will consult with experts in the Department of Health and Human Services and the Congress to assess their recommendations.

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### Disability Insurance Reforms

As a result of the legislation we enacted in 1977, which strengthened the financing of the Social Security System, the Social Security disability insurance program is now in stable financial condition. Last year, my Administration proposed modifications in the program to further improve its administration and to increase incentives for disabled beneficiaries to seek rehabilitation and to return to work. In 1980, we will work with the Congress to enact these reforms. I hope the Congress will stay as close as possible to my original proposal.

### HOUSING

My Administration has brought improved stability to the Nation's housing market. Housing starts from 1977 through 1979 averaged more than 1.9 million units per year. We have been and remain committed to assuring the availability of an adequate level of mortgage credit during a period of record high interest rates. Toward that goal, we developed the six-month money market certificate and broadened the secondary market activity of the Government National Mortgage Association and the Federal Home Loan Mortgage Corporation. Most recently, the bank regulators introduced two and one-half year certificates which should become valuable sources of funds for savings institutions, enabling them to continue a high level of mortgage lending.

I am pleased that our anti-inflation policies have begun to slow the rate of growth in home prices. Within the context of our overall economic strategy, we will continue to support measures which provide for improved stability in the housing industry, avoiding the boom and bust cycles that led to unemployment, business failures and dislocation in the past. I have sent to the Congress legislation to update the government's emergency authority, under the Brooke-Cranston program to purchase mortgages in times of economic stress. The current authority could not be used effectively. I urge quick Congressional action on this legislation, so that the Administration will be in a position to use this program, if necessary.

We have also brought improved stability and predictability and higher production to the provision of assisted housing for low- and moderate-income Americans, including the elderly and the handicapped. During the period from 1978 through 1981, my Administration will have committed nearly 1.3 million units of housing for lower income renters and homeowners. Actual construction starts reached 175,000 units in 1979, a level which we will sustain through the next several years.

I will be proposing in my FY 1981 budget a level of 300,000 assisted rental units and 25,000 assisted homeownership units, a total 25% increase over 1980 levels. This recommendation reflects my Administration's concern about the number of poor Americans still living in substandard housing. I will also propose this year to extend HUD's home ownership assistance and interest subsidies to low-income tenants in designated revitalization areas. That will help address the particular problem of displacement of low-income persons and the elderly by urban revitalization and condominium conversions.

My Administration will again be working with the Congress to pass the condominium reform legislation that I proposed last year. That legislation will provide basic protections

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for the purchasers of condominium units. Many unit owners lack adequate remedies to redress serious inequities under existing law, and expeditious Federal action in this area is a priority.

In 1980 we will also propose a number of significant new legislative initiatives. I will be proposing a comprehensive simplification and consolidation of the Nation's basic housing laws on mortgage insurance and mortgage credit activities of the Federal Housing Administration and the Government National Mortgage Association. This proposal will make the services of these agencies more understandable and accessible to the American public.

I will also be recommending prompt Congressional action to extend the Home Mortgage Disclosure Act, which has been an important factor in aiding the availability of mortgage credit in inner city areas.

Finally, building on the urban partnership we have established with the cities, we will continue to increase the control local governments exercise over the operation of Federal housing programs. We will propose a fundamental change in HUD's public housing modernization program to allow local authorities to use up to 50% of their public housing production funds for modernization and repair of the existing, deteriorated stock of public housing. And in recognition of the severity of the housing problems in America's rural communities, we will be implementing the Action Agenda of 12 Rural Housing Initiatives which I announced last month.

#### Neighborhood Development

Neighborhood development is an essential component of my policies designed to revitalize our Nation's urban areas. My Administration has taken a number of steps to assist non-governmental, neighborhood groups carry out community improvement plans.

In Fiscal Year 1981, I will propose increased funding for the Neighborhood Self-Help Development Program. This program aims to build the capacity of independent, neighborhood organizations to implement conservation and revitalization projects in low- and moderate-income neighborhoods.

In 1980, I will strongly support the renewal of the Home Mortgage Disclosure Act in order to encourage neighborhood reinvestment. My Administration will also continue to support fully the neighborhood reinvestment actions of independent regulatory agencies, such as the Federal Home Loan Bank Board's Community Investment Fund.

#### TRANSPORTATION

A major goal during the 1980's is to bring about a dramatic increase in the economic and energy efficiency of our transportation systems. While this Nation's transportation facilities are among the best in the world, they were planned, designed and constructed in an era of abundant and cheap energy. The country now faces a totally different situation of scarce and increasingly expensive energy. To help combat this problem, I have proposed to use \$16.5 billion over the next decade from the windfall profits tax revenues to increase the energy efficiency of transportation. Of that, \$13 billion would be allocated to increase transit capacity; \$2.5 billion would be directed to promote the energy-efficient use of the automobile; and \$1 billion for research on automotive fuel efficiency. I urge the Congress to enact this proposal without delay.

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To further promote energy conservation, stimulate urban growth and create new employment opportunities in the inner cities, I urge the Congress to support mass transportation authorization legislation. This year I will seek reauthorization and extension of the public transportation grant program.

With the assistance of the Congress, we have taken a number of positive steps to reform outmoded transportation regulation. The Airline Deregulation Act of 1978 is working well, with reduced passenger fares per mile, and with the airlines better able to withstand the effects of recession and fuel price increases than would have otherwise been possible. To continue that type of progress, last year I submitted truck and rail regulatory reform bills and I am committed to seeking their enactment in 1980. These important bills will save consumers billions of dollars annually and reduce wasted fuel consumption.

To further improve America's railroads, I have introduced legislation to direct Federal railroad financial assistance toward restructuring of failing railroads and improved employment efficiency.

I will also ask Congress to increase funding for and extend the life of the Northeast Corridor Improvement Project to improve passenger rail services in the Northeast.

Statutory authority for present airport programs and related aviation taxes will expire during 1980. I have already sent to the Congress a proposal to use nearly \$15 billion from the Airport and Airways Trust Fund over the next five years for airport and aviation expenses. I urge Congress to enact this proposal this year.

Finally, I am committed to the further development of our maritime industry. To achieve maximum export competitive position for the United States, the ties between our port facilities and our land transport facilities must be greatly improved. Last year, my Administration conducted a comprehensive review of maritime policy and transmitted to the Congress our goals for liner regulation and merchant marine promotion. This year, we will be working with the Congress to pass legislation that embodies our interest in expanded trade and a strong merchant marine fleet.

#### SPECIAL NEEDS

##### Women

The efforts of my Administration over the last several years have been concentrated on providing American women with a full range of opportunities. Programmatic initiatives have been developed to overcome the widespread discrimination and disparities which women have faced in education, in health, and in employment.

The Women's Education Equity Act has been funded in both Titles I and II to provide school boards with grants for programs designed to end discrimination in education. The avoidance of discrimination in education has been also stressed through improvements in the enforcement of existing civil rights legislation.

The particular health problems faced have been addressed with increases in the family planning funds under Title XX, as well as improved teenage pregnancy funding and programs. Further, my National Health Plan provides complete coverage to pregnant mothers and infants without cost.

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Employment still continues to be a major problem with a wide gap between the average week wage of men and women. This is being addressed through major improvements in the funding for the Women's Bureau of the Department of Labor for model training programs and research projects.

CETA prime sponsors have been matched on a four-to-one basis to improve the amount of funding for these programs.

In the year ahead, the Administration will be supporting the passage of legislation to decrease domestic violence and provide shelters for battered spouses.

### Families

As part of my Administration's effort to focus attention upon and strengthen the family structure, last year I established the Office of Families within the Department of Health, Education, and Welfare. That office will help coordinate our activities in this vital area. Later this year, we will hold the White House Conference on Families, which I initially proposed during my 1976 campaign. This conference, the culmination of three years of work, will help focus public attention on the problems affecting families and on the means needed to solve or avoid those problems.

### Older Americans

My Administration has taken great strides toward solving the particular problems faced by senior citizens. Early in this term we worked successfully with the Congress to assure adequate revenues for the Social Security Trust Funds. I have also signed into law legislation prohibiting employers from requiring retirement prior to age 70, and removing mandatory retirement for most Federal employees. Further, the Administration worked closely with Congress to amend the Older Americans Act in a way that has already improved administration of its housing, social services, food delivery, and employment programs.

This year, I will be submitting to Congress a budget which again demonstrates my commitment to programs for the elderly. It will include increased funding for nutrition, senior centers and home health care, and will focus added resources on the needs of older Americans. I will also be seeking to strengthen further the Social Security System by proposing legislation to permit borrowing among the separate trust funds.

With the 1981 White House Conference on Aging approaching, my Administration is making every effort to assure an effective and useful conference. This forum should enable older Americans to voice their concerns and give us guidance in our continued efforts to ensure the quality of life so richly deserved by our senior citizens, with special attention to those in need of long-term care.

## GOVERNMENT ASSISTANCE

### General Aid to State and Local Governments

Since taking office, I have been strongly committed to strengthening the fiscal condition of our Nation's State and local governments. I have accomplished this goal by maintaining consistent and strong economic growth, and by encouraging economic development of local communities, and by supporting the General Revenue Sharing and Counter-Cyclical Fiscal Assistance programs.

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### General Revenue Sharing

This year I will propose the renewal of General Revenue Sharing. My Administration's proposal will forge a closer partnership among the Federal, State and local governments and will further emphasize the pivotal role of the States in our Federal system. My proposal for GRS renewal also will provide additional aid to the cities and counties that are most strained fiscally.

I will soon send legislation to Congress that will extend GRS for five years at the current funding level of \$6.9 billion. One-third of the money will be provided to State governments on the basis of the current distribution formula. As a condition for continued payments to the States, each State will be required to constitute a broadly-based Commission to assess and address the fiscal problems confronted by the State and by the local governments within the State. These Commissions will provide a mechanism for involving the States to a greater extent in the Federal-State-local government partnership.

Two-thirds of GRS payments will be provided to local governments on the basis of population, tax effort and per capita income. While I will propose retention of the basic distribution formula for local governments, I also will propose a number of modest formula changes to provide greater aid to localities with large service responsibilities and with insufficient fiscal resources.

My proposal for GRS renewal will be the cornerstone of my policy for Federal-State-local government relations in the 1980's. This policy will emphasize the need for all levels of government to cooperate in order to meet the needs of the most fiscally strained cities and counties, and also will emphasize the important role that GRS can play in forging this partnership. I urge Congress to move quickly on my GRS proposal, to assure that our Nation's States and localities can begin the 1980's in sound fiscal condition.

### Counter-Cyclical and Targeted Fiscal Assistance

Last year, I submitted to Congress a two-part fiscal aid package designed to strengthen further the fiscal condition of our Nation's States and localities. The first part of this legislation provided standby counter-cyclical legislation to protect States and localities from unexpected changes in the national economy. The second part provided transitional highly targeted fiscal assistance in FY 1980 to only the most distressed local governments.

Substantial progress has been made on this legislation in the past year. The Senate passed legislation providing both targeted fiscal assistance and counter-cyclical aid in August, 1979, and similar legislation is now ready for House action. It is important that Congress complete its action on this legislation early this year.

### URBAN POLICY

Two years ago, I proposed the Nation's first comprehensive urban policy. That policy involved more than one hundred improvements in existing Federal programs, four new Executive Orders and nineteen pieces of urban-oriented legislation. With Congress' cooperation, fifteen of these bills have now been signed into law. Additional action is expected to put into place more of these proposals this year.

### Economic Development

One of the principal goals of my domestic policy has been to strengthen the private sector economic base of our Nation's economically troubled urban and rural areas. With Congress' cooperation, we have substantially expanded the Federal government's economic development programs and provided new tax incentives for private investment in urban and rural communities. These programs have helped many communities to attract new private sector jobs and investments and to retain the jobs and investments that already are in place.

When I took office, the Federal government was spending less than \$300 million annually on economic development programs, and only \$60 million of those funds in our Nation's urban areas. My FY 1980 budget requested more than \$1.5 billion for economic development grants, loans and interest subsidies and more than \$2.5 billion for loan guarantees. Approximately 60% of these funds will be spent in our Nation's urban areas. My FY 1981 budget continues these programs at these already high levels. In addition, we have extended the 10% investment credit to include rehabilitation of existing industrial facilities as well as new construction.

This year we need to continue our progress by extending and expanding the programs of the Economic Development Administration. With Congress' cooperation, this legislation already has passed both the House and the Senate. Both the House and the Senate bills include the key elements of my original National Development Bank proposal and provide a substantial expansion of the economic development grant, loan, loan guarantee and interest subsidy programs of the Federal government. This legislation is vitally important to the economic revitalization and redevelopment of our Nation's economically troubled urban and rural areas. I am hopeful that the conferees will complete their work shortly so that we can get these essential programs underway.

I continue to believe that the development of private sector investment and jobs is the key to revitalizing our Nation's economically depressed urban and rural areas. To ensure that the necessary economic development goes forward, the Congress must enact legislation reauthorizing the programs of the Economic Development Administration. That legislation is now in Conference, and I urge the conferees to complete their work soon, so that we can provide a foundation for the economic development of our Nation in the 1980's.

### Community Development

The partnership among Federal, State and local governments to revitalize our Nation's communities has been a high priority of my Administration. When I took office, I proposed a substantial expansion of the Community Development Block Grant (CDBG) program and the enactment of a new \$400 million Urban Development Action Grant (UDAG) program. Both of these programs have provided essential community and economic development assistance to our Nation's cities and counties.

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This year, I will ask Congress to reauthorize both the CDBG and UDAG programs. I will propose that the CDBG program be reauthorized for three more years, and that a \$150 million increase in funding be provided for FY 1981. I also will propose that the UDAG program be extended for three years, and that \$675 million be provided for this program in the upcoming fiscal year. These actions should help our Nation's cities and counties to continue the progress they have made in the last three years.

### Rural Policy

Since the beginning of my Administration, we have taken steps to address the pressing needs of a changing and rapidly growing rural America. For many rural areas, and for most rural residents, the last decade was a time of rapid growth and development. While this growth and development has produced higher income and increased jobs in rural communities, it has also created substantial housing, energy, transportation, health, and management problems.

Last December I announced our Small Community and Rural Development Policy, which is the culmination of several years' work and is designed to address these pressing problems now affecting rural areas. The major elements of the policy involve:

- Creation of the position of Under Secretary of Agriculture for Small Community and Rural Development to provide leadership in carrying out this policy.
- Establishment of an inter-agency working group to assist in the implementation of this policy.
- Appointment of a citizens Advisory Council to advise the President on the performance of the Federal government in the implementation of this policy and to recommend needed changes.
- An invitation to the Nation's government-formed rural development councils to work in partnership with Federal agencies in delivering State and Federal programs to rural areas.
- A directive to the working group to annually review existing and proposed policies, programs, and budget levels to determine their adequacy in meeting rural needs and fulfilling the policy objectives and principles.

This is a landmark policy. It is the first time rural affairs has been given the prominence of a Presidential policy. Although many new program authorities for dealing with rural problems have been provided over the past two or three decades, there has been no institutional capacity at the Federal level for coordinating and focusing these efforts in a coherent and effective way. This policy provides that capacity, backed by my personal commitment to make it work.

My Administration will be working with the Congress this year to pass legislation needed to fulfill the commitment of this rural policy initiative.

### Refugees

In 1979 my Administration made significant progress in resolving a number of problems arising from the increase in refugees. Last March, I proposed comprehensive refugee legislation, and I regard its passage as a high priority this year. The legislation -- which is the first comprehensive reform

of our refugee immigration and domestic resettlement policies in twenty-eight years -- will bring common sense and cohesion to an unnecessarily fragmented approach to international and domestic refugee needs. Under vigorous new leadership, the Office of the U.S. Coordinator for Refugee Affairs, which I created last year, will aggressively address the needs of refugees at home and abroad. We will also encourage greater cooperation with the private sector and other actions to ensure successful refugee resettlement.

### Veterans

As our commitment to peace and our national security remains as strong as ever, so too is our Nation's obligation to those whose past service to our country helped to keep peace in the world. For that reason, my Administration's commitment to the needs of America's veterans will remain a high priority.

My Administration is committed to sustain high quality health care in the V.A. hospital system, the largest in the free world, and to encourage its growth in the most effective and efficient manner. That commitment will be reflected in my budget for FY 1981. The system must maintain its independent integrity.

In 1980, we will continue to honor and seek recognition of all our Nation's veterans, but we must acknowledge that veterans of the Vietnam War have yet to be accorded the full honor bestowed upon veterans of past wars. We will continue this year to assist Vietnam-era veterans with special needs and concerns, building on my initiative last year for these veterans. Accordingly, this year, I will again ask the Congress to reform and revitalize the VA's vocational rehabilitation program, and to extend eligibility for the G.I. Bill to those veterans of the Vietnam War era who are most in need of advanced job training opportunities. In addition, I will seek increased benefits for the recipients participating in the current G.I. Bill program. The Nation's veterans deserve these benefits, and I am committed to serving them.

My Budget also proposes legislation to grant a cost-of-living increase for the recipients of compensation for disabilities incurred while in the service of their country.

### CONSUMERS

#### Consumer Representation

Last September I signed an Executive Order designed to strengthen and coordinate Federal consumer programs and to establish procedures to improve and facilitate consumer participation in government decisionmaking. Under the Order, each Federal agency must adopt and implement its own strong consumer program.

I also established an interagency Council to coordinate the Agencies' actions in responding to the Executive Order. This year, under the leadership of my Special Assistant for Consumer Affairs, we will be working to make certain that the Order is faithfully implemented and that consumers receive better protection and assistance from Federal agencies.

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My Administration will continue to support efforts to provide financial assistance in regulatory proceedings to citizen groups, small businesses and others whose participation is limited by their economic circumstances. These programs are needed to balance the regulatory process by assuring opportunities for broad public involvement in these proceedings.

Finally, the Administration will continue to support reform of class-action procedures to ease the unnecessary burdens and costs of class actions, while at the same time preventing their use as an harassment technique.

#### National Consumer Cooperative Bank

My Administration worked closely with the Congress to create the National Consumer Cooperative Bank. The Bank is to provide loans, loan guarantees, and other financial services to non-profit consumer cooperatives, operating in such areas as food, housing, health, and auto repair.

To demonstrate my commitment to this innovative institution, I have signed legislation increasing appropriations for the Bank from \$4 million in fiscal 1979 to \$74 million in fiscal 1980. Legislation has also been signed adding two members to the Bank's board of directors -- one to represent the interests of small business and one to represent the general public.

This year we will continue our efforts with Congress to make the Bank a strong and vital resource for consumers.

#### Consumer Services Information

Genuine competition is lacking in many service industries because consumers generally lack comparative cost and quality information. To help alleviate this problem, my Administration will assist non-profit groups and State and local government agencies to develop local consumer information systems to provide accurate cost and quality data on locally provided services. An essential part of this effort will be an evaluation of the impact of better consumer information on inflation and productivity in the service sector.

### SCIENCE

#### Science and Technology

Since the beginning of my Administration, I have been committed to strengthening our Nation's research and development capability and to advancing those areas of science and technology which are vital to our economic and social well-being. That commitment has been reflected in: a 40% increase in basic research funding, resulting in the highest research and development funding in our Nation's history; a new Automotive Research initiative in which the industry, in partnership with the Federal government, will undertake basic research essential to help improve future automobiles; an acceleration of scientific and technological exchanges with the People's Republic of China; a major review of space activities and needs, resulting in a 60% increase in space funding and in the development of a space policy that will set the direction of our space efforts over the next decade; and a major new program to encourage industrial innovation.

Each of the undertakings will be pursued, in cooperation with the Congress, in this year.

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Space

The diversity of our activities in space shows that space technology has become an integral part of our lives -- in communications, in remote sensing for defense and civilian purposes, and in studies of the earth and the universe. Guided by a sound, aggressive, and fiscally responsible space policy, my Administration has undertaken a concerted effort to support and further our space activities.

During my Administration, the expenditures for Federal space programs have increased by 75%. Much of this increase is to meet the increasingly operational nature of our space activities. Nearly half of our expenditures are now for defense purposes; photo-reconnaissance satellites, for example, are enormously important in stabilizing world affairs and thereby make a significant contribution to the security of all nations. And my new initiative to establish an oceanic satellite system will provide invaluable ocean data for both the civil and defense sectors, thereby avoiding unnecessary duplication.

I have also emphasized space science and exploration, continuing to fund such spectacular programs as the Voyager missions that provided us with the remarkable close-up views of Jupiter and its moons. I am proposing two new measures -- the space telescope and the new Gamma Ray Observatory to provide a unique capability to observe distant galaxies and to obtain information about our universe from outside the earth's obscuring atmosphere.

In 1980, I will continue my strong support for the space program. That will be reflected in my budget and in my continued commitment to the space shuttle.

ARTS & HUMANITIESArts

The arts provide fundamental enrichment for our Nation. The National Endowment for the Arts has played a major role in focusing public attention on the arts. In doing so, the Endowment has brought wider audiences from all parts of the country into contact with all of the arts.

Since the beginning of my term, I have increased the government's support for the Endowment's activities. I will continue that record of expanded support again this year. This will enable the Endowment to strengthen its efforts to open the arts to new audiences, new forums, and new parts of the country.

Humanities

The humanities play a vital role in deepening our understanding of culture and society. To enable the National Endowment for the Humanities to continue its important efforts, I will again be proposing increased funding for the Endowment.

While maintaining the on-going programs aiding scholarly research, education, and cultural interpretation, the Endowment will use these increased funds to augment its support for:

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- o research designed to increase our understanding of the traditions, cultures, and directions of countries in the Third World;
- o studies exploring the complex public and ethical issues created by an increasingly technological society; and
- o efforts to preserve the priceless documents and other materials that constitute the heritage of this Nation and of its regional and ethnic communities.

To bring the fruits of this work to increasing numbers of the public at large, support will be provided for humanities activities in libraries, museums, and media, as well as for a variety of special activities tailored to the needs of groups that have traditionally not had ready access to opportunities for learning in the humanities.

In pursuing these objectives, the Endowment will concentrate on using Federal funds to stimulate support from non-Federal sources, in order to enhance our tradition of private philanthropy and to expand the financial base of our cultural institutions.

#### DISTRICT OF COLUMBIA

No longer is our Nation's Capital a convenient target for misdirected political attacks. My Administration has developed a partnership for progress with the District of Columbia.

My Administration worked with the last Congress to pass a proposed Constitutional amendment granting full voting representation to the citizens of our Nation's Capital. The ratification process for this proposed amendment has begun and I urge the State legislatures which have not ratified the resolution to join those which have. We will continue our efforts this year in the ratification effort.

Last year, progress was made toward strengthening the District's ability to meet its citizens' needs. With the Congress' help, we enacted legislation authorizing construction of the full METRO Mass Transit System and legislation funding the District's pension plan for municipal employees.

In 1980, we will build on this record. My Administration will continue to work closely with the Congress and Mayor Barry to expand home rule for the District, including development of a sensible formula for determining the Federal payment to the District.

I will continue working with Mayor Barry to make our Nation's Capital City a model for the rest of the Nation.

#### Commission on the Holocaust

Last year, I received and approved the recommendations of the President's Commission on the Holocaust, which I established to assess how our government might officially recognize, for the first time, the tragedy of the Holocaust. I will shortly be appointing a Council of distinguished Americans to develop ways to implement the Commission's proposals. The Council and my Administration will work closely with the Congress as we establish an appropriate memorial to the six million Jews and the millions of other victims of Nazism during World War II.

#### IV. MAKING GOVERNMENT EFFECTIVE AND EFFICIENT

One of my major commitments as a candidate was to make the Federal government more effective and efficient. Over the past three years, with Congress' help, I believe that enormous progress has been made toward that goal. Reforms thought to be impossible -- such as Civil Service Reform -- have been enacted. Regulatory burdens -- such as airline regulation and government paperwork -- have been reduced or eliminated. This coming year, I intend to work with the Congress to improve further the government's ability to serve the nation effectively.

##### Government Reorganization

One of my highest priorities has been to improve the quality and efficiency of Federal programs through reorganization. Since I took office, we have submitted 13 reorganization initiatives to Congress, and Congress has approved all of them. These initiatives have strengthened the Federal government's capacity to deal effectively with such critical issues as energy, civil service, disaster relief, civil rights, international development assistance, education and trade.

In 1979, Congress approved legislation that I sought to consolidate education programs in a new Cabinet department. The Department of Education will provide full-time leadership, improved management and direct accountability for its performance to me, to the Congress and to those involved in education at every level.

This month I put into effect a major reorganization of the Federal government's trade functions approved by Congress last year. In conjunction with the Multilateral Trade Negotiations Agreements this reorganization will ensure that expanded trade opportunities for American business abroad are fully realized, and that my goal of trade expansion is given a higher priority by the Federal government.

Organizational initiatives are also an important part of my energy program. We have consolidated enforcement functions for the Alaska Natural Gas Transportation System under a single Federal Inspector to ensure timely completion of the natural gas pipeline. To reduce our dependence on foreign oil, I have proposed the creation of an Energy Mobilization Board which will expedite Federal, State, and local decisions on proposed energy facilities. I am also urging the Congress to approve creation of an Energy Security Corporation to spur development of a domestic fuels industry.

This year I will propose to Congress another significant reorganization: a plan which will strengthen the internal management and effectiveness of the Nuclear Regulatory Commission. Safety is our highest concern in regulating nuclear power development, and my reorganization plan will help improve the NRC's ability to ensure nuclear safety.

##### General Management Reform

To simplify the government for our citizens and to reduce the burden of unnecessary requirements and regulations, we will pursue a number of initiatives this year. We have instituted a government-wide management system to mandate the cost effectiveness of new regulations and the sunseting of old ones. In 1980, we will continue to pursue further

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reform of regulations through legislation designed to make permanent a new framework for managing the regulatory process, and legislation to reduce paperwork and red tape. We will also pursue initiatives to simplify the eligibility requirements for human services programs and to improve the management and delivery of social services through increased use of private sector skills and talent. This reform will reduce the obstacles for needy citizens seeking assistance and improve our ability to remove fraud from the system.

Last year, we implemented a program to manage the government's cash flow more efficiently. We have saved over \$450 million a year, and we expect further annual savings of \$600 million through more timely collection of cash payments, tighter control over disbursements and reductions in idle balances.

We have vigorously implemented legislation passed last year to establish independent inspectors general in each department and coordinated their work through the Executive Group to Combat Fraud and Waste in Government. To spot areas where management reform is especially likely to increase efficiency, I have created a Management Improvement Council to diagnose such circumstances and prescribe a cure.

We will continue to pursue vigorously our efforts to improve the structure and management of government programs. This is tough, unglamorous work, but it is essential to reduce the cost of government and to provide better service to the American people.

#### Civil Service and Compensation Reform

In March 1978 I said that civil service reform would be the centerpiece of my government reorganization efforts. The Congress supported it, and I am pleased to report it is working very well. In the first real test of the reform act, over 98% of the eligible top-level managers joined the Senior Executive Service, choosing the challenge and accountability demanded by this new corps of top executives. The Office of Personnel Management, the Merit Systems Protection Board, and the Federal Labor Relations Authority authorized by the Act have operated effectively in their first year. And the agencies throughout the government continue to make substantial progress in implementing the other important civil service reforms. For the first time in the hundred year history of the civil service system Federal employees can get and hold jobs, and be paid, on the basis of actual on-the-job performance -- not merely length of service.

Last year, I asked the Congress to take the next step in my Federal Employee Compensation Reform Message. I urged you to pass a pay reform bill which would modernize the Federal compensation system. This legislation is fair to Federal employees and to American taxpayers alike. Our white collar, blue collar and military compensation systems must be reformed in order to make certain that we neither overpay nor underpay Federal employees. It is a fair bill, and one which will help restore public confidence in the Federal service. I urge Congressional action on it.

#### Regulatory Reform

Over the past three years, we have put into place a comprehensive program to overhaul the Federal regulatory establishment, and eliminate unnecessary regulatory burdens. For 1980, I am determined to continue the progress of this effort; it is the most important part of my ongoing campaign to make our government more efficient and effective.

Airline deregulation. The Airline Deregulation Act of 1978 has revolutionized air transportation. In the first year of its operation, the new environment of free competition created by the law produced a record number of flights and passengers, a much wider variety of service packages, and a savings of approximately \$2.5 billion in the fares paid by the travelling public. Under the Act, regulatory controls will continue to be relaxed, until in 1985, the CAB itself will be completely phased out of existence.

Trucking deregulation. The trucking industry is enmeshed in detailed regulations that control the routes truckers can drive and the goods they can carry. In addition, truckers are allowed to fix prices through industry rate bureaus. This regulatory system works to stifle competition, waste fuel, reduce service to small towns, and inflate prices.

My appointees to the Interstate Commerce Commission have started modernizing the system, but we need legislation to provide comprehensive reform. I have submitted a bill to open up entry, lift restrictions on the goods truckers may haul and the routes they may use, promote vigorous price competition, reduce regulatory delays, and improve safety on the road.

This bill is an important step in fighting inflation, and I look forward to passage of a sound bill by early summer. If appropriate legislation is not enacted, I would expect the ICC to proceed under its authority to implement reform initiatives.

In addition, we need legislation to increase competition in the household moving industry. The Senate recently passed a constructive bill, and I urge the House to strengthen and pass it.

Railroad deregulation. Railroads have traditionally been one of the most overregulated industries in America. As a result, management initiative, service, and competitive pricing have been stifled. Railroad plants and equipment have deteriorated, and the average railroad industry rate of return on investment is far too low. My Administration will continue to work to eliminate these wasteful conditions and the regulatory structure which helps cause them. Our principal weapon in that effort is the railroad deregulation bill that I proposed last year. Enactment of significant railroad deregulation legislation this year is essential to restoring our railroad system to its former strength.

Financial institutions regulation. Last year the combination of deposit rate ceilings and outmoded restrictions on the asset powers of thrift institutions produced severe inequities for the small saver, substantial savings outflows from many thrift institutions, and disruptions in the availability of mortgage credit. Contrary to its intended purpose, the Regulation Q system has contributed to the cyclical nature of the housing market and has destabilized the flow of mortgage funds. In a related area, changing competitive relationships, as well as innovations in the market, have increased inequities and produced a continuing decline in Federal Reserve membership. Now is the time to take the actions necessary to prepare for the financial environment of the 1980's.

The Congress passed legislation in 1979 which increased the ability of many Americans to obtain mortgage credit. In addition, the Congress made major progress toward enactment of the historic financial reform legislation I proposed last year.

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Legislative Veto. While supporting the Regulation Reform Act, I will strongly oppose proposals that would undermine the ability of the President to manage the regulatory process, or would cripple the effectiveness of needed programs. In particular, my Administration will oppose proposals to subject individual agency rules to veto by one or two houses of Congress, to transfer regulatory policy decision-making authority to the Federal courts, and to create rigid statutory procedures for Presidential supervision of Executive Branch regulatory agencies.

This last year has seen Congress besieged by assaults on various important regulatory statutes, especially the Federal Trade Commission Act, seeking groundless exemptions, crippling loopholes, and unprecedented Congressional interference with ongoing proceedings. I will resist strenuously all such efforts to confuse special interest pressure with regulatory reform.

### Communications

My highest priority in the communications area is passage of regulatory reform legislation covering the telecommunications industry. In addition, in 1980 we will continue our program to make the media more diverse and to ensure that the public gets the full benefit of the advances in communications technologies. Administration efforts include:

- o working to increase minority participation; already our program has helped produce a two-thirds increase in minority ownership of broadcast stations, and we will continue that progress;
- o working with the Federal Communications Commission to continue to eliminate needless paperwork and regulations;
- o pursuing plans to open up channels for as many as 1,000 new radio stations, to improve service to rural areas and provide more opportunities for minorities;
- o developing proposals to improve the way frequencies are assigned, including incentives for users to conserve the increasingly crowded radio spectrum;
- o encouraging the use of satellites, cable TV, and other technologies to deliver public services and to improve rural communications;
- o working with Congress and the FCC to protect First Amendment rights and the free flow of information, through such measures as my bill on police searches of newsrooms; and
- o continuing to support a strong, independent public broadcasting system and working to increase its coverage to reach all Americans.

In addition, I will submit to the Senate, later this year, the Treaty and Protocol that resulted from the World Administrative Radio Conference concluded in Geneva in December. This conference, and the follow-up conferences that will be held in the next few years, will determine the utilization

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of the radio spectrum for the rest of the century. We prepared for this conference for over two years; our delegation has secured for the United States all allocations necessary for its civilian and military services while also responding to the legitimate needs of the Third World nations.

### Sunset

We will continue to work with Congress to pass sunset legislation. This legislation will overcome the inertia that lets Federal programs continue when they have outlived their purpose. It will ensure that Congress regularly reviews programs to decide whether they should be changed or eliminated. A comprehensive sunset bill, with a strong mechanism to force action when programs need change, is a vital building-block toward making the government more efficient.

### Paperwork Reduction

In the past three years, my Administration has cut the amount of time Americans spend filling out Federal forms by 127 million hours -- almost 15%. I recently issued an Executive Order to continue this progress by strengthening our management program. However, Congress is enacting new paperwork requirements in energy, environmental protection, and other areas, and we must have legislation to provide the strong administrative controls that will be needed to minimize these burdens.

I urge Congress to pass a Paperwork Reduction Act to close the wide loopholes in Executive Branch oversight power and create new authority to halt duplicative data collection. In addition, I urge legislation be enacted to improve Federal statistical systems by strengthening central management and by encouraging agencies to share data, under new, tough confidentiality safeguards.

### Lobby Reform

The American people have a right to know what significant influences affect their national legislature. The proliferation of well-financed, organizational lobbying activities during recent years has demonstrated the clear need for reform of the outdated and ineffective lobby disclosure law now in effect. This year my Administration will again work with Congress to pass a sound lobby law reform bill -- one that respects the First Amendment rights of all Americans and minimizes paperwork burdens, yet allows meaningful disclosures.

### Public Financing of Congressional Elections

The impact of special interest contributions on congressional campaigns has grown dramatically in recent years. It is time to adopt public financing for congressional elections before it is too late. Such public financing will avoid even the appearance of undue special interest influence, and will allow worthy candidates without adequate funds to run for Congress. I urge the Congress to act on this legislation.

### Judicial Reform

In my Civil Justice Reform Message last year, I made proposals to increase the efficiency, cut the cost, and enhance the integrity of our Federal court system. Last year, I signed the Federal Magistrates Act of 1979. Both the Senate and the House have passed the Dispute Resolution Act, which would develop simple and informal means of resolving citizen disputes, and I look forward to early final action on this legislation. The Federal Courts Improvement Act has passed the Senate, and I urge the House to act on it early in this session. I hope that the Congress will also pass the other bills recommended in my Message, such as the one which would curtail diversity jurisdiction.

LEAA

LEAA's potential to improve and strengthen State and local criminal justice programs has never been realized. Two years ago, I proposed far-reaching reforms in its structure and programs. Last month, Congress passed, and I signed, a bill which incorporated most of those reforms and which reauthorized LEAA for four more years. These reforms will preclude excessive expenditure of funds for equipment, enable better information and research about crime problems and permit funding only of innovative programs which have a high probability or record of proven success. During this year we will implement the new legislation in a way that makes certain the agency is efficiently carrying out its mission of providing meaningful law enforcement assistance.

Patent Reform

As part of the Industrial Innovation policy that I announced last year, we will be seeking to reform our patent laws in a way which will spur creativity and invention. The Administration will be working with Congress to develop a single policy to guide the Departments and Agencies dealing with patents resulting from federally-sponsored research. Such uniform treatment should encourage the commercial use of discoveries while protecting the taxpayers' investment.

V. PROTECTING BASIC RIGHTS AND LIBERTIES

Since taking office, I have worked to protect and enhance the basic rights and liberties guaranteed to Americans under the Constitution and our other laws. With your cooperation, we have made important progress in this area. This year, though, important work remains to be done if our goal of ensuring equality and basic freedoms for all Americans is to be realized. The dream of equal opportunity remains unfulfilled. I will do whatever I can to bring that dream closer to realization.

Equal Rights Amendment

I am committed as strongly as possible to the ratification of the Equal Rights Amendment. Its ratification this year will be one of my highest priorities.

As a result of our efforts in 1978, the Equal Rights Amendment's deadline for ratification was extended for three years. We have now two years and three States left. We cannot afford any delay in marshalling our resources and efforts to obtain the ratification of those three additional States. With your help, I believe we can succeed this year.

Although the Congress has no official role in the ratification process at this point, you do have the ability to affect public opinion and the support of State Legislators for the Amendment. I urge Members from States which have not yet ratified the Equal Rights Amendment to use that ability.

Civil Rights

The completion of the civil rights reorganization and significant operational improvements in the agencies that carry out equal employment opportunity functions have enabled the federal government to shift its focus for the first time to large-scale enforcement efforts. These have been buttressed by our vigorous and successful posture in several landmark affirmative action cases. At the same time, the reorganization

mandate to eliminate unnecessary costs, paperwork and other burdens to businesses is being vigorously implemented by the Equal Employment Opportunity Commission. That will continue with increased resources this year.

To make certain that civil rights activities are given the highest priority in the Agencies, we have created a civil rights unit in the Office of Management and Budget. This new unit will monitor civil rights enforcement and advise the Director of OMB on the funding and management resources needed for effective enforcement.

#### Martin Luther King, Jr.

Dr. Martin Luther King, Jr. led this Nation's effort to provide all its citizens with civil rights and equal opportunities. His commitment to human rights, peace and non-violence stands as a monument to his humanity and courage. As one of our Nation's most outstanding leaders, it is appropriate that his birthday be commemorated as a national holiday, and I will continue to work with the Congress to enact legislation that will achieve this goal.

#### Fair Housing

Enforcement of laws against housing discrimination has lagged in comparison with the employment area. Because there is no adequate enforcement mechanism, Title VIII of the Civil Rights Act, which prohibits discrimination in housing, has been largely ineffective. I have strongly supported legislation which seeks to provide the Department of Housing and Urban Development with the power to hold administrative hearings and to issue "cease and desist orders" in cases where Title VIII has been violated. We will continue to work with the Congress during 1980 to enact this long-overdue authority. Its enactment will continue to be my highest legislative priority in the civil rights area.

#### Intelligence Charters

A legislative charter for the intelligence agencies and a charter for the FBI are long overdue. The failure to define in law the duties and responsibilities of these agencies has made possible some of the abuses which have occurred in recent years.

Several months ago, I submitted to the Congress a legislative charter for the FBI which protects the rights of our citizens while preserving the Bureau's ability to meet its important responsibilities. In 1980, we will continue to work with the Congress toward enactment of this legislation.

Events of the past year indicate the need for a strengthened and clearly defined role for our intelligence community. On the basis of the sound consultative work done already with Congress, I plan to submit a proposed charter early this year.

#### Hatch Act Reform

Federal employees who work in non-sensitive positions should have the right to participate in off-the-job political activities. My Administration will continue to support legislation which would reform the Hatch Act to accomplish this goal, and would prevent any on-the-job political abuse.

### Criminal Code

The Federal criminal laws are often archaic, frequently contradictory and imprecise, and clearly in need of revision and codification. My Administration will continue to work with the Congress to develop a Federal criminal code which simplifies and clarifies our criminal laws, while maintaining our basic civil liberties and protections.

### Labor Law Reform

Our labor laws are vital to ensuring that a sound labor-management relationship exists in collective bargaining. Efforts to abuse those labor laws, especially by unduly slowing or blocking their implementation, have increased in recent years. As a result, a reform of our labor laws is badly needed to guarantee that their intended spirit is fully observed and enforced.

I am again ready to work with the Congress to develop legislation which improves the fairness and effectiveness of our labor laws.

### Handicapped

During my Administration, we have made great strides toward ending discrimination against handicapped people through broadened employment opportunities, educational opportunities, and greater access to public facilities and services. Just after I came to office, the Department of Health, Education and Welfare issued the first regulations on Section 504 of the Rehabilitation Act. Since then, numerous other Federal agencies have issued final regulations, and we expect to have regulations from all the necessary agencies by the end of 1980.

Last year I supported legislation which would prohibit discrimination against the handicapped in private employment and housing. I will continue to support that initiative this year and to clarify legislative and administrative uncertainty about provisions of the Acts affecting the rights or programs affecting handicapped individuals.

While my Administration has worked to improve programs serving the handicapped, we must continue to push for removal of psychological and physical barriers against handicapped people in our society. We are actively organizing and preparing for next year's International Year of the Disabled. The International Year will enable this country -- with the public and private sector working together -- to demonstrate its commitment to the disabled and to teach or learn from other nations about ways to advance the quality of life of handicapped individuals.

### Privacy

Changes in our society are threatening the rights to personal privacy. Government and private institutions collect increasing amounts of information about individuals. Many decisions that once were made face-to-face are now based on recorded data, and modern technology allows this data to be transferred throughout the country instantaneously. Much of this information must be collected and used to enforce the laws, provide financial services, and for other important services. However, these needs must be balanced against the right to privacy and against the harm that unfair uses of information can cause.

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Last year, I announced the government's first comprehensive privacy program, building on legislation already passed to prevent improper use of wiretaps and improper access to personal bank records. This new program has five separate bills -- establishing privacy safeguards for medical, research, bank, insurance, and credit records and providing special protections, modeled on the wiretap laws, for electronic funds transfer systems. In addition, I have proposed legislation limiting police searches of newsrooms to deal with the problems created by the Supreme Court's Stanford Daily decision.

My privacy program includes non-legislative action as well. We have improved the handling of Federal records -- we stopped the growth of personnel records and started cutting back, and we established rules to control computer matching of Federal files. I have called upon employers to establish voluntary privacy codes for the records concerning their employees and launched nationwide hearings to promote that effort.

International guidelines are needed to protect the privacy of personal information transferred from one country to another, while avoiding disruption of needed information flows. We have spearheaded work in the Organization for Economic Cooperation and Development toward this end, and guidelines have been drafted for adoption this year.

The key protections, however, need legislation. I urge Congress to act now on the five privacy bills I have submitted.

#### VI. PROTECTING AND DEVELOPING OUR NATURAL RESOURCES

Two of our Nation's greatest natural resources are our environment and our fertile agricultural capacity. Since I have been in office, I have worked with the Congress to preserve, protect and where appropriate, develop our natural resources. In the environmental areas, I have been concerned about the importance of preserving a clean environment, and have taken a number of major actions designed to foster such an environment.

In the agricultural area, I have taken the steps needed to improve farm incomes and increase our agricultural production to record levels. With your help we can continue to make progress in both of these areas in 1980.

##### Environment

Balancing the need for resource development and conservation has been a major environmental theme of my Administration. I remain strongly convinced that this Nation can have economic and energy development and adequate environmental protection. As we open the decade of the 80's, all Americans can be proud of their natural and cultural heritage which continues to satisfy economic, recreational, and spiritual requirements.

1980 is the tenth anniversary of a decade of environmental awareness that began on Earth Day, 1970. During this past decade, monumental legislative achievements have occurred. These include: the National Environmental Policy Act, the Clean Air and Clean Water Acts, additions to our National Parks, Trails, and River Systems, and the Endangered Species Act. I was pleased to sign into law the reauthorization of the Endangered Species Act last year. During 1980 as we celebrate this tenth anniversary let us rededicate ourselves

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to the creation and maintenance of a safe and healthy environment, to the wise use and development of our natural resources, to the fair implementation of environmental statutes, to preserving unique wildlife resources, and to even greater achievements for improving the quality of life for all Americans.

During the next year, my Administration will vigorously pursue the protection of Alaskan lands; the implementation of an effective water resources policy; a careful implementation of domestic energy production programs, with proper regard for environmental values; a review of wilderness potential on the public lands; creation of a hazardous waste management program; fisheries development and coastal management policies.

#### Alaska Lands

Passage of legislation which adequately resolves the allocation of Federal lands in Alaska continues to be my highest environmental priority. At stake is the fate of tens of millions of acres of beautiful land, outstanding and unique wildlife populations, native cultures, and the opportunity to ensure that future generations of Americans will be able to experience and benefit from these nationally significant resources.

The proposals which I have supported in the 95th Congress, and again during the first session of this Congress, assure that Alaska's great national treasures can be preserved, while providing for increased domestic energy production and for the economic needs of all Alaskans.

In addition to recommendations for designating National Parks, Wildlife Refuges, Wilderness Areas, National Forests, and Wild and Scenic Rivers on the Federal lands in Alaska, I have or will be proposing aggressive but environmentally sensitive oil and gas development programs in Alaska's outer continental shelf and National Petroleum Reserve. My Administration is also stepping up the transfer of 103 million acres of Federal land to the State of Alaska and 44 million acres to Alaskan natives so that both the State of Alaska and the Native Corporations can build their economic base.

However, in order to maintain the proper balance between resource protection and development in Alaska, the Congress must now enact the comprehensive legislation which has been before that body for over two years. The 96th Congress will soon be asked to vote on what clearly amounts to the conservation decision of the century.

The House of Representatives has already passed a strong conservation bill and the Senate will shortly take up debate on this issue. I urge that the Congress carry out its responsibility to enact legislation which truly protects and preserves our natural heritage in Alaska.

#### Hazardous Waste/Toxic Substances

One of the most important environmental and public health issues facing our Nation is the threat caused by the improper disposal of hazardous substances. Accidents like those at Love Canal and Valley of the Drums have highlighted the inadequacy of the existing laws and inability of governments at all levels to respond quickly and efficiently to these dangerous incidents. In the coming years, there may be thousands of hazardous waste sites which will need attention, the cost of which could be enormous. Clearly an effective public policy is needed to deal with this situation.

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Last June, I submitted to Congress a comprehensive \$1.6 billion legislative proposal that establishes a system to deal with releases from uncontrollable hazardous waste sites as well as spills of oil and hazardous substances. This system includes provisions for emergency government response, effective enforcement, liability and in some cases, economic compensation. The system also calls for a partnership with the States in cleaning up and containing this problem. This legislation is absolutely essential if we are to meet our responsibilities to the public and I urge the Congress to act on it expeditiously.

#### Nuclear Waste Management

The problems related to the management, disposal and storage of nuclear wastes remains one of the most serious problems with nuclear power. My Administration has been deeply concerned with this problem for the past three years. An exhaustive study and review of this problem has been undertaken by the Administration over the past year.

Based on the findings and recommendations of that study, I will soon be proposing to Congress comprehensive legislation that deals directly with this problem. My proposals, if enacted, will represent the biggest step forward in the area of nuclear waste management since the dawn of the nuclear age. I urge the Congress to take action in this area this year.

#### RARE II

In 1979, I submitted to Congress my recommendations on wilderness for the National Forests under the RARE II procedure. These proposals include 15.4 million acres of new wilderness -- the most desirable areas within the vast review. Over 10 million acres are undergoing further study. In addition, I directed the Forest Service to release for multiple use management the 36 million acres of land that was designated for non-wilderness. I urge the Congress to approve my recommendations this year.

#### Water Policy Legislation

Sound water management is vital to the economic and environmental health of our Nation.

Administrative implementation of the comprehensive water policy initiatives which I announced in June of 1978 is nearing completion. We will continue to work with the Congress to pass legislation needed to improve further Federal water resources programs and to support the States in their primary responsibilities for water allocation and management.

I am pleased that last fall the Senate authorized an expanded grant program to the States for water management and water conservation technical assistance, and I expect the House to soon pass this legislation. The cost sharing bill which I have proposed is critically needed to give the States a more effective voice in setting water project priorities in state and Federal water policy decisions.

I believe the establishment of an independent review unit in the Water Resources Council is essential, and I urge the Congress to act quickly on the pending authorization. The independent review unit will provide an objective, impartial, technical analysis to the Administration and to the Congress, of water projects proposed for authorization or new-start construction funding. This information will enable the Administration and the Congress to make better informed decisions on where to invest the taxpayers' water resource dollars.

It should be clear that my Administration supports sound water resources development, and has taken several steps to improve the quality of projects sent to Congress for authorization and funding. I am concerned that the water projects authorization bills now under consideration by Congress threaten to overturn the progress made in recent years. I urge the Congress to give this legislation the careful and thoughtful scrutiny required by our joint commitment to restraining Federal spending and ensuring a sound environment.

#### Fisheries Development

Last May, my Administration proposed a fisheries development policy that recognizes both the importance of the U.S. commercial fishing industry to the Nation's economy and that fish is an important food source. This policy includes a recognition of the potential for fisheries expansion within the Nation's 200-mile fisheries conservation zone, and the importance of the Federal government's creating a positive climate for fisheries development. In conjunction with this policy, my Administration has sent a legislative proposal on fisheries development to the Congress.

It is time that the United States begin taking action to more fully utilize the fisheries resources of the 200-mile economic zone. I urge the Congress to join with me in this effort.

### AGRICULTURE

#### Agricultural Progress

While much work remains to be done, America's agriculture is by far the best in the world. Efforts made by my Administration, in cooperation with Congress, to secure economic stability for the farmer, have produced results.

In 1979, we experienced another record year for farm production. Net farm income jumped to \$32 billion in 1979, a \$4 billion increase over 1978. Agricultural exports also reached new highs, rising 18% in 1979 to \$32 billion. Despite the suspension of exports to the Soviet Union, we can expect a continued healthy export picture for our Nation's farmers.

Last year the Secretary of Agriculture travelled around the country and conducted an extraordinarily detailed and creative dialogue with the Nation's farmers. He obtained invaluable suggestions on economic and social issues concerning farm life; as we prepare our farm program for this year and beyond, the advice of our Nation's farmers will clearly be reflected in the policies we develop with the Congress.

#### Soviet Grain Suspension

In response to the Soviet armed invasion of Afghanistan on Christmas Eve, I took several actions to demonstrate our Nation's resolve to resist such hostile acts of aggression against a sovereign, independent nation. One of the most important of these actions was the suspension of grain sales to the Soviet Union beyond the 8 million tons provided under our 1975 grains agreement. The Soviet Union had intended to purchase an estimated 25 million tons of U.S. wheat and feed grains. Thus, the suspension of sales above the 8 million ton agreement level is expected to result in the freeing of about 17 million tons.

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My decision to suspend these sales was a difficult one, but a necessary one. We could not continue to do business as usual with the Soviet Union while it is invading an independent, sovereign nation in an area of the world of strategic importance to the United States. I am fully committed to a policy of promoting international trade, and particularly the expanded export of U.S. agricultural products. I am proud of my Administration's record in this regard. Because of the aggressive efforts of American farmers and businessmen, working in cooperation with Federal representatives, and the provision of new authorities by Congress, we have set new export records in each of the past 3 years. Even with the Soviet suspension, we intend to set still another record in the coming year. In making my decisions on the suspension, I believed it would be unfair to ask the American farmer to bear a greater share of the burden and sacrifice than their fellow Americans were asked to bear. Farmers should not be penalized simply because they are part of an agricultural machine that is of growing strategic importance in the world.

To protect American farmers from the price depressing effects of the grain suspension, I directed the Secretary of Agriculture to take several actions:

- o The Commodity Credit Corporation will assume the contractual obligations for grain previously committed for shipment to the Soviet Union.
- o The Department of Agriculture, acting through the Commodity Credit Corporation, will purchase wheat contracted for export to the Soviet Union for the purpose of forming an emergency international wheat reserve. In this connection, I will propose legislation authorizing release of this wheat for international aid purposes.
- o To encourage farmers to place additional grain in the farmer-held grain reserve, the Secretary of Agriculture has made several modifications in that important program.
- o The Commodity Credit Corporation will purchase corn at the local level to alleviate the congestion within the transportation system caused by the refusal of the International Longshoremen's Association to load grain up to the 8 million metric ton level.

In combination, these actions are expected to isolate from the market an amount of grain equivalent to that not shipped to the Soviet Union, thereby avoiding a decline in grain prices. I am pleased to report that these actions are having the desired results and that American farmers are being protected from the effects of the suspension.

If further actions are necessary to insure that American agriculture does not bear a disproportionately large share of the burden associated with this action, I will not hesitate to take them.

#### Crop Insurance

We now have an assortment of Federal loan, grant and insurance programs designed to protect farmers from the economic risks associated with natural disasters. We recognized early in my Administration that these programs were in serious need of reform. They are marked by many shortcomings: inconsistencies in eligibility, inequities in the level of benefits to producers of different crops, and inefficiencies

in the use of taxpayer money. Recent evidence of abuse in the agricultural disaster loan programs provides further evidence of the need for this reform.

I have sent the Congress a proposal to consolidate these authorities in the form of an all-risk comprehensive insurance program. Congress has made clear progress in devising an improved crop insurance program, but work remains to be done. I urge the Congress to finish its work on this legislation as soon as possible.

#### International Emergency Wheat Reserve

The Congress has not yet acted on the proposal I made in the last Session to create an International Emergency Wheat Reserve. This reserve of up to 4 million tons of wheat would be used to assure recipient nations that we will meet our international food aid commitments. The suspension of further grain sales to the Soviet Union provides an appropriate opportunity to provide this authority, and thereby establish guidelines for the release of wheat now being acquired by the Commodity Credit Corporation.

#### FOREIGN POLICY

From the time I assumed office three years ago this month, I have stressed the need for this country to assert a leading role in a world undergoing the most extensive and intensive change in human history.

My policies have been directed in particular at three areas of change:

- the steady growth and increased projection abroad of Soviet military power -- power that has grown faster than our own over the past two decades.
- the overwhelming dependence of Western nations, which now increasingly includes the United States, on vital oil supplies from the Middle East.
- the pressures of change in many nations of the developing world, including the year old revolution in Iran and uncertainty about the future in many other countries.

As a result of those fundamental facts, we face some of the most serious challenges in the history of this Nation. The Soviet invasion of Afghanistan is a threat to global peace, to East-West relations, and to regional stability and to the flow of oil. As the unprecedented and overwhelming vote in the General Assembly demonstrated, countries across the world -- and particularly the non-aligned -- regard the Soviet invasion as a threat to their independence and security. Turmoil within the region adjacent to the Persian Gulf poses risks for the security and prosperity of every Western nation and thus for the entire global economy. The continuing holding of American hostages in Iran is both an affront to civilized people everywhere, and a serious impediment to meeting the self-evident threat to widely-shared common interests -- including those of Iran.

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But as we focus our most urgent efforts on pressing problems, we will continue to pursue the benefits that only change can bring. For it always has been the essence of America that we want to move on -- we understand that prosperity, progress and most of all peace cannot be had by standing still. A world of nations striving to preserve their independence, and of peoples aspiring for economic development and political freedom, is not a world hostile to the ideals and interests of the United States. We face powerful adversaries, but we have strong friends and dependable allies. We have common interests with the vast majority of the world's nations and peoples.

There have been encouraging developments in recent years, as well as matters requiring continued vigilance and concern:

- Our alliances with the world's most advanced and democratic states from Western Europe through Japan are stronger than ever.
- We have helped to bring about a dramatic improvement in relations between Egypt and Israel and an historic step towards a comprehensive Arab-Israeli settlement.
- Our relations with China are growing closer, providing a major new dimension in our policy in Asia and the world.
- And across southern Africa from Rhodesia to Namibia we are helping with the peaceful transition to majority rule in a context of respect for minority as well as majority rights.

The central challenge for us today is to our steadfastness of purpose. We are no longer tempted by isolationism. But we must also learn to deal effectively with the contradiction of the world -- the need to cooperate with potential adversaries without euphoria, without undermining our determination to compete with such adversaries and if necessary confront the threats they may pose to our security.

We face a broad range of threats and opportunities. We have and should continue to pursue a broad range of defense, diplomatic and economic capabilities and objectives.

I see five basic goals for America in the world over the 1980's:

- First, we will continue, as we have over the past three years, to build America's military strength and that of our allies and friends. Neither the Soviet Union nor any other nation will have reason to question our will to sustain the strongest and most flexible defense forces.
- Second, we will pursue an active diplomacy in the world, working -- together with our friends and allies -- to resolve disputes through peaceful means and to make any aggressor pay a heavy price.
- Third, we will strive to resolve pressing international economic problems -- particularly energy and inflation -- and continue to pursue our still larger objective of global economic growth through expanded trade and development assistance.

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- Fourth, we will continue vigorously to support the process of building democratic institutions and improving human rights protection around the world. We are deeply convinced that the future lies not with dictatorship but democracy.
- Fifth, we remain deeply committed to the process of mutual and verifiable arms control, particularly to the effort to prevent the spread and further development of nuclear weapons. Our decision to defer, but not abandon our efforts to secure ratification of the SALT II Treaty reflects our firm conviction that the United States has a profound national security interest in the constraints on Soviet nuclear forces which only that treaty can provide.

Continuing close cooperation between the Congress and the Executive Branch will be required to achieve these goals. My most immediate legislative priorities include:

- (1) Defense Department Authorization and Appropriations Bills
- (2) Special International Security Assistance, for Pakistan and other countries
- (3) Bilateral and Multilateral Foreign Assistance Bills, including Central America supplemental
- (4) The China Trade Agreement
- (5) Intelligence Charters
- (6) Refugee Legislation and Funding
- (7) Human Rights Conventions
- (8) And, when appropriate, the SALT II Treaty.

One very immediate and pressing objective that is uppermost on our minds and those of the American people is the release of our hostages in Iran.

We have no basic quarrel with the nation, the revolution or the people of Iran. The threat to them comes not from American policy but from Soviet actions in the region. We are prepared to work with the government of Iran to develop a new and mutually beneficial relationship.

But that will not be possible so long as Iran continues to hold Americans hostage, in defiance of the world community and civilized behavior. They must be released unharmed. We have thus far pursued a measured program of peaceful diplomatic and economic steps in an attempt to resolve this issue without resorting to other remedies available to us under international law. This reflects the deep respect of our Nation for the rule of law and for the safety of our people being held, and our belief that a great power bears a responsibility to use its strength in a measured and judicious manner. But our patience is not unlimited and our concern for the well-being of our fellow citizens grows each day.

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ENHANCING NATIONAL SECURITY -- AMERICAN MILITARY STRENGTH

The maintenance of national security is my first concern, as it has been for every President before me.

As I stated one year ago in Atlanta: "This is still a world of danger, a world in which democracy and freedom are still challenged, a world in which peace must be re-won every day."

We must have both the military power and the political will to deter our adversaries and to support our friends and allies.

We must pay whatever price is required to remain the strongest nation in the world. That price has increased as the military power of our major adversary has grown and its readiness to use that power been made all too evident in Afghanistan.

The U.S.-Soviet Relationship

We are demonstrating to the Soviet Union across a broad front that it will pay a heavy price for its aggression in terms of our relationship. Throughout the last decades U.S.-Soviet relations have been a mixture of cooperation and competition. The Soviet attack on Afghanistan and the ruthless extermination of its government have highlighted in the starkest terms the darker side of their policies -- going well beyond competition and the legitimate pursuit of national interest, and violating all norms of international law and practice.

This attempt to subjugate an independent, non-aligned Islamic people is a callous violation of international law and the United Nations Charter, two fundamentals of international order. Hence, it is also a dangerous threat to world peace. For the first time since World War II, the Soviets have sent combat forces into an area that was not previously under their control, into a non-aligned and sovereign state.

On January 4 I therefore announced a number of measures, including the reduction of grain sales and the curtailment of trade and technology transfer, designed to demonstrate our firm opposition to Soviet actions in Afghanistan and to underscore our belief that in the face of this blatant transgression of international law, it was impossible to conduct business as usual. I have also been in consultation with our allies and with countries in the region regarding additional multilateral measures that might be taken to register our disapproval and bolster security in Southwest Asia. I have been heartened by the support expressed for our position, and by the fact that such support has been tangible, as well as moral.

The destruction of the independence of Afghanistan government and the occupation by the Soviet Union has altered the strategic situation in that part of the world in a very ominous fashion. It has brought the Soviet Union within striking distance of the Indian Ocean and even the Persian Gulf.

It has eliminated a buffer between the Soviet Union and Pakistan and presented a new threat to Iran. These two countries are now far more vulnerable to Soviet political intimidation. If that intimidation were to prove effective, the Soviet Union might well control an area of vital strategic and economic significance to the survival of Western Europe, the Far East, and ultimately the United States.

It is clear that the entire subcontinent of Asia and specifically Pakistan is threatened. Therefore, I am asking Congress, as the first order of business, to pass an economic and military aid package designed to assist Pakistan defend itself.

#### Defense Budget

For many years the Soviets have steadily increased their real defense spending, expanded their strategic forces, strengthened their forces in Europe and Asia, and enhanced their capability for projecting military force around the world directly or through the use of proxies. Afghanistan dramatizes the vastly increased military power of the Soviet Union.

The Soviet Union has built a war machine far beyond any reasonable requirements for their own defense and security. In contrast, our own defense spending declined in real terms every year from 1968 through 1976.

We have reversed this decline in our own effort. Every year since 1976 there has been a real increase in our defense spending — and our lead has encouraged increases by our allies. With the support of the Congress, we must and will make an even greater effort in the years ahead.

The Fiscal Year 1981 budget would increase funding authority for defense to more than \$158 billion, a real growth of more than 5% over my request for Fiscal Year 1980. Therefore, requested outlays for defense during Fiscal Year 1981 will grow by more than 3% in real terms over the preceding year.

The trends we mean to correct cannot be remedied overnight; we must be willing to see this program through. To ensure that we do so I am setting a growth rate for defense that we can sustain over the long haul.

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The defense program I have proposed for the next five years will require some sacrifice -- but sacrifice we can well afford.

The defense program emphasizes four areas:

- (a) It ensures that our strategic nuclear forces will be equivalent to those of the Soviet Union and that deterrence against nuclear war will be maintained;
- (b) It upgrades our forces so that the military balance between NATO and the Warsaw Pact will continue to deter the outbreak of war -- conventional or nuclear -- in Europe;
- (c) It provides us the ability to come quickly to the aid of friends and allies around the globe;
- (d) And it ensures that our Navy will continue to be the most powerful on the seas.

#### Strategic Forces

We are strengthening each of the three legs of our strategic forces. The cruise missile production which will begin next year will modernize our strategic air deterrent. B-52 capabilities will also be improved. These steps will maintain and enhance the B-52 fleet by improving its ability to deliver weapons against increasingly heavily defended targets.

We are also modernizing our strategic submarine missile force. The first new Trident submarine has already been launched and will begin sea trials this year. The second Trident will be launched in the spring of 1980. The first of our new Trident missiles, with a range of more than 4,000 miles, have already begun operational patrols in Poseidon submarines.

The new MX missile will enhance the survivability of our land-based intercontinental ballistic missile force. That is why I decided last spring to produce this missile and selected the basing mode best suited to enhance its capability. Further the MX will strengthen our capability to attack a wide variety of Soviet targets.

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Our new systems will enable U.S. strategic forces to maintain equivalence in the face of the mounting Soviet challenge. We would however need an even greater investment in strategic systems to meet the likely Soviet buildup without SALT.

### Forces for NATO

We are greatly accelerating our ability to reinforce Western Europe with massive ground and air forces in a crisis. We are undertaking a major modernization program for the Army's weapons and equipment, adding armor, firepower, and tactical mobility.

We are repositioning more heavy equipment in Europe to help us cope with attacks with little warning, and greatly strengthening our airlift and sealift capabilities.

We are also improving our tactical air forces -- buying about 1700 new fighter and attack aircraft over the next five years -- and increasing the number of Air Force fighter wings by over 10%.

We are accelerating the rate at which we can move combat aircraft to Europe to cope with any surprise attack, and adding to the number of shelters at European airbases to prevent our aircraft from being destroyed on the ground.

### Rapid Deployment Forces

We are systematically enhancing our ability to respond rapidly to non-NATO contingencies wherever required by our commitments or when our vital interests are threatened.

The rapid deployment forces we are assembling will be extraordinarily flexible: They could range in size from a few ships or air squadrons to formations as large as 100,000 men, together with their support. Our forces will be prepared for rapid deployment to any region of strategic significance.

Among the specific initiatives we are taking to help us respond to crises outside of Europe are:

- the development and production of a new fleet of large cargo aircraft with intercontinental range;
- the design and procurement of a force of Maritime Prepositioning Ships that will carry heavy equipment and supplies for three Marine Corps brigades.

In addition, responding to the Soviet military presence in Cuba and the proxy role of Cuba on behalf of the USSR, we have taken or are taking the following actions in support of the rapid deployment force:

- (1) We are substantially increasing our ability to monitor Cuban and Soviet/Cuban activities;
- (2) We have established a Caribbean Joint Task Force Headquarters which improves our ability to respond to events in the region;
- (3) We are increasing regional military exercises; and,
- (4) We are intensifying assistance to countries in the region that are threatened by Soviet or Cuban intervention.

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### Naval Forces

Seapower is indispensable to our global position -- in peace and also in war. Our shipbuilding program will sustain a 550-ship Navy in the 1990s and we will continue to build the most capable ships afloat.

The program I have proposed will assure the ability of our Navy to operate in high threat areas, to maintain control of the seas and protect vital lines of communication -- both military and economic -- and to provide the strong maritime component of our rapid deployment forces. This is essential for operations in remote areas of the world, where we cannot predict far in advance the precise location of trouble, or preposition equipment on land.

### Military Personnel

No matter how capable or advanced our weapons systems, our military security depends on the abilities, the training and the dedication of the people who serve in our armed forces. I am determined to recruit and to retain under any foreseeable circumstances an ample level of such skilled and experienced military personnel.

We have enhanced our readiness and combat endurance by improving the Reserve Components. All reservists are assigned to units structured to complement and provide needed depth to our active forces. Some reserve personnel have also now been equipped with new equipment.

### Mobilization Planning

I have also launched a major effort to establish a coherent and practical basis for all government mobilization planning. Begun last May, this is the first such effort conducted at Presidential level since World War II. It involves virtually every Federal agency, with the aim of improved efficiency and readiness.

### Our Intelligence Posture

Our national interests are critically dependent on a strong and effective intelligence capability. We will not shortchange the intelligence capabilities needed to assure our national security. Maintenance of and continued improvements in our multi-faceted intelligence effort are essential if we are to cope successfully with the turbulence and uncertainties of today's world.

The intelligence budget I have submitted to the Congress responds to our needs in a responsible way, providing for significant growth over the Fiscal Year 1980 budget. This growth will enable us to develop new technical means of intelligence collection while also assuring that the more traditional methods of intelligence work are also given proper stress. We must continue to integrate both modes of collection in our analyses.

It is imperative that we now move forward promptly within the context of effective Congressional oversight to provide America's intelligence community with Charters which can permit it to operate more effectively and within a national concern codified by law.

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## REGIONAL POLICIES

Every President for over three decades has recognized that America's interests are global and that we must pursue a global foreign policy.

Two world wars have made clear our stake in Western Europe and the North Atlantic area. We are also inextricably linked with the Far East -- politically, economically, and militarily. In both of these, the United States has a permanent presence and security commitments which would be automatically triggered. We have become increasingly conscious of our growing interests in a third area -- the Middle East and the Persian Gulf area.

We have vital stakes in other major regions of the world as well. We have long recognized that in an era of interdependence, our own security and prosperity depend upon a larger common effort with friends and allies throughout the world.

### The Atlantic Alliance

At the outset of this Administration I emphasized the primacy of our Atlantic relationship in this country's national security agenda. We have made important progress toward making the Atlantic Alliance still more effective in a changing security environment.

We are meeting the Soviet challenge in a number of important ways:

First, there is a recognition among our allies that mutual security is a responsibility to be shared by all. We are each committed to increase national defense expenditures by 3% per year. There remains much work to be done in strengthening NATO's conventional defense; the work proceeding under the Alliance's Long Term Defense Program will help achieve this objective.

Last month, we and our NATO allies took an historic step in Alliance security policies with the decision to improve substantially our theater nuclear capabilities. The theater nuclear force modernization (TNF) program, which includes the deployment of improved Pershing ballistic missiles and of ground-launched cruise missiles in Europe, received the unanimous support of our allies. The accelerated deployment of Soviet SS-20 MIRVed missiles made this modernization step essential. TNF deployments will give the Alliance an important retaliatory option that will make clear to the Soviets that they cannot wage a nuclear war in Europe and expect that Soviet territory will remain unscathed.

While we move forward with our necessary defense efforts in Europe, we are also proceeding with our efforts to improve European security through arms control.

As an integral part of the NATO TNF decisions, the Alliance has made it clear that it is prepared to negotiate limitations on long-range theater nuclear missiles.

On our part, our TNF modernization efforts will make possible a streamlining of our nuclear weapons stockpile in Europe, allowing us to withdraw 1,000 nuclear warheads over the next year.

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In the Mutual and Balanced Force Reduction talks, we and our allies have recently put forward new proposals that are designed to simplify the negotiations and improve the prospect for early progress in limiting conventional military forces in Europe.

In a very real sense the accomplishments of the past year answered a critical question concerning NATO's future: can the Western Alliance, which has provided the foundation for one of the longest periods of peace and prosperity that Europe has ever enjoyed, still summon the essential cohesion, relevance, and resolve to deal with fundamental security issues likely to affect its member nations well into the next century? NATO's consensus in favor of modernizing and negotiating about its nuclear arsenal while continuing to improve conventional forces, dramatized Allied capacity to respond effectively to both the military and political threats posed by the Soviet Union.

Relations with our allies and friends in Europe are taking on ever broader dimensions. Our security agenda remains central; we are addressing new concerns as well.

I met with an unprecedented number of European statesmen in Washington during the year just past, including the leaders of Great Britain, West Germany, Austria, Norway, Finland, the Netherlands, Ireland, Sweden, and the European Community; in all of these meetings a common theme was the changing realities of political and economic interdependence and, as we enter a new decade, the need to promote more equitable conditions of peaceful growth and stability throughout the world.

This approach has achieved tangible form in a number of ways. For example, every West European government supports us as we have continued by every peaceful means to seek the release of American hostages held in Tehran in defiance of universal standards of international law and decency. We are consulting and cooperating closely in our responses to the Soviet Union's invasion and occupation of Afghanistan.

In the NATO area itself, we moved together vigorously to meet the serious economic problems faced by Turkey and thereby strengthen a vital part of NATO's southern flank and we have signed a new base agreement with Turkey. This action, though indispensable in its own right, also supported our continuing efforts to promote a solution to the Cyprus problem and to bring about the reintegration of Greece within the military framework of the Atlantic Alliance, objectives which retain high priority this year.

### Asia

The United States is a Pacific nation, as much as it is an Atlantic nation. Our interests in Asia are as important to us as our interests in Europe. Our trade with Asia is even greater than our trade with Europe. We have pursued and maintained these interests on the basis of a stable balance of power in the region. Our partnership and alliance with Japan is central to our Asian policy. We are strengthening our new relationship with China. We have expanded our ties with the Association of South East Asian Nations (ASEAN) and its member governments.

My trip to the Far East helped forge closer working relationships with Japan and Korea.

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## Asian Security

The balance of power is fundamental to Asian security. We have maintained that balance through a strong United States military posture in the region, as well as close ties with our allies, Japan, Australia, New Zealand and Korea. Over the past year I have worked to stabilize the United States military presence in Asia by concluding an amended base agreement with the Philippines that will last until 1991. We have fostered the closest degree of security cooperation with Japan in the history of our two nations -- exemplified by joint planning for the defense of Japan, increased Japanese contributions to United States base costs in Japan, and large-scale Japanese purchases of United States defense equipment. After examining in detail new intelligence estimates of North Korean military strength, I decided to maintain our troop strength in the Republic of Korea at its present level until at least 1981. The reaffirmation of our commitment to Korean security has been of great importance to the Koreans as they make necessary political adjustments in the wake of President Park's assassination.

Response by nations in East Asia to the Soviet aggression in Afghanistan has been gratifying. Australia in particular deserves recognition for the forthright stand it has taken. Japan and the ASEAN nations have also been strongly supportive.

## China

Over the last year we have expanded our new relationship with the People's Republic of China to ensure that where our interests coincide, our separate actions will be mutually reinforcing. To this end we have enhanced our consultative relationship. We have also sought to develop an enduring institutional framework in the economic, cultural, scientific, and trade areas.

This process has been facilitated by the successful visits of Vice Premier Deng to the United States and Vice President Mondale to China; through the signing of over 15 commercial, scientific, and cultural agreements; through numerous Cabinet-level visits; and through a significant expansion of trade and the flow of people between our two countries.

During Secretary of Defense Brown's recent trip to the People's Republic of China, wide-ranging talks were held on global and regional issues, arms control, technology transfer, and ways to sustain bilateral contacts. Although we may differ with the Chinese on some issues, our views coincide on many important issues, particularly with respect to the implications for the region of the Soviet invasion of Afghanistan.

In 1980 I look forward to passage by Congress early in the year of the China Trade Agreement and of authorization of OPIC operations in China; we plan to conclude civil aviation, maritime, and textile agreements; and continue to expand our commercial, cultural, and scientific relations, particularly through ExImBank credits to the People's Republic of China.

## Southeast Asia

The countries comprising ASEAN are central to United States interests in Southeast Asia.

Throughout the past year, our relations with ASEAN have continued to expand as our consultative arrangements were strengthened.

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The stability and prosperity of Southeast Asia have been severely challenged by Soviet-supported Vietnamese aggression in Cambodia. During this year we will continue to encourage a political settlement in Cambodia which will permit that nation to be governed by leaders of its own choice. We have taken all prudent steps possible to deter Vietnamese attacks on Thai territory by increasing our support to the Thais, and by direct warnings to Vietnam and the U.S.S.R. The other members of ASEAN have stood firmly behind Thailand, and this in great measure has helped to contain the conflict. We have been gratified by Thailand's courageous and humane acceptance of the Cambodian refugees.

#### Middle East--Persian Gulf--South Asia

Events in Iran and Afghanistan have dramatized for us the critical importance for American security and prosperity of the area running from the Middle East through the Persian Gulf to South Asia. This region provides two-thirds of the world's oil exports, supplying most of the energy needs of our allies in Europe and Japan. It has been a scene of almost constant conflict between nations, and of serious internal instability within many countries. And now one of its nations has been invaded by the Soviet Union.

We are dealing with these multiple challenges in a number of ways.

#### Middle East

First, it has been a key goal of my Administration since 1977 to promote an enduring resolution of the Arab-Israeli conflict -- which is so essential to bringing stability and peace to the entire region. Following the Camp David Summit of August 1978, in March 1979, I helped bring about the signing of a peace treaty between Egypt and Israel -- the first time in 30 years of Middle East conflict that peace had shined with such a bright and promising flame. At the historic signing ceremony at the White House, Prime Minister Begin and President Sadat repeated their Camp David pledge to work for full autonomy for the West Bank and Gaza.

Since then Egypt and Israel have been working to complete this part of the Camp David framework and to provide an opportunity for the Palestinian people to participate in determining their future. I strongly support these efforts, and have pledged that we will be a full partner in the autonomy negotiations. We will continue to work vigorously for a comprehensive peace in the Middle East, building on the unprecedented achievements at Camp David.

At the same time, I have reinforced America's commitment to Israel's security, and to the right of all nations in the area to live at peace with their neighbors, within secure and recognized frontiers.

#### Persian Gulf

In recent years as our own fuel imports have soared, the Persian Gulf has become vital to the United States as it has been to many of our friends and allies. Over the longer term, the world's dependence on Persian Gulf oil is likely to increase. The denial of these oil supplies -- to us or to others -- would threaten our security and provoke an economic crisis greater than that of the Great Depression 50 years ago, with a fundamental change in the way we live.

Two threats to the flow of oil -- from regional instability and now potentially from the Soviet Union -- require that we firmly defend our vital interests when threatened.

In the past year, we have begun to increase our capacity to project military power into the Persian Gulf region, and are engaged in explorations of increased use of military facilities in the area. We have increased our naval presence in the Indian Ocean. We have been working with countries in the region on shared security concerns. Our rapid deployment forces, as described earlier, could be used in support of friendly governments in the Gulf and Southwest Asian region, as well as in other areas.

#### South Asia

The overwhelming challenge in this region will be dealing with the new situation posed by Soviet aggression in Afghanistan. We must help the regional states develop a capability to withstand Soviet pressures in a strengthened framework for cooperation in the region. We want to cooperate with all the states of the region in this regard -- with India and Pakistan, with Sri Lanka, Bangladesh and Nepal.

In this new situation, we are proposing to the Congress a military and economic assistance program to enable Pakistan to buttress its defenses. This is a matter of the most urgent concern, and I strongly urge the earliest possible approval by the House and Senate. We are also working closely with other friends of Pakistan to increase the resources available for Pakistan's development and security.

We are also pursuing the possibility of gaining access to military facilities in the region in time of trouble. We are prepared to work closely with our friends in the region, on a cooperative basis, to do whatever is required to ensure that aggressors would bear heavy costs so that further aggression is deterred.

A high priority for us in the region is to manage our nuclear concerns with India and Pakistan in ways that are compatible with our global and regional priorities. The changed security situation in South Asia arising from the Soviet invasion of Afghanistan calls for legislative action to allow renewed assistance to Pakistan. But this in no way diminishes our commitment to work to prevent nuclear weapons proliferation, in Pakistan or elsewhere.

Steady growth of our economic assistance is also essential if the countries of South Asia are to achieve growth and true stability.

#### Africa

A peaceful transition to majority rule in Southern Africa continues to be a major goal of the United States. We gave our fullest support to the successful British drive to reach an agreement among all parties in Rhodesia. The process of implementation will not be easy, but the path is now open to a peaceful outcome. With our European allies, Canada and the African states directly concerned we also are making progress toward independence and majority rule for Namibia. The momentum resulting from successful resolution of the Rhodesian conflict should aid in these initiatives.

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Congressional support for the Executive Branch decision to maintain sanctions on Rhodesia until the parties reached agreement on a ceasefire and an impartial elections process had begun was instrumental in creating the conditions necessary for agreement. Now that the United States, European trading partners and the surrounding African states have lifted sanctions, the process of economic reconstruction in Rhodesia -- soon to be Zimbabwe -- can begin.

With the creation of an independent Zimbabwe after many years of fighting, we will be prepared to cooperate in a coherent multi-donor development plan for the poor nations in the Southern Africa region.

Our active support for self-determination and racial equality in Southern Africa has enabled the United States to develop a continuing and effective dialogue with governments throughout the continent. As Africa grows more important to us for economic, political and strategic reasons, we will be strengthening our ties of mutual interest with Africans. We will continue to participate in their first priority -- economic development -- and to help Africans resolve their political problems and maintain stability in their continent.

Whether in the Horn or in other areas of the continent, we will also provide to friendly nations security assistance when needed for defense of their borders.

#### North Africa

In 1979 the United States moved to help a long-standing friend by strengthening our arms supply relationship with Morocco. In assisting Morocco to deal with attacks inside its internationally recognized frontiers, we seek conditions of greater security and confidence in which a political settlement of the Western Sahara conflict can be effectively pursued. Though not itself a mediator, the United States in the months ahead will encourage the countries in the area to resolve their differences peacefully in order that the vast economic potential of North Africa can be exploited for the well-being of the people living there.

#### Latin America

Since my inauguration, I have worked hard to forge a new, collaborative relationship with the nations of Latin America and the Caribbean -- one resting on a firm commitment to human rights, democratization, economic development and non-intervention. The events of 1979 -- even the turbulence in Central America and the Caribbean -- presented us with opportunities to move toward these goals.

There was encouraging progress in the area of human rights and democratization in the Western Hemisphere this past year. The inauguration of a new democracy in Ecuador, and the strong effort by the Andean countries to preserve democracy in Bolivia were positive steps.

During 1979, I met with the President of Mexico twice to discuss the opportunities and difficult issues before our two countries. We have taken worthwhile steps, including an agreement on natural gas and on trade.

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On October 1, Vice President Mondale and many leaders from Latin America traveled to Panama to celebrate the coming into force of the Panama Canal Treaties. The transition to a new relationship and a new structure to manage the Canal was smooth and effective because of the contributions and the mutual respect between Panamanians and Americans.

The Vice President also traveled to Brazil and Venezuela. The Secretary of State met with leaders in Quito at the inauguration of the new democratic President of Ecuador and in LaPaz at the OAS General Assembly. These meetings have helped us to develop further the close consultative ties which are so important to a free and balanced community of nations in the hemisphere.

Also, in 1979, the United States moved to a much closer economic and political relationship with the increasingly significant Andean Pact countries. A memorandum of understanding on economic relations was signed in Washington in November.

Central America and the Caribbean region are undergoing a period of rapid social and political change. There is a threat that intervention by Cuba may thwart the desire of the people of the region for progress within a democratic framework and we have been working closely with the governments in the region to try to aid in the developmental process of the region and are prepared to assist those threatened by outside intervention.

The Caribbean Group, which is coordinated by the World Bank and which we helped establish, has now become an important factor for development in the region, adding \$260 million in concessionary resources to the region. We have increased our aid to the Caribbean, reprogrammed loans, and are seeking prompt Congressional action on a supplemental of \$80 million for Nicaragua and Central America.

My Science Advisor, Dr. Frank Press, led a large delegation of scientists and educators to Barbados, Peru, Venezuela and Brazil to forge new and fruitful ties between our countries in important areas of science and technology.

#### THE INTERNATIONAL ECONOMY

A growing defense effort and a vigorous foreign policy rest upon a strong economy here in the United States. And the strength of our own economy depends upon our ability to lead and compete in the international marketplace.

#### Energy

An essential lesson to be drawn from Iran is that there are compelling foreign policy, as well as domestic economic reasons for lessening our dependence on foreign oil.

In response to a series of United States proposals, the industrial countries adopted in 1979 a cooperative energy strategy for the 1980's. Its main elements are collective restraint on oil imports; intensified efforts to conserve oil and boost production of conventional substitutes for oil; and collaborative research, development and commercialization of new fuel technologies.

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At the Tokyo Economic Summit in June, the heads of government of the seven major industrial democracies agreed that they must take responsibility for curbing oil demand. By the end of the year, 20 industrialized nations, members of the International Energy Association, had agreed not only to enforce equitably allocated ceilings on their oil imports, but to create a system for quickly adjusting the ceilings to changes in world oil supply. Completion of the detailed agreements to execute the global oil demand-allocation process is at the head of the international energy agenda for 1980.

At the 1980 Economic Summit in Venice, I intend to propose further joint action to smooth the transition from oil to more abundant fuels and to slow the growth in oil prices.

In support of the international oil strategy, the Administration and the United States coal industry are launching joint marketing efforts to make this country a major exporter of steam coal. With assurance of reliable United States coal supply at competitive prices, many of the electric power plants to be built in the 1980s and 1990s can be coal-fired rather than oil-burning. Coal exports will help us pay for our declining but costly oil imports.

A new source of natural gas supply for the United States -- Mexico -- was opened through the conclusion of government-to-government negotiations. Through close cooperation with our northern neighbor, Canada, the Administration cleared the way for expanding the flow of Canadian natural gas to the United States and for private development of the Alaskan gas pipeline across Canada to the lower 48 states.

We continue to believe that nuclear power will play an essential role in meeting the energy needs of many nations, but with effective safeguards against the proliferation of nuclear weapons.

#### International Monetary Policy

We are moving forcefully to establish the fundamental economic conditions for a strong dollar. In 1979 the balance of payments was in approximate balance for the first time in three years, despite substantially higher oil import costs. Our anti-inflationary economic policies and strong energy program should provide a basis for further improvement. Of course the outcome depends in part also upon responsible pricing behavior by OPEC and other oil producers.

We support the efforts under way to strengthen the international monetary system. I urge the Congress to enact promptly legislation permitting the United States to increase its quota in the International Monetary Fund (IMF) as part of the general expansion of Fund resources. We welcome the measures being taken by the IMF to improve its ability to promote sound economic and exchange rate policies in all member countries. We also welcome the study of the possible establishment of a "substitution account" to strengthen the international monetary system by promoting the role of the Special Drawing Right as the principal reserve asset in the system.

#### Trade

Under the direction of my Special Trade Representative, we brought to a successful conclusion the multilateral trade negotiations, the most ambitious set of negotiations to reduce barriers to international trade in a decade. The resulting "MTN" agreements, covering a broad spectrum of

trade issues, were concluded and ratified by overwhelming majorities of the United States Congress. These binding commitments, signed by all the major trading nations, provide the framework for a new era in international trading relations with them and with the developing nations. This makes clear my resolve and that of the American people to resist the dangers of protectionism.

The reorganization of the Federal government trade agencies which I directed will assure more effective and prompt governmental action to exploit the export opportunities afforded by the MTN. The plan, approved by Congress this fall, establishes a strong, authoritative voice in the Executive Office of the President to provide coherence and leadership to United States trade policy, negotiations, and the implementation of the MTN trade codes. The reorganization establishes the Office of the U.S. Trade Representative and strengthens the Commerce Department.

### Sugar

In 1979, Congress ratified the International Sugar Agreement, thus fulfilling a major commitment of this Administration. The agreement is an important element in our international commodity policy with far-reaching implications for our relations with developing countries, particularly sugar producers in Latin America. This agreement and other measures my Administration has taken already have helped to stabilize sugar prices and bring high domestic prices into line with those prevailing in the world marketplace. Producers and consumers alike will benefit from a more stable market for this essential commodity. We need prompt enactment of implementing legislation for this agreement.

### Tin

At year's end, Congress approved stockpile disposal legislation which will permit the General Services Administration to sell 30,000 metric tons of tin from our strategic stockpile and contribute up to 5,000 metric tons to the International Tin Organization's (ITO) buffer stock. This fulfills a United States pledge made during the Conference on International Economic Cooperation and represents a major step forward in our relations with producing countries in the developing world. We will consult with other members of the ITO to ensure that our tin disposals do not disrupt markets and take into account the needs of both producers and consumers.

### Common Fund

The United States joined members of the United Nations Conference on Trade and Development, both developed and developing nations, in negotiating an agreement on the framework of a Common Fund to help international commodity agreements stabilize the prices of raw materials. Negotiations are now underway on the final articles of agreement of the Fund.

The United States also participated in successful negotiations on an international rubber agreement.

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## Economic Cooperation With Developing Nations

Our relations with the developing nations are of central importance to the United States. The fabric of our relations with these countries has both political and economic dimensions, as we witnessed in recent weeks when nations of the Third World took the lead in condemning the Soviet invasion of Afghanistan. Our ability to work together with developing nations toward goals we have in common -- their political independence, the resolution of regional tensions, and our growing ties of trade for example -- require us to maintain the policy of active engagement with the developing world that we have pursued over the past three years.

The foreign assistance legislation which I will be submitting to you for FY 81 provides the authority and the funds to carry on a cooperative relationship with a large number of developing nations. Prompt Congressional action on this legislation is essential in order to meet our treaty and base rights agreements, continue our peace efforts in the Middle East, provide economic and development support to countries in need, promote progress on North-South issues, protect Western interests, and counter Soviet influence.

We will also be asking Congress to enable us to honor our international agreements for multilateral assistance by authorizing and appropriating funds for the International Financial Institutions.

Finally, the Administration and the Congress agreed in 1979 on fundamental changes in the way the United States government is organized to conduct economic and technical relations with the developing nations. I submitted and the Congress approved a plan to consolidate in a small policy-coordination body, the International Development Cooperation Agency (IDCA), responsibility for direct United States development assistance, for guidance to United States representatives in multilateral development agencies, and for presenting our long-term development interests in Federal government policy bodies dealing with trade and other economic relations with developing nations. I also submitted, and the House approved in the 1979 session of Congress, a plan to establish the Institute for Scientific and Technological Cooperation (ISTC), a constituent element of the IDCA group of agencies. Once approved, the ISTC will carry out research as well as support research by foreign scientists on technological means of reducing poverty in developing nations.

## Food -- The War on Hunger

One of the main economic problems facing developing countries is lagging food production. We must help these countries meet this problem -- not only so that their peoples will be free from the threat of continuing hunger, but also so that their societies will be strong enough to resist external pressure. I have directed that United States bilateral and multilateral aid be geared increasingly to this goal, as recommended by our Hunger Commission, chaired by Sol Linowitz; we are urging other donor countries to join in more effective efforts to this end.

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Good progress has been made since the Tokyo Economic Summit called for increased effort on this front. The World Bank is giving this problem top priority, as are some other donor countries. The resources of the consultative Group on International Agricultural Research will be doubled over a five-year period. The work of our own Institute of Scientific and Technological Cooperation will further strengthen the search for relevant new agricultural technologies.

The goal of freeing the world from hunger by the year 2000 should command the full support of all countries.

## THE HUMAN DIMENSION OF FOREIGN POLICY

### Human Rights

The ultimate aim of our foreign policy must be to preserve freedom for ourselves and to expand freedom for others. This is a matter both of national principle and of national interest. For we believe that free and open societies are not only better able to meet the rising expectations of their people; they are also better able to accommodate often conflicting internal pressures before popular frustrations explode in violent and radical directions.

We do not seek to impose our system or institutions on others. Rather, we seek to support, in practical and concrete ways, the efforts of other nations to build their own institutions in ways that will meet the irrepressible human drive for freedom and justice.

Human rights policy commands the strong support of our citizens, and of the Congress. The world climate increasingly favors human rights progress.

Despite new turbulence and conflict, the past year featured some encouraging positive developments. We cannot and should not claim credit for them. But it is clear that we are part of a growing movement. During 1979, we saw:

- The further strengthening of democratic practices in Spain and Portugal, with free elections in both countries;
- The disappearance of several of the world's most repressive regimes;
- The freeing of political prisoners in Asia, Africa, and Latin America;
- A return to democratic rule in several Latin American countries and widespread progress in reducing human rights violations in the region;
- The growing strength of international human rights institutions. The Inter-American Court of Human Rights held its first meeting. Preparations began for another conference to review compliance with the Helsinki accords, to be held in Madrid this November. The OAU took long strides toward establishing a human rights commission for Africa. UN bodies became increasingly active in their human rights efforts.

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The United States is still not a party to the key human rights treaties that establish world standards and implementing machinery. In early 1978, I sent for Senate approval four such treaties, the American Convention on Human Rights, the Convention on Racial Discrimination, and the UN Covenants on Civil and Political Rights and on Economic and Social and Cultural Rights. Hearings were held in 1979. No single action by this country would do more to advance the cause of human rights than Senate approval of these instruments and a fifth human rights treaty sent to Congress previously, the Genocide Convention. I urge the earliest possible Senate action.

#### Humanitarian Aid

The mass exodus of refugees from Vietnam reached a crescendo in summer 1979 with over 65,000 people a month fleeing repression and economic privation. Most fled by boat, and many were lost at sea. In July, at a special UN meeting on refugees, Vice President Mondale presented a major United States program to rescue and help support and resettle the new refugee population. I doubled to 14,000 a month the number of Indochinese refugees the United States, in accord with our finest traditions, would absorb over the year ahead.

The Vietnamese invasion of Kampuchea in late 1978 gravely jeopardized the supply of food for the already decimated and brutalized Khmer people. In October, I announced that the United States would pay one-third of the costs of the international relief program mounted jointly by UNICEF and the International Committee of the Red Cross. Leaders of thirty-five church and voluntary agencies, with White House encouragement, are engaged in their own large fund-raising program for refugees.

In early November, Mrs. Carter visited refugees on the Thai-Cambodian border and reported back to me, the United States voluntary agencies, and the American people. In response, our efforts to avert a mass famine were accelerated.

The obstacles remain daunting -- continued warfare and aggression by Vietnam, non-distribution by the Phnom Penh authorities of much of the UNICEF-ICRC aid, movement of up to 900,000 hungry Khmer to and across the Thai border where they can be fed and helped.

But Americans will continue their efforts both public and private to avert the famine that looms. New help for our efforts will come from the National Committee formed in early 1980 by leading citizens to help in mobilizing and supporting the sustained effort essential to achieve this humanitarian goal.

As the year began, we are also considering new means of helping, through our contribution to the UN High Commissioner for Refugees and in other ways, the mounting Afghan refugee population in Pakistan and other desperate refugee situations such as Somalia.

It cannot be ignored that the destructive and aggressive policies of the Soviet Union have added immeasurably to the suffering in these three tragic situations.

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I have asked the heads of the appropriate departments of the Executive Branch to play an active role in the Select Commission on Immigration and Refugee Policy to formulate a new approach to deal with sensitivity with the difficult subject of people arriving on our shores from Latin America.

My meeting with Pope John Paul II during his historic and unprecedented visit to the United States helped raise the world's consciousness in connection with pressing problems of famine, homelessness, and human rights. Our talks spurred positive action in many of these areas, notably Indochina, and set the stage for further action in 1980.

### THE CONTROL OF NUCLEAR WEAPONS

Together with our friends and allies, we are striving to build a world in which peoples with diverse interests can live freely and prosper. But all that humankind has achieved to date, all that we are seeking to accomplish, and human existence itself can be undone in an instant -- in the catastrophe of a nuclear war.

Thus one of the central objectives of my Administration has been to control the proliferation of nuclear weapons to those nations which do not have them, and their further development by the existing nuclear powers -- notably the Soviet Union and the United States.

#### Non-Proliferation

I entered office committed to assert American leadership in stemming the proliferation of nuclear weapons -- which could create fundamental new instabilities in critical regions of the world, and threaten the security of the United States. This should not and cannot be done unilaterally. The cooperation of other suppliers of nuclear technology and materials is needed. This issue must not become a North-South confrontation.

We have been proceeding on a number of fronts:

- We have been seeking to encourage nations to accede to the Non-Proliferation Treaty, or to accept full-scope international safeguards. The Nuclear Non-Proliferation Act calls for such safeguards in connection with United States nuclear exports.
- The International Nuclear Fuel Cycle Evaluation (INFCE) has demonstrated that suppliers and recipients can work together. Its results will be published in a month. While differences remain, it will provide a broader international basis for national decisions which must balance energy needs with non-proliferation concerns.
- Finally, we are working to encourage regional cooperation and restraint. Protocol I of the Treaty of Tlatelolco which will contribute to the lessening of nuclear dangers for our Latin American neighbors has not yet been ratified by the United States Senate.

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Working together with the Congress, I remain committed to the vigorous pursuit of our non-proliferation objectives.

### Limitations on Strategic Arms

The most prominent of our nuclear arms control efforts is, of course, SALT II.

The signing of the Treaty brought to an end painstaking negotiations carried out under three administrations of both parties.

- SALT II is in our mutual interest; it is neither an American favor to the Soviet Union nor a Soviet favor to the United States.
- Ratification of the SALT II Treaty would represent a major step forward in restraining the continued growth of Soviet strategic forces.

Because SALT II reduces superpower competition in its most dangerous manifestation, this Treaty is the single most important bilateral accord of the decade:

- SALT II will permit us better to maintain strategic equivalence in nuclear weapons and devote our defense increases more heavily to our highest priority needs for conventional force improvements;
- Without it, the Soviets can add more power to their forces and better conceal from us what they are doing;
- Without SALT II, and the beginning of SALT III, deeper cuts would take many more years to achieve;
- Without SALT II, our efforts to control the proliferation of nuclear weapons will be more difficult.

I believe that the Senate will ratify SALT II because the Treaty is, in its simplest terms, in the interest of our Nation's security.

But I do not believe it advisable at this time to bring up the Treaty for consideration on the Senate floor. The Congress and the Executive Branch must first deal with the pressing matters arising from the Soviet invasion of Afghanistan.

### CONCLUSION

As we enter the decade of the 1980's, we face challenges both at home and abroad which will test our qualities as a people -- our toughness and willingness to sacrifice for larger goals, our courage and our vision.

For this Nation to remain secure, for this country to prosper, we must rise above narrow interests. The dangers of disunity are self-evident in a world of major power confrontation. The rewards of a new national consensus and sense of purpose are equally clear.

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We have new support in the world for our purposes of national independence and individual human dignity. We have a new will at home to do what is required to keep us the strongest nation on earth.

We must move together into this decade with the strength which comes from realization of the dangers before us and from the confidence that together we can overcome them.

JIMMY CARTER

THE WHITE HOUSE,

January 21, 1980.

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THE SECRETARY OF ENERGY  
WASHINGTON, D.C.

January 17, 1980

MEMORANDUM FOR Charles Schultze

FROM: Charles W. Duncan, Jr.

Enclosed are some suggestions on your energy/economic portion of the State of the Union speech.

Enclosure

A handwritten signature in cursive script, appearing to read "C. W. Duncan, Jr.", written in dark ink.

We cannot have a strong nation and a weak economy. We cannot lead others if we fail to curb our own inflation and our appetite for foreign oil.

The decade of the 1970s left us with two overriding economic tasks to fulfill in the 1980s: reducing our foreign oil dependence and controlling inflation.

We are on the verge of enacting a long-term national energy policy that will cut our current oil imports in half by the end of the decade. We will use far less energy in our cars, our houses and our factories. We will produce far more energy from domestic sources, such as coal.

If Congress will promptly enact my energy legislation, which is now in the final stages of consideration, we can get on with this job.

While these long-term policies are taking hold, we still remain dangerously exposed to the vagaries of world oil supplies. We cannot escape from that reality, but we can act to reduce the exposure.

I have asked the Department of Energy -- in consultation with the ~~Tonight I am declaring an energy emergency. Under~~  
~~legislation enacted by the Congress last year, I am~~  
Governors -- to develop  
establishing gasoline conservation goals for each of the  
50 states. Each state can meet its goals in ways of its  
own choosing. ~~But in case oil supplies are short, the~~  
~~legislation gives me the power -- which I will use -- to~~  
~~impose Federal conservation plans on states which fail to~~  
~~meet their targets.~~

{ Over the next few weeks, I will consider whether our oil supply situation warrants making these state targets mandatory.

Last year I pledged that this nation would never import more oil than it did in 1977 -- 8-1/2 million barrels a day. I am tonight setting a lower target for 1980, 8.2 million barrels a day, <sup>as I did in 1979.</sup> If imports threaten to exceed that level, I will impose a fee to keep them within the target.

The United States is now discussing with other oil consuming countries how to avert a costly competitive scramble for oil when supplies are short. If those discussions produce a fair and equitable scheme for cutting back imports still further, I am prepared to lower our own import target below the 8.2 million barrel per day level.

Last year the Congress enacted authorization for standby gasoline rationing. But it can only take effect in case of an oil supply shortfall of 20 percent. We <sup>will</sup> need protection at an earlier stage if there is a ~~against smaller supply shortages~~. And so, this year I will propose <sup>to the Congress that I be given additional authority</sup> ~~standby conservation measures to take effect~~ in case of supply shortages of less than 20 percent, since they can still cause very substantial disruptions to our economy.

Our second task is to reduce inflation. We have to fight it now. And we will be fighting it for sometime to come. Our immediate weapons are a tight Federal Budget and a cooperative effort between labor and management to hold down wage and price increases.

My 1981 budget provides for an essential rise in defense outlays. But it

proposes no tax cuts, a reduction in inflation-adjusted spending outside of defense, and a deficit that is more than halved. So long as double-digit inflation continues and the long heralded recession refuses to appear, our top budgetary priority has to be the reduction of the deficit. ?

We are building on the Administration's National Accord with organized labor to enlist American working people as full partners in a fair and equitable fight on inflation.

Restraint -- in the Federal budget and in private wage and price increases -- is an absolute necessity in fighting inflation. But it is not enough. In the longer run, we need to attack the fundamental causes of inflation that make such painful restraint necessary. We must make the American economy more productive, more efficient, and less vulnerable to outside inflationary events.

First, we will continue to reduce the inflationary burden of regulation on the American economy by dismantling unnecessary regulation and lowering the costs of necessary regulation.

Second, we will work to slow up the scandalous rise in health care costs. I will continue my fight to hold down hospital costs. And I have sent to Congress a national health insurance proposal that will help control overall health costs.

Third, my energy program will help fight inflation in two ways -- our nation's productivity will grow as we learn to use energy more efficiently, and our economy will become less vulnerable to sudden OPEC price increases as oil imports are reduced.

Fourth, persistence in budgetary restraint will make possible future tax cuts. And when that times comes, we will have to give priority to tax policies that stimulate savings, capital investment and productivity.

Fifth, even in the tight budgets which I have submitted to Congress, I have sharply increased Federal support for research and development -- especially basic research which is the seed of our country's technological and scientific strength.

The 1970s left us with severe energy and inflation problems. But they are not insuperable. With persistence and self-discipline, we can solve them. America in the 1980s will be all the stronger for having done so.