

Energy, Independence, and the U.S.

An Interview With Milton Shaw and Francis X. Gannon

Of the various groups that have taken strong positions on questions of energy production—including the role of nuclear energy—one of the most active is Americans for Energy Independence (AEI). What follows is drawn from an interview with Milton Shaw and Francis X. Gannon, two people who are working with that organization. Mr. Shaw is a consulting engineer whose extensive work with energy development and production includes working directly with Admiral H.G. Rickover on the first submarine nuclear power plants for Nautilus and Sea Wolf. Dr. Gannon has worked in Third World countries, is experienced in environmental economics, and has worked for the American labor movement. Until recently, he served as AEI's Acting Executive Director and was the Director of the AEI-sponsored First National Summit Conference for Energy Leadership held April 7-9, 1976.

The interview is an outcome of a conversation that James Finn, a member of the Board of AEI, had with these two men about their views and the work of that organization.

In the intense debates about the energy needs of the United States and how those needs can best be met, Americans for Energy Independence has taken a number of strong positions. Given both your truly formidable background in energy development and your own heavy schedule, why, Mr. Shaw, did you decide to serve on the Advisory Panel of AEI? What do you expect or hope it will accomplish?

SHAW: What first attracted me was AEI's objective of acting openly—as a public interest group—to stimulate policies and actions for moving the U.S. rapidly toward reasonable energy self-sufficiency. This means in fuel resources and energy supplies.

Other organizations also endorse this objective. But AEI's founders were national leaders with diversified interests. They had already been involved in energy conservation areas and did not appear to be participating in it for self-serving purposes. They were concerned with broad energy objectives. More important, for me, they weren't about to be intimidated by the "antis" on the most difficult and controversial energy issues. They saw that our energy problems were increasingly more difficult and costly to resolve. Essentially AEI's organizers agreed that we must concentrate on removing the barriers to increase or use our available domestic energy sources—coal, gas, oil, and uranium—with currently available technology and proven production capabilities. AEI is convinced that this country knows how to achieve independence and can do so in an economic, safe, and environmentally acceptable manner. We are trying to clarify the differences between the myths and the realities associated with the national

energy crisis. Our primary focus is to help alleviate the crisis in the near term while contributing meaningfully to the long-range solutions.

I should acknowledge my belief that if we had strong governmental leadership, committed to achieving near-term energy objectives, we wouldn't need an AEI.

You talk about separating the myths from the reality with regard to energy. How do you perceive that reality?

SHAW: First of all, national energy self-sufficiency is absolutely necessary to the continued well-being of our country. We don't need more evidence that our growing dependence on foreign energy, especially oil, poses grave and unacceptable threats to our economy, our security, and our ability to maintain effective foreign policies. It's also clear that an expanding and therefore energy-sufficient American economy is the foundation for U.S. efforts to help developing countries, especially the Third World nonoil exporters so adversely affected by the world energy crisis.

Would you spell that out a little? What are the major parts of the problem?

SHAW: The fuels we depend on now to produce our energy are primarily gas, oil, coal, and uranium. Gas and oil have long been our least abundant fuels and our most exploited. We depend on them for about 75 per cent of the energy we now produce, but the production is declining. Yet our coal production hasn't increased substantially in the past five years. Despite the oil embargo over two and a half years ago, the U.S. hasn't aggressively utilized either its coal or uranium



SHAW

resources. Here I'm not complaining about the fine speeches and plans. Our society is failing to act and follow through to get the necessary commitments and results. In short, the U.S. consumption of energy is substantially what it was in 1973. We are increasingly dependent on foreign supplies of oil, yet we have no mechanisms to keep prices from increasing or to counter other potential dangers, like another embargo. There is absolutely no reason why this crisis shouldn't be treated with the same urgency and resources we used when attacked by hostile forces in open warfare. In my opinion the consequences are as serious—even though more subtle—and the public has yet to understand that this nation is engaged in an economic type of warfare.

You say the need for the development of more energy resources is obvious, but you also say there is no government leadership. And except for a bump at the time of the oil embargo, most Americans seem to have adjusted. They don't seem to feel we're living in an energy crisis.

SHAW: The President and other responsible officials in the Administration and the Congress all state that we have a critical problem. They insist we must urgently do something about it. Responsible business and governmental leaders know there is a serious time factor involved in planning and implementing even the most simple actions necessary to increase our domestic energy production. That goes for any area—coal, oil, gas, or uranium. No matter which energy supply is selected from among our proven energy sources we have to build

new facilities on a crash basis. Besides, practically every responsible party agrees that some combination of all of these domestic sources must be rapidly utilized to solve our energy crisis. Those who bear no responsibility or accountability for the planning and production of our energy and fuel supplies can speak idealistically and optimistically about other options and delays. They can also point the finger at the self-serving motives of those who urge immediate action because of their legitimate concerns and positions of responsibility.

GANNON: The crisis seems limited, since the globe is awash with oil right now. Look at the oil situation in the OPEC countries or elsewhere. You'll find that there's a tremendous amount of oil around. Many persons think that this country can bear the burden of buying that oil at any price. That's the first problem. Secondly, in that situation, while leaders often recognize that there is a crisis, they often don't understand the time frame involved in this. The presumption is that if you muddle your way through—which is a typical American way of approaching political life—you'll get through the crisis anyway. The time factor involved in producing new energy doesn't enter into the picture. It takes up to ten years to build a particular power plant. Maybe fifteen years before it really becomes efficient and produces the kind of predictable and economic power you need in this society. This reality is rarely considered.

Conservation measures are also called for. But many can only be adopted as a part of replacing many existing homes and industrial facilities over time and really produce meaningful results over a twenty- or forty-year period. In discussing energy, the time frame for producing results is too often ignored. In discussing conservation, the differences between conservation—that is, cutting back—and curtailment—namely, cutting out—are not stressed or even acknowledged. No wonder the politician and the man on the street are confused!

But if we are awash in oil, why is there a crisis?

SHAW: We simply can't afford the price and the potential consequences of burning valuable oil at such a growing rate. In the long term it just isn't there for us—or for the other nations that also need it. For any given short period it's like a family having a few thousand dollars in a savings account. You may have enough money to satisfy your needs, if they are within the amount in the bank—so you can be awash with money for a period of time. But if you're looking over the long term and have no way of replenishing that savings account, it's obvious that being awash isn't going to take care of your money problems, at least not five or ten years from now. Experts in our country and throughout the world agree that when it comes to our piped fuel—oil and gas—there is only a finite quantity available for us and the rest of the world. Finite. It really doesn't make a lot of difference whether this is a thirty-year quantity or forty-year quantity in terms of what has to be done to provide options for the nation. The lead time needed to provide substitutes for that gas and oil is very long, extremely costly, and full of risks and uncertainties and problems. This lead time is being drained away by failure to act decisively and constructively.

So on the basis of presently known resources of oil and gas, we can really be big spenders only for a limited time.

SHAW: "Living high on the hog" is what we used to call it in Tennessee, where I come from. In a sense, our country has been "living high on the energy hog." We have wasted our fuels and our energy, failed to conserve many of our valuable resources. We have assumed that when we open the valve, the flow of oil and gas will forever be there. This continues to be the case despite the fact that everyone agrees now there is a finite quantity of these fuels and it can be measured in our lifetime.

GANNON: The question comes up: How do you face up to the fact that your domestic oil and gas outlook is, at best, a bleak prospect? And unless you face up to this reality you're going to be subject to foreign influences that seek to control your security or that impose economic forces on your society you cannot control. For instance, at the time of the oil embargo in 1973 we were importing about \$7 billion worth of oil. Now, last year, in 1975, it was \$28 billion. Sometime in the future this payment for foreign oil could reach \$100 billion. Right now we seem to be on a direct course toward that level—that is, 10 per cent of our trillion-dollar economy would be going for foreign oil. What kind of an adverse impact would this have on our society? Particularly if at one point the oil-producing countries "just drop the other shoe"? And so you are constantly being subjected to enormous extranational pressures both on your economy and on your very survival as a free society. By an external pressure over which you have no real control.

You're positing, in that statement, a close connection between oil dependency—or just energy growth—and our economy.

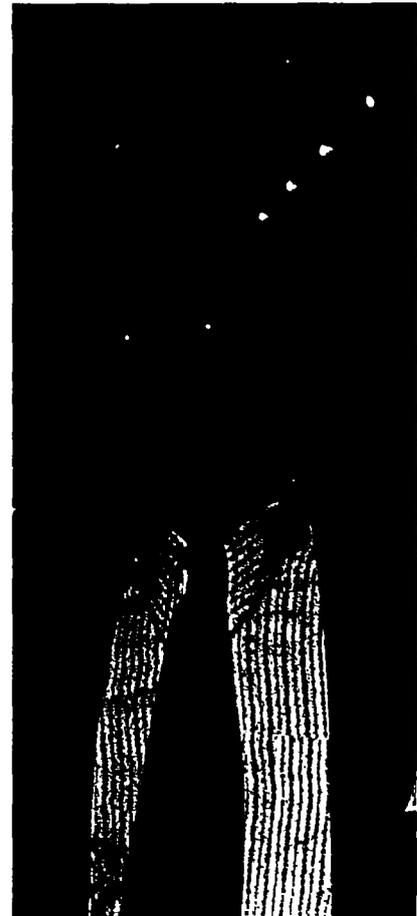
GANNON: Energy is closely associated with growth and development. This doesn't mean that it's always in constant relationship. But over the past forty or fifty years we know that as the economy went up 1 per cent, the energy use went up a comparable percentage. A direct cause-and-effect relationship isn't provable in many instances. But over time this position seems to hold up. As our economy starts taking off again, so will our energy use.

You are suggesting that as our economy moves as we want it to move, we are going to need more energy?

SHAW: Unquestionably!

Now, you've said there is an energy crisis, that the experts agree on this, significant segments of government agree, but nevertheless the nation's leaders are attempting to muddle through politically. If all that is true, what role does an organization like Americans for Energy Independence have? What can it usefully do?

SHAW: We advocate more full disclosure of the facts—validated by responsible and authoritative sources—that relate to our fuels and energy situation. We want all the facts made available to the public and discussed openly and fairly. Then we need to establish meaningful priorities and effective actions covering the real options this country has now and for the next ten years or so. One



GANNON

of AEI's biggest challenges is to substitute factual information for "hopes and dreams"—good and bad. We should also cut through the confusion created by "proponents" and "opponents" and by any "Pied Pipers of technology" who propose unrealistic ways to "solve the energy problem."

The experts not only agree that there is a crisis but how to resolve it?

SHAW: Yes, and to a far greater degree than the critics and the media convey to the public. There is broad agreement among the real experts and other responsible leadership in our society. There are few, if any, who do not urge that we develop and use our own domestic resources more fully with those production capabilities and know-how that we already have.

Our domestic energy programs have to be structured around strong conservation measures, husbanding oil and gas resources and finding new sources and broader use of coal and nuclear power. This doesn't mean kidding ourselves about prolonging our available oil and gas supplies. But we should be conservative and frugal in this time of need so as to buy ourselves valuable lead time as we develop the more plentiful options of coal and uranium. We have to conserve time as well as our fuel resources! These near-term possibilities have to be placed first and foremost, because there are so very few other things this nation can do that will help us in any substantive way over the next ten years.

To clarify one thing. You mentioned conservation, which

most people would support. Then you said short term, which implies a long term as well. The short term is to make use of the resources available, oil and gas and coal and nuclear energy. Now, you said these measures have support from most of those in responsible positions. This is what I'd like to have you elaborate on.

SHAW: Oh, there is no doubt that from 1967 to 1970 the nuclear commitments grew too rapidly for the minds of many people—proponents and opponents. The nuclear industry could not match early forecasts and hopes—and the numbers of plants that were anticipated to be operable by 1985 when they were originally purchased will not be realized. Even the nuclear power advocates acknowledge that the nuclear industry has encountered great difficulties as it tried to bring into being the vast numbers of nuclear plants this nation needs. To build and perfect these plants has been an enormous and changing challenge. But just as this national effort reached maturity, it found that its hands were being tied behind its back. Thus, instead of being able to address the real engineering and administrative problems, much time has to go into responding to the legitimate public concerns as well as responding to and fighting off the professional critics. These include those who lack much experience in the nuclear industry, but who resort to blocking and intimidating as a way of life. The net result has been that the nuclear industry, as well as the coal industry, has been facing tremendous obstacles. A pervasive negativism has set in across the entire energy industry, and this can hardly enhance the safety, the reliability, the availability, or the costs of the power plants. In fact, consumers should be alarmed by the cost increases incurred when delay and cutbacks are forced by the critics. The "antis" call for conservation and elimination of the need for fuel and energy resources. Actually, though, they appear to be contributing to a horrible waste of even more valuable resources—manpower, material, and time—as a result of the obstacles they continue to place in front of the essential national programs being carried out in accordance with approved federal regulations by responsible citizens.

Could you be a little more specific about these obstacles, about the delays in time?

SHAW: Let me try. When we built the first large commercial nuclear power plants in this country—and I'm not referring to the first prototypes or demonstration units—the industry, along with the appropriate regulatory activities, demonstrated that this could be done effectively with our labor and engineering resources in a period of four to five years for each plant. These have proven to be safe, reliable, and economic plants—many have been operating for ten years or more, and operating well. It is now taking ten years or so for essentially the same kind of undertaking, with costs of men, materials, and other valuable resources increased manyfold—for many reasons, good and bad. However, one can look at what is happening in other countries that are committed to strong nuclear programs—for reasons like ours. They are building these plants in four to five years, just as we formerly did in the U.S.—and we could do it again. We have introduced tremendous

uncertainties and delays in each of these projects—frequently in the name of "improved safety" or "to enhance the quality of the environment." No nation can afford the additional expenditures and waste of national resources from such inefficient operations. No nation can afford to tie up such tremendous amounts of capital. Investments are costing a lot more than necessary because of the heavy escalation of costs and the high interest rates that have to be paid as a result of delays and uncertainties during construction.

Good people can accept constructive criticism and actually thrive on it. Destructive criticism, unfair attacks, irresponsible intimidation, and other such actions have been driving many good people out of the engineering and production professions. I know of many skilled and unskilled workers, welders, machinists, riggers, and others—along with the inspectors and engineers—who cannot continue to subject themselves and their families to the frustrations, the stops and gos and the uncertainties of these types of energy facilities, going on year after year, getting worse rather than better, while our energy crisis worsens. The sincere professionals who drop out because of their frustrations are lost in the glaring publicity given to the tiny handful who drop out and join the professional opposition. Everyone is consuming everyone else, everyone loses—and our leadership is apparently incapable of awakening the nation to the crisis or doing anything meaningful about it.

GANNON: On the other side, what happens here is that people opposing greater energy use will say, "We oppose nuclear use in this country on grounds of safety or economics. Further, we want a moratorium on nuclear energy." Of course this jumps over the fact that despite many problems, radiation has not caused an injury or a death to any member of the public under the government-regulated nuclear industry in thirty years. And they use all sorts of scare stories about most every accident in a nuclear facility. They play up every problem as if the safety features haven't been taken into account, when actually the safety features have been built into this industry more than any other industry known to mankind. But they'll say then, "We'll use coal." We *do* have enormous reserves of coal—400 billion tons is a common estimate. But the actual mining engineering, transportation, and financing—the practical problems associated with getting more coal—they do nothing constructive. In fact, along the way they criticize and throw roadblocks against mining and using more coal.

In this country we are producing now the same amount of coal we produced in 1946. Basically we are not putting the effort and resources into the coal industry required to produce the coal the country requires for energy needs. And everybody, including the most outspoken nuclear, oil, or gas advocate, recognizes that coal has to play a major part of the nation's program to produce the energy we need. But the situation is a complex one. Because we switched so rapidly to oil and gas in the '50's and '60's, 300,000 miners left the coal fields for good. A whole generation of people who were skilled in mining left. So, at the present time what you

have, as Carl Bagge of the National Coal Producers Association has said, is a grandfather-grandson industry. The first question: How do you get skilled miners back into the mines when the nation hasn't got enough miners? Number two: People say let's get more coal from the Western strip mines. Then you come up with the problems associated there with energy efficiency. How many BTUs can you produce with that kind of coal, and how do you transport it? We let the railroad transportation industry in this country fall apart, and as a consequence we need thousands of cars and better roadbeds to transport this coal, and we don't have them. In addition, we switched many of our power plants from coal to oil and gas in the '50's and '60's. All of a sudden we are telling them to switch back to coal and install environmental clean-up equipment. The utilities don't have the incentives or financial resources for such major changes, particularly with their older plants.

And I haven't mentioned the environmental problems associated with coal mining and the fact that the land reclamation standards should be kept at high levels and met. In certain areas of the country the reclamation standards seem quite high. In Pennsylvania, according to many sources, you have good coal reclamation laws and practices. In other states the laws and practices are said to be weaker. Certainly trade unions, responsible coal industry leaders, Americans for Energy Independence, and other concerned citizens want safety standards and reclamation standards maintained while we seek to double the production of coal. These are the specific kinds of problems—engineering, financing, transportation, manpower—that are not taken into account when we say that we can use our 400 billion tons of coal.

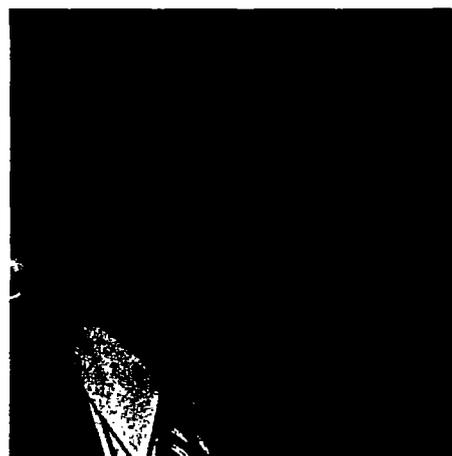
Do those who say that coal is an easy alternative to the use of nuclear power right now know the problems of the coal industry?

SHAW: No, but one can't criticize people who may not be informed on such complex matters. We have to assess the role those advocates of alternatives to nuclear power are willing to assume in order to help make usable the 400 billion tons of coal or whatever that number may be in the near-term time frame. Are these nuclear critics really advocates of coal? Or are they just against nuclear power when nuclear is being debated, and against coal when it is being debated? Are they out front, as they should be, saying, "I don't think we ought to use nuclear energy because we can use coal instead—and I accept a responsibility and a commitment to enable its greater use. I will fight off anybody who is deterring that effort because we can't solve our near-term energy problems with any of the novel concepts, such as solar, windmills, or tidal power."

There is a game being played in this country by some people who are against every one of our real options to solve the energy crisis. Basically they believe that we do not need any more energy. They believe that technology has led us down the drain, so to speak, and they are going to fight against every such technological effort on every front. The tactics being used are hardly conducive to sustaining the better features of the way of life we've managed to develop in this country, despite the many

problems introduced by some mishandling or misuse of that technology by society. After all, the technology is neutral. It is what mankind does with it that should be the issue.

And if the critics are right about not needing the additional energy, I think most of us who have been affiliated with energy production would not want to build unnecessary plants. There is no glory in each of these difficult undertakings, which involve commitments of ten years or longer. There are lots of easier ways for engineers and craftspeople to earn a living, I assure you. Personally I have left the nuclear business twice—and found myself right back in it as a result of testing out the real options the nation has in place of nuclear power. Others too have done the same thing. My concerns and my criticism of our nuclear power program are a matter of public record—on the basis of feeling responsible for converting these concerns into constructive actions. I and others feel that that is the role critics should play in a democracy.



I don't think the critics of nuclear power understand that some of the strongest advocates of nuclear power would fight against building nuclear plants if there were ways to assure the long-term utilization of environmentally acceptable coal burners, or good gas or oil plants to meet our known energy needs. Nuclear power plants are tremendously difficult engineering undertakings—and my concerns are not related to the catastrophic-accident mythology concocted by ill-informed nuclear critics. The nonnuclear options being put before the public by the nuclear critics are not real options unless they depend on burning coal, oil, or gas. Such novel concepts—no matter how promising—are not real options in terms of solving our energy crisis during the next two decades.

GANNON: In fact, we have no national energy policy. This is reflected throughout the public and private sectors. Look at the current situation. You have had Presidential candidates running for the highest office in the land addressing national gatherings with statements that put total emphasis on solar energy as the answer to our immediate energy problems. Now they know, and everybody else knows, that emphasis on solar energy for bulk power generation is not a plausible way to move. The same thing happened with the plutonium statement endorsed by the governing board of the National Council

of Churches. Despite whatever merits it had, this statement, contrary to the more comprehensive one issued by the World Council of Churches, simply ignored the overall energy challenge before the nation.

Let me interrupt for a moment here. I'd like to get back to the NCC's plutonium statement. But you mentioned solar energy and, I believe, solar/thermal energy. You do think those concepts should be investigated?

SHAW: By all means the nation has to pursue its best ideas for the long term. The most promising of the various alternative energy concepts should be worked on. They should be demonstrated to the limit of our national ability to pursue various advanced alternatives and still make decisions on existing national priorities. The merits of each of these advanced energy concepts should be judged by the same standards we use for the concepts in use today. We can't judge these advanced concepts on the basis of a hoped-for performance in an idealized society. We must judge them in terms of practical considerations in our country. For example, what health and safety standards should be used to judge the new concepts? It is evident that the country is having difficulty in determining whether to judge nuclear power by the real experience over the past thirty years—zero deaths and zero injuries to any member of the public—or by the health and safety concerns hypothesized by those who are not responsible for the conduct of the program.

Novel concepts can truly be visionary. But the step to their widespread commercial use is a mammoth and expensive one for any of the technologies, even after ample evidence of their intrinsic merits. Such a step requires long-term commitments by government, industry, and the customers, along with public acceptability over the long period of the investments. Obviously, advocacy will have to build up if a concept is to be successful. Who will market the concept if it is not the industry that advocates it?

So, when you ask the question about the pursuit of solar energy, we have to consider what will be done after R&D has established its potential for demonstration and widespread use in the free enterprise system. Will the producers, the investors, and the large number of customers be willing to make long-term commitments? Many of us would like to see solar electric power supply a part of our much-needed energy. Yet we know very well that much mythology would have to be abandoned before one could convince responsible organizations and people to consider substituting solar energy for proven means of supplying the power. Who is to underwrite the risks and make the investments? Solar electric power simply has not been developed or demonstrated to the degree necessary to establish its potential availability and widespread utilization in our lifetime. On the other hand, solar energy for heating water and some space heating can be utilized in certain regions of our country—by those who wish to invest in it rather than in some of the more proven and more economic alternatives at this time.

GANNON: I should add that Americans for Energy Independence is clearly interested in these advanced concepts. For instance, the state group that AEI is

working with in Arizona is trying to work on a research facility that would deal with the whole question of solar energy. AEI is very much interested in working with them, but has to recognize the time frame within which this is going to come about. So while supporting that project the immediate problem AEI faces is the alternative in, let's say, the next ten years when certain decisions have to be taken. When those decisions are taken, they affect the whole future of this society.

SHAW: It's right that we pursue its development and also right that we not oversell its potential; if we are going to be committed to it, make sure it's done right.

You're saying we should pursue those long-range things, but we should do it prudently and not expect to produce any miracles.

SHAW: Yes, there are no miracles in the energy business. I used to be quite an enthusiast, too, but we haven't had a breakthrough in the energy business in a very, very long time. In fact, most things that have been happening just seem to make each successive undertaking much more difficult, complex, and costly. I can't help noting that the scientific, engineering, and business capabilities to generate these breakthroughs are not nearly as great as some of the spectators who are cheering us on may think. As an editor you surely have discovered that it is not as easy to write a good article as it is to criticize even a good one. There is no doubt that the energy development field is being inundated by sideline "experts" who have never really attempted to select a technology and demonstrate it. Much less have they tried to transform it into wide-scale use under even more ideal conditions than those that exist today.

In our national climate there is an increasing reluctance for qualified organizations and professionals to make those long-term commitments—the kind that were made in the 1950's and 1960's—required to achieve widespread success with even technically less sophisticated concepts than those being pursued in the R&D sector at present. I'm afraid the country has lost this characteristic of commitment too. I am fearful that the large-scale energy engineering capability that will be required when people come to their senses will be rather hard to find, and much harder to use. I should note, however, that this is not unique to the energy business. It looks as if it is happening in practically every segment of our government, in the medical profession, and in many other fields in which this country excelled in the past.

GANNON: Well, of course, it's perfectly normal—and indeed useful to society—for ordinary citizens to conclude that they have better knowledge of particular circumstances than those involved in them. The experts can be irresponsible on occasion and invite this kind of citizen involvement by their own failure to obtain corrective actions through their peer groups.

You're right. And war is too important to be left to the generals.

SHAW: While I can't object to that point, I'd like to try to keep this issue in its proper perspective. In our democracy people have the right to scream and criticize. But there is no characteristic of a democracy that

suggests that these screams and criticisms, by themselves, should be permitted to control the activities, as I believe they are being permitted to do today. In fact, the officials who are charged with certain responsibilities have an obligation to make sure that those screams do not interfere with the assigned job being performed correctly and on time. We've learned to handle such involvement by the ordinary citizen in the athletic world. The people who have paid the price of admission to watch athletes perform in various sports—amateur or professional—can scream their bloody heads off, whether they are professionally qualified to play the game or not. They can criticize the players, the coach, the umpires, and everyone else. But the sideline athletes are prevented by laws and rules from going out on the field and from interfering with the orderly progress of these activities.

I am always impressed with the ability to establish such ground rules and standards of participation and performance in every type of athletic activity—national and international—and by the willingness of the public to accept and abide by those rules, no matter what they think about how the game is being played or who is getting hurt. We have yet to establish comparable ground rules and codes of performance—by the players and the critics—on those energy matters vital to our nation's well-being and to our security.

GANNON: Two questions need to be asked. One is the citizen responsibility and the other is the responsibility of those who have the knowledge, the ability, and the experience. The experts can't set themselves up as some sort of high priests. Some distinguished physicists have said that there should be a caste of high priests overseeing energy development, that this is information that is not comprehensible to the average public. Well, our democracy doesn't work that way. Democracy requires that scientists and technologists work with the public, explain what they are doing, and work through the democratic framework. But the public has to respond in a responsible way also.

You mentioned earlier the policy statement on the plutonium economy that was prepared by the board of the National Council of Churches in this country. Now, when we're talking about democracy and public debate may be a good time to return to it. That statement should, I presume, give the lay person pause. The committee that produced it was chaired by Margaret Mead and René Dubos, and was composed of a number of well-known people from different fields. And it really calls a halt to the production of nuclear energy.

In my reading of that statement three main points were made about the dangers of nuclear energy and the breeder reactors. They centered on, first, the problem of releasing radioactivity by accident or sabotage. Second, the diversion of fuels to nuclear weapons. And third, the problem of managing a plutonium society. And each of these was listed as an almost inevitable outcome. These are serious charges, serious concerns.

SHAW: They are serious charges and serious concerns. But they were distorted in terms of fact and years of actual experience. These concerns have been

recognized, discussed openly in the public forum, and managed reasonably well, in full compliance with well-established national regulations. Thus, for example, I don't know of a single person who has been associated with nuclear activities that has not had these same concerns. Because the people involved have a commitment and a responsibility, these concerns have been discussed rather openly—particularly in the professional, business, and regulatory circuits that help those who are concerned provide some reasonable solutions, to assure that each problem is manageable. The professional critics haven't been generating any original data, or doing anything more than placing their judgments on top of those who are generating and evaluating the data. Of course there are always going to be differences in judgment and in interpretation of the facts. This is part of any technical undertaking. Again, the basic issue should be the health and safety of the public—that is the issue the nuclear critics are screaming about. Again, the track record of no deaths and no injuries to any member of the public from these nuclear activities for the past thirty years throughout the country reinforces the fact that these concerns are manageable by those members of industry and government that are responsible. Everyone involved will support fully the need for upgrading and taking all reasonable steps to assure that improvements will be forthcoming in anticipation of continued expansion and increasing difficulty—as in any type of engineering undertaking of this magnitude.

One should acknowledge that our national leadership was rather astute in establishing a regulated environment for nuclear matters from the time that thought was first given to developing the nuclear technology in our country over thirty years ago. In other words, I think credit should be given to the government leaders for having established this regulated and monitored environment—and for having taken into account these anticipated serious concerns. I think they provided reasonable assurance to the public that these concerns will remain manageable. Now, the right way to monitor performance is to evaluate the actual record of performance. Do the facts on the health and safety of the public from nuclear causes support the claims and criticisms? Is the technology to be deemed guilty on the basis of hypothetical data twisted out of perspective by the professional critics and by those that bear no responsibility for producing evidence that supports their position? If plutonium is as "deadly" as claimed, why is the record of the health and safety of workers and others who have been exposed to accidents over the past thirty years so lacking in evidence of the "deadly" effects? Zero deaths and zero injuries to any member of the public from these causes—even though unforeseen serious accidents have occurred with plutonium, and the atmosphere contains tons of fall-out of plutonium from bomb tests—certainly suggest this toxic substance can be managed and its potentially adverse effects can be controlled. I have enough faith in human beings to believe that a reasonably good record can be sustained, although probably not nearly as good as the one achieved thus far in the nuclear business.

Does that record apply in other countries too?

SHAW: Essentially yes, in the free world. In other words, there have been serious accidents in plutonium handling in our weapons laboratories and in handling weapons. To my knowledge there have been none in handling plutonium for the civilian power program. We and other countries have put tons of plutonium dust into the atmosphere from weapons testing. This dispersed plutonium will far exceed the individual consequences of each of those "accidents" that are being postulated for nuclear plants. It is appropriate and necessary to discuss these postulated accidents and to monitor constantly the problems being encountered in handling plutonium, even though no damage results. All technological undertakings require such continuing vigilance. This type of hypothesizing and monitoring is one of the best ways to prevent accidents. They have to be discussed and analyzed, and steps have to be taken to assure that there is a minimum probability of occurrence and recurrence and for expert overview and for qualified and responsible criticism. And if accidents happen, there must be maximum protection of the workers and the public—and such protection must be sustained no matter how good the safety record is.

So I don't want to be dragged into arguments about whether or not plutonium accidents are potentially serious. I know they are. What chemical substances—radioactive or not—are not potentially serious in some form or another, including water and salt? The results of the efforts to date should be examined to determine if those responsible have complied with those standards established for their conduct that have been accepted in this country. If they aren't, corrective actions should be taken in order to get the results we insist on. But don't fix the jury or run a kangaroo court on the technology or on the people that may be doing decent jobs on behalf of their profession and their country. We have had too much of that witch-hunting in my lifetime in our country.

As a member of the public I am very confused about what our national health and safety standards really are. The track record on accidents, or risk of fatality and injury from various sources, is fairly well established and publicized. Apparently the public has been willing to accept 55,000 deaths a year and countless other injuries and damages from motor vehicles. Since the first commercial nuclear power station started operation in 1957 almost two million people in the U.S. have died from all accidents, while no one has died from a commercial nuclear power reactor accident. We are not asking for a quota for deaths for nuclear power, but rather for relevance of the standards by which the public and the media are judging the risks and benefits of this technology. We want a better record than the public has been willing to accept for other technologies. Nuclear power started out on that basis, and its proponents remain committed to sustain those efforts to do better. All we urge is that the public and the media judge nuclear power performance and compare it with the real options.

While we're speaking of dangers and possible accidents, let me ask a specific question. One of the dangers mentioned in the NCC plutonium statement was that of

radioactive waste material. And that statement projected a possible annual production of hundreds of tons of plutonium emitting radioactive particles for hundreds of thousands of years.

SHAW: First of all, plutonium, by its very nature, has a very long life before decaying. This is known as its half-life, and it's about 24,000 years. This sounds very impressive and very ominous. But other common chemical substances, like lead, arsenic, salt, etc., have even longer lives, infinitely long—in fact, forever. So one should note that life really may not be the real issue, particularly if it is over a few decades or so. The real issue is whether the substance can be handled in a manageable way and whether the public can be given the protection necessary to maintain health and safety. Plutonium, when it decays, emits an alpha particle. Protection of man against such particles is readily achieved by simple materials such as cellophane. Of course, plutonium, like arsenic and lead, is a very heavy element; it is toxic independent of the potential adverse effects from its radioactivity. So steps have to be taken to protect the public as we've learned to do for the more common toxic chemicals, and those that may not be so common, like those developed in past years for biological and chemical warfare. I don't recall that the latter had any redeeming features either. There are efforts continuing to ease the concerns about plutonium—such as through transmutation of the plutonium to other substances. But again, are such concerns about toxicity sufficient reason to stop the utilization of this nuclear technology any more than worrying about the potential devastating effects of Grand Coulee Dam failing and wiping out everything downstream on the Columbia River?

What about the nuclear waste problem?

SHAW: The nuclear waste problem was created the first day we had controlled nuclear fission. That happened over thirty years ago. Large amounts of fission product wastes came out of the nuclear bomb programs in our country and abroad. Some of these wastes are in our atmosphere. I know that our technology is under better control than ever before. I know that improvements in this technology now permit us to store these wastes in such a way that they are solidified and immobilized. The best experts in the world agree that these wastes can be stored safely in deep salt beds, the most stable geological formation known to man, so there will be no danger of their migrating.

We ought to get on with this well-accepted solution, instead of letting indecision, procrastination, and confusion allow the wastes to exist in a less protected form and location. Surely, R&D can continue—virtually forever—but it won't result in agreement to go ahead by those that oppose nuclear power, no matter what is done. Thus, if there appears to be an increased liability now because of those wastes, I'd suggest that it is due to the indecision and the failure to act to place these wastes in a safe form and location, and making sure that the decision has proper monitoring and follow-up actions. This is almost like watching people mess around with firearms, debating how to assure that the guns will be safe, and

letting them be handled and mishandled while the debate continues—almost as if the people are scared to disarm them and put them away under lock and key—and solve the problem. As far as the nuclear wastes are concerned, I am convinced that we have the technology and the capability to store them safely while we keep introducing improvements as meaningful evidence becomes available that our concerns are not being properly addressed.

And the amount of waste?

SHAW: The amount of waste that would result from a household using nuclear power for a year would be less than the size of my watch! I'm convinced that this type of waste problem is manageable. There are a number of solutions that can be made acceptable. Some solutions we know about are not being picked up and used. That's the type of thing that's bothering me. Our country appears to have lost its ability to get these serious concerns discussed and resolved in the real world. The people who are building and operating reactors and their legitimate critics cannot continue to consume each other. The critics have a responsibility too. I am astounded by the character of this problem. It's a national tragedy.

How do you account for that to yourself?

SHAW: To me it appears that the people who most actively oppose nuclear power are really intimidating and bludgeoning officials and others by rousing fear to the point of causing the deferrals, the indecision, and misleading the public. History is full of examples where such techniques have been used effectively for unbelievably long periods.

Are you saying that they themselves are probably fearful, that they are themselves misled?

SHAW: I think some of the "antis" are honestly fearful and honestly misled. They really have lost their faith in mankind and its institutions. Some of the most active critics are professional ones. That's the way they earn their living. As I suggested, history is full of people who have done this type of thing—to fulfill their own needs, not to serve humanity, as they claim. Somebody always has had to come behind and clean up the messes they have created, when possible, while they've gone on to something else. They are professional merchants of fear that hide behind complex technological or emotional issues.

GANNON: And I think the interesting facet in the nuclear debate—at least from my view as a nonexpert in a nuclear area but certainly as an interested public citizen—has been the fact that some of the key scientific and technical people who were raising the issue of nuclear dangers several years ago have now changed their minds. They've been convinced that the technology has been improving, will be improved further, is doing well, and what you've got left behind are people who are still out there in the wilderness insisting that we destroy nuclear energy at all cost. They don't stop to take into account the overall energy consequences of their position.

And the problem with that plutonium statement of the

NCC from my viewpoint—and I won't go into the techniques or the technicalities of safety or terrorism or all these other things—the simple problem is that it just didn't bother to address the energy problems of this society. It's as if the only thing you are going to have is the plutonium economy or nothing else. The committee didn't even bother to look at the main energy problem. The energy crisis is not something contrived. It's here. You have to take action. The only thing you can do is conserve or use those key production facilities and capabilities you have available. Otherwise, in a couple of years from now you're not going to be able to solve the problems that are right at your doorstep. The very people who are saying this is a moral issue seem to be ignoring



the main moral issue of feeding people, of giving them jobs, of creating the kind of society we need, of providing the kind of stable economy that would help other economies abroad in the world. These are the kinds of problems that concerned the framers of a similar but more balanced statement issued by the World Council of Churches. It's regrettable that the drafters of the U.S. National Council of Churches simply paid no attention to such matters.

If we bring issues of security and safety into the debate, fit them into the overall energy-use context, then we are talking of moral issues as they relate to the political sphere. But the NCC statement was talking moral issues in abstraction. That is moralizing, not morality, as Reinhold Niebuhr more than once pointed out.

A number of people who signed that initial NCC statement should agree with you; that is, that you can't make judgments without taking account of the larger context. And the larger context is what we started talking about initially, the energy needs of this country and resources that are available. Could you relate the concerns expressed in that statement to the purposes of AEI?

GANNON: Well, AEI has certainly taken a clear position that we can utilize nuclear power safely. And the combination of the government and industry has demonstrated that this can be done for many years, and there's no reason it cannot be sustained. While AEI is

advocating the continued use of nuclear power, it's also advocating, or really stating, that we must make sure it's done in a safe, environmentally acceptable manner, taking into account legitimate cautions.

SHAW: We would do this for any proven energy source, whether it's coal or uranium. We're for greater coal development. And for proper land reclamation. We are for using the technology we have efficiently and safely. The basic purpose of some of the "antis" is *not* to make sure that plutonium is used safely; their basic purpose is to put the technological genie back in the bottle, so to speak, and hope that we can cause the whole world to drop the nuclear option.

GANNON: You've asked if we debate people. Yes, we have met with diverse groups, including the Nader-type groups, and we're quite willing to debate openly and publicly on these issues. We find there are issues where we are in solid agreement with other groups, much to their surprise and perhaps to our own. In the conservation area, for instance, we find very strong agreement.

SHAW: Probably where we differ from some of the extreme groups and advocates of conservation is that we recognize the hard realities of achieving certain conservation practices. Furthermore, conservation can help but cannot solve many of the real near-term problems related to our energy needs. We also are trying to point out that many conservation practices require building new energy machines. Some of these may be far more important and contribute more to sustained improvements than some of those causes being advocated. For example, a high-temperature nuclear plant like the breeder is a major conservation device. If you know you can get sixty times as much energy out of a pound of mined material and contribute 30 per cent less waste heat to the environment, why wouldn't the true conservationist become a staunch advocate of the breeder? What we're trying to do is get out on the table the various options for conservation, trying to provide meaningful perspective on them, and trying to induce our leadership to provide the real facts and guidance to the public on those methods readily within our grasp.

GANNON: What we're saying is that you cannot be for all forms of energy at once. You've got to differentiate between the forms of energy available in the short run and those in the long run. Once you do that, you begin to zero in on the resources that you should develop now.

Sometimes people we talk with are puzzled by the title of our organization, Americans for Energy Independence. This doesn't mean we have a "Fortress Energy America" mentality, or anything like that. We're deeply concerned with the problems of the Third World and the Fourth World today, countries deprived of earnings because of a lack of productive capacity to export. We're very much concerned, first, that this country maintain a solid economy to support development of countries dependent on export trade to sustain their natural development. For instance, when the United States economy went into the present recession (to use a mild term), it certainly hurt us, and we had millions and millions of people unemployed. But look what it did to a country like Mexico. The trade

between our two countries declined tremendously and adversely affected Mexico and all those countries in Latin America that rely on a strong U.S. economy to keep their own economies growing.

Secondly, we have a responsibility to maintain high standards in our technological development so that we can, if possible, adapt these and help the other countries use them, as F. Schumacher argues in *Small Is Beautiful*, in a manner that's adaptable to their own circumstances and society. We must help them move forward in their development process as readily as possible. So, many of the groups represented by Americans for Energy Independence are not concerned *only* with the United States. There's no such thing as absolute independence, energy or otherwise, in the interdependent world in which we live. But we wish to achieve a reasonable degree of energy self-sufficiency so that this country cannot be moved aside or forced off its development process simply because we are subject to the whims of other nations that are able to cut off our energy sources at any given moment.

But even that degree of self-sufficiency entails large responsibilities to the many countries that are not self-sufficient in energy, doesn't it?

SHAW: Yes, there is a heavy responsibility that goes with this objective—positively and negatively. For example, we should not encourage other countries to depend on some exotic forms of energy—solar, tidal, geothermal—that we know will not be readily achieved. For some smaller developing countries this could include nuclear power. Some of these energy concepts are still in the visionary stage. Some countries should not be encouraged to build nuclear power plants, just as they shouldn't buy 747s to start an airline business. Our technical needs and options are not necessarily right for someone else. One can sense the desire of many small countries to be out in front with the most modern technology. But one can also anticipate that if they buy into even the proven nuclear power plants too early, it could probably drain every scientist, every technician, every engineer they have in order to carry out the program reasonably well and get the return on it in a national sense.

We should help these countries take advantage of what we can do for ourselves. If we have more nuclear plants, they can have more oil. If we deny ourselves nuclear energy, we will certainly consume the replacement oil and leave very little for the others. There are limits to how much some of these countries can compete in certain spheres of supply. Some of us in AEI feel very strongly that the international implication of what we are *not* doing may be felt seriously by those countries that do not have alternatives like ours in the energy field. This takes us back to another point. A number of other countries do have a number of options, but they usually take the technological lead from this country. If we don't develop and demonstrate the technology here, it may or may not be developed. I don't think the professional critics have any better capability to make judgments in these areas than you or I. How can you really respond to people in foreign countries who say, "You know very well that the

U.S. builds the best power reactor plants in this world, the most conservative reactors for safety and performance. But you won't sell them to us. You're forcing us to buy an inferior product from another country, which we don't want to do. But we're going to go nuclear because we have no option.''

You're saying here that even if the United States does not go ahead, other countries are going to do so.

SHAW: Factually speaking, they've gone ahead. They've made their commitments, and they're building nuclear plants as if their future depends on them. Most of these countries are unequivocal with regard to their nuclear energy programs. Most do not have the coal option; most don't have the oil or the gas. Some with plenty of oil and gas have made strong commitments to nuclear power in order to save their more precious fossil resources. Iran is the best example. They are building two reactor plants they bought from Germany, two more from France, and they have been wanting to buy a significant number from the U.S. Their leaders look us in the eye and tell us they aren't going to burn their valuable oil to make electricity when they can buy the nuclear power alternative that has been proven to be safe and economical in the U.S., France, Germany, Japan, and elsewhere throughout the world. Then, you sort of sit back and think about this and try to figure out why you can't quite explain our national attitude to yourself. Obviously, *their* leadership is willing to move aggressively with what we have successfully developed and demonstrated and *ours* isn't.

If you could transform tomorrow into the ideal, what would you like to see done politically in this country? What practical measures taken?

SHAW: A number of things appear necessary. First, the double-talk from our leadership about the seriousness of the national energy problem and the real near-term options has to be stopped. Actions have to be compatible with, and reinforce, the policy, particularly in the critical and pivotal areas. One good way to regroup and to start the right movement forward would be for the President to go on TV with a series of about three evening discussions. By the way, this is not a unique thought; it has been suggested by many others. He should lay out the energy picture as he thinks it really is, summarize the principal differences of opinion where they exist, explain some real alternatives and realistic options the American people have, dispel some of the prevalent myths and make sure the public gets the story on the real risks and concerns of acting and of not acting, and then propose a specific plan that requires support from the Congress and the people—as well as from all sectors of the Administration. The time has come for America to step forward and act aggressively against this energy crisis. Our leadership has the responsibility to place the options and the choices before the American people as they have done before when confronting other crises.

We've got to make some hard choices.

SHAW: Absolutely—and stop the double-talk. I think the American people and the Congress are prepared to respond to responsible leadership and to make those hard choices. The President may be surprised to find that America is still willing and able to respond to strong and determined leadership. Fundamentally there are solid and proven technical solutions for most of the problems in this area. Much of the controversy has been created because of the weaknesses, the uncertainties, and the lack of leadership and direction. In view of the seriousness of the current crisis, it appears appropriate for the President to initiate such a face-to-face discussion with the American people. I don't think it would be too hard for the public to understand and respond to most of the key action items. Some would be tough to get going—but a batting average of 50 to 75 per cent would look mighty good in today's climate.

One real key to getting the message through to the people would be the follow-through on characteristics of the specific programs. This program has to address the critical areas as if we were really in trouble, which I think we are. I and many others who have talked about such an approach by the President feel that the political advantage of doing something like this is profound, too. The risks and consequences of not moving along these lines can be disastrous because many of the events that could trigger a devastating situation are really not within the control of the Administration or the Congress. An extremely cold winter, or an extremely hot summer, or another embargo, can't be programmed or handled by rhetoric or by the political activists. Looking at it from the other side, it appears that a great political liability exists unless the Administration and the Congress have such a plan. I am no politician, but I know one thing: When something triggers the crisis again, as the embargo did over two and a half years ago, the people aren't going to be listening to the critics. They are going to be pointing the finger at those in charge and demanding action while accepting the attendant risks and difficulties.

GANNON: There's another element here, namely, that we believe that the informed senators and representatives have to get so fired up that they work with other members of Congress, work with the Executive branch and others to understand the perceptions and concerns of the people. This means on AEI's part an educational process with the leadership groups of this country—business, labor, the civic organizations, religious, professional—so that they come to understand the energy options that are available in the short term. That's where AEI is putting a great deal of its effort. It's one of the reasons we've held a national energy summit conference this spring. We felt it incumbent upon us to bring concerned people together so that they could share their experiences and make choices on the basis of the very practical short-term options that are available. On that basis perhaps many of us should be able to agree on what can be done, what should be done, and how it should be done.