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NUCLEAR POWER, NUCLEAR REGULATION,
AND AMERICA'S ELECTRICITY FUTURE

It is a pleasure to be here to take part in this distinguished gathering to offer some views on our nation's energy future, and on the role to be played in that energy future by nuclear power and its regulators. Let me say at the outset that, despite anything you may have read to the contrary -- yes, even in Energy Daily -- I am not in the business of giving farewell speeches. When I turn valedictorian, I'll say so. Salutatorian may be more like it, for a change of Administrations, with the arrival of many new faces in positions of responsibility, is an eminently suitable occasion to take a long and broad look at the tasks ahead for the public and the private sector in the energy field. The NRC's area of jurisdiction is, of course, just one part of the overall electricity picture; but the compelling need is for an integrated electricity policy that makes rational and coordinated decisions about all options, rather than looking at each one in isolation. Accordingly, I plan to talk today not only about our agenda at the Nuclear Regulatory Commission but also about the national energy picture and the place of nuclear power within it.

In a word, I think this is a time of enormous challenges and of commensurately great opportunities, both in the electricity field generally and with regard to nuclear energy in particular. In broadest terms, it is not just a comprehensive and unified electricity policy that is required; equally important, and perhaps more difficult, is the need, once a policy is decided on, to find the mechanisms for putting that policy into effect at the regional and state level, where the actual decisions about supplies of electricity are made.

It is ironic, and somewhat paradoxical, that in recent years, in spite of the widespread recognition that an integrated energy policy is needed, we as a nation have in some respects been moving toward more fragmented planning for electrical generation. Let me explain. For many years, state public utility commissions were generally content to let electric utilities make their own choices about sources of electric power, with little interference from the PUCs. Utilities were therefore at liberty to plan for the long haul as well as for the shorter term, and to build generating capacity accordingly. In recent years, however, partly in response to a sense of having been "burned" by some utilities that overextended themselves with capital investments (including nuclear plants), PUCs have taken a much more active role in decisionmaking on electrical generation. This closer scrutiny of utilities' planning has in practice meant substantial pressure on utilities to choose the least costly form of electrical generation at any given time, certainly a healthy development.

But there are problems in practice. Currently, the price of natural gas is low, and the conditions for pipeline construction are favorable, with the result that utilities around the country are looking to natural gas for their new generating capacity. I do not make this point to disparage natural gas as a source of electricity, but rather to suggest that it should be a cause of concern whenever utilities everywhere are looking to the same source of energy at the same time, instead of developing the multiple sources of electricity that would serve the nation better in the long run. On this point, I said not long ago, if you will pardon my quoting myself:

Just as the wise individual investor knows that developing a balanced and diverse portfolio usually makes better sense than invariably seeking the quickest profit, it may be that excessive reliance on the least expensive energy option may leave the nation undersupplied with electrical generating capacity at some point in the future, or unable to adjust to unexpectedly changed circumstances. An unforeseen interruption in the supply of one energy source, or a decision to place a much higher priority on the prevention of global warming, could leave a void in the national energy supply.

Unfortunately, this tendency to define least-cost choices on too narrow a basis is driving the nation in the direction of less diversity, not more. That carries risks. If all the fishermen rush to the side of the boat where the fish seem to be biting, the result may be more fish in the boat -- but there are other possible outcomes as well.

Let me make clear: there is nothing wrong with least-cost planning in principle. On the contrary, it is salutary that PUCs, ratepayers, and others are demanding to look closely at the costs of different approaches to meeting electricity needs. The question, rather, is how costs are defined. An integrated approach to considering cost would take account not only of the price of a given source of electricity on the spot market, but also of broader and less readily defined costs, such as environmental impacts and the intangible but nonetheless real cost of excessive dependence on a single electricity option. Furthermore, an investment strategy of the type that the President-elect is discussing presupposes a realistic -- that is, not too short -- payback period for infrastructure investments. This kind of realistic approach to costs also takes into account uncertainties, and allows for a range of economic, environmental and social objectives to be balanced.

I do not mean to suggest a lack of planning to meet national electrical energy needs, nor that there will not be more such planning when the new Administration takes over. The real task is to figure out how to ensure that "big picture" national planning on sources of electrical generation -- w percent of capacity from natural gas, x percent from coal, y percent from renewables, z percent from nuclear, and so on, with full consideration of alternatives and the need for energy sufficiency -- gets translated into practical decisions at the PUC level. Put another way, if the national electrical strategy is the pattern for a mosaic made up of tiles of different colors, there has to be a mechanism to give guidance to the people installing the tiles, for if they are left to their own devices, and everyone's favorite color is gold, there will be no pattern, just a monochromatic wall. I don't have any easy answer for how that is to be accomplished, but it is clear that it will not and can not happen unless the federal government develops algorithms that PUCs can use in their decisionmaking, so that the desired mix of sources of electricity generation is achieved in the diverse individual decisions of PUCs. Without workable criteria that they can apply, the tendency will be for all PUCs to point the same way.

Clearly, there must be greater emphasis on electricity conservation, and more broadly, on demand-side management. Already, we have seen electric utilities, in part responding to their state PUCs, taking the lead in encouraging consumers to use more energy-efficient appliances, and providing financial incentives to consumers to reduce peak-load demand. We need to pay attention to renewable resources; to use well the limited amount of environmentally benign energy resources we have; and to finish what we start, by which I mean both to complete facilities that have been begun and to use existing facilities to the end of their useful life. And as I have said, we need an evaluation of

costs and benefits of energy sources that is realistic and comprehensive enough to take into account not only short term costs but also long-term and indirect consequences, such as the cost of nuclear waste disposal, the environmental effects of fossil fuel combustion, and the consequences of dependence on foreign oil.

I personally believe that an inevitable consequence of greater attention to demand-side management, as well as more comprehensive evaluation of costs and benefits, is increased electrification. That may at first seem counterintuitive; but if demand-side management drives down the cost of doing a job with electricity, the long-term effect is likely to be increased utilization of electricity, especially in the area of transportation. The idea of electric cars in general use may seem implausible today, but a few years ago, the idea of low-priced, high-performance computers in many millions of homes would have seemed even more implausible.

Let me emphasize that I am not speaking as a promoter of nuclear energy, but rather as an observer of the national energy picture, when I say that I think that rational decisionmakers will decide that nuclear power should continue to play a role as one component of the national energy portfolio. It is not my intent to sound a call to arms for a nuclear renaissance; rather, I am offering what I think is the realistic prediction that in a decade in which the endangerment of fossil fuel supplies has played a part in bringing about war, and global warming is thought by many to pose a danger to coastal cities and low-lying nations around the world, decisionmakers in this country and others will be reluctant to forego an option for nuclear energy altogether.

If that point is once conceded, and we assume for purposes of argument that the question "whether nuclear power" is answered in the affirmative, even if only to a modest extent, then the question becomes, "how nuclear power." More specifically, if nuclear power is to continue to be a means of electrical generation in this country, how will plants be built, how will they be operated, how will they be regulated, and what if any roadblocks to their viability must be removed?

To answer those questions, I think we have to step back for a moment and look at the almost 40 years that have elapsed since the Atomic Energy Act inaugurated the civilian nuclear power program in 1954. Nuclear energy in this nation began with an immature and evolving technology, and with a licensing process designed accordingly. The two-step licensing process, with one hearing at the construction permit stage and another at the pre-operational stage, reflected the fact that major elements of the design were incomplete at the pre-construction stage, and that

many safety issues would be resolved only during the process of building the plant. It has taken 38 years -- until October of this year, when Congress passed the Energy Policy Act of 1992 and the President signed it -- to revise that legal structure to take account of the possibility that all design issues can be resolved before the first spadeful of earth is turned.

But it is more than the legal process that is imprinted with the assumptions of the past and that requires a fresh look. Both the vendors who sell nuclear reactors and those of us whose job it is to regulate them have to some extent become prisoners of old ways of thinking. As a manager who has worked in both the private and the public sector, I believe that there is nothing more stifling to any organization than the all too human impulse to say, in every situation, "But we've always done it this way." For a generation, American vendors essentially built the same plant, again and again. That is not to say that they standardized their designs -- on the contrary, every design was unique, with resulting inefficiency for both the industry and its regulators -- but the innovative designs, capable of making breakthroughs in safety or efficiency, were never created. By the same token, regulation, dealing with a static technology, likewise became static and perhaps stifling. There are some regulatory requirements in place today not because they can be justified in current terms, but because they have always been there, or because they seemed like a good idea at the time they were imposed.

What I am suggesting is a need for a kind of "zero-based thinking" with regard to nuclear energy on all sides. From the industry, we need hard thinking on the order of, "if you were starting with a clean slate today, what kinds of plants would you build?" We have seen some of this thinking in the advanced reactor designs submitted to the NRC. Similarly, the regulators need to ask what kinds of regulatory requirements would make sense today, if one were starting from scratch. Finally, Americans in general, and energy planners in particular, need to ask themselves this question: "Forgetting ideology, and forgetting positions taken in the past, what kinds of energy choices are sensible in the 1990's and beyond?"

In suggesting the desirability of a comprehensive review of NRC regulatory requirements, I do not mean to imply that most or all of our current regulations are presumptively outmoded, or excessive, or off the mark. I have seen too much at the NRC, in the reactor area and elsewhere -- nuclear medicine, for example -- to subscribe to the ideologue's simplistic notion that that regulatory body regulates best which regulates least. But I do not think we will know for sure what is valuable and what is not unless we undertake a systematic evaluation of the regulations. We need to look at the empirical evidence and decide what works

and what doesn't, what is sufficient, what is excessive, and what is obsolete. The outcome of such a review can be not just to eliminate unnecessary regulations, but also to improve existing ones, and, where current regulations prove on examination to need no revision, to have increased confidence in the soundness of our regulatory structure.

A review of our regulations ties in with the industry's current concern over the trend toward growth in operating and maintenance costs. We hear frequently the complaint from industry that NRC requirements, especially those imposed in the aftermath of Three Mile Island are responsible for this, and that their tendency is to ratchet toward ever greater stringency. We should find out whether that charge is valid. I believe that a dispassionate review of the empirical evidence, such as I have described, beginning with no preconceived ideological bent of any kind, can only be salutary. We need to review our experience periodically or as an organization our arteries will harden.

In this connection, the NRC staff has already undertaken a number of reviews of specific regulations. In addition, a proposal is now before the Commission to create a special task group to take a zero-based look at selected portions of NRC regulations for power reactors, as well as other regulatory guidance and our mechanisms for inspections. If adopted, and I am confident it will be, it will tie in with other existing programs for the continuing review and upgrading of our regulations, including efforts to eliminate requirements marginal to safety and to move in the direction of risk-based and performance-based regulation.

What else must the industry and the NRC do to assure that the nuclear option remains available if the nation's energy planners choose to make use of it? For one thing, it is essential that the weaker performers among the nuclear utilities in the United States upgrade their performance and narrow the gap that currently separates them from the best performers. The best performers, it should be stressed, are as good as any in the world; and yet, seven nuclear power plants remain on the NRC's "watch list" of problem plants. Why should that be of grave concern even to the best performers? The answer should be obvious: the nuclear power industry may be unique among industries in this country in that it lies in the power of just one utility, by making just one catastrophic mistake, to spell the end of an entire technology for a generation. Thus it is not enough for utilities to run their own plants well; they must also exert peer pressure on their weaker colleagues, and assist them in upgrading their performance.

From the standpoint of the NRC, our primary, overarching responsibility must always be to assure the safety of operating

plants, and to conduct our processes with an openness and candor that gives the public confidence in the competence and integrity of the regulators. More specifically, one of the most critical tasks before us is to redouble our efforts to put in place a strong and predictable process for acting on applications for license renewal. It is increasingly apparent that license renewal is not an issue that can be postponed until nuclear reactors near the end of their 40-year terms; rather, it is an issue which affects utility decisionmaking well before the 40-year term runs out. A utility which faces the need to make a large capital investment to keep a plant operating must, in order to plan rationally, know whether that investment will be useful only over the remaining years of the license term -- in which case it may not be cost-effective -- or over those years plus the possible 20 additional years of a renewed license. In short, the question is not simply whether a plant can operate for 40 years or for 60; the issue may also be whether that plant shuts down after 30 years because of uncertainty whether it will get permission to run beyond its initial license term. We have already seen instances in which utilities have chosen to shut plants down before the end of their license term for just this reason. It seems to me that it is incumbent on the NRC to make every effort to have a clear and predictable license renewal structure in place, so that utilities can base their capital investment decisions strictly on economics, rather than having also to factor in the inscrutability of the regulatory process.

Finally, and most seriously, the prolonged inability of the nation to reach a resolution of the waste disposal issue is a sword of Damocles that has hung over the nuclear option in this country since before the NRC was created, almost 18 years ago. If that phrase seems extreme, consider first that in strictly economic terms, it is difficult to calculate the real cost of nuclear energy without factoring in the cost of waste disposal. Second, especially in an era of heightened environmental awareness, the public -- on whose attitude the future of nuclear power is in large part dependent -- is justifiably concerned that there is as yet no demonstrably safe repository for the long-term storage or disposal of high-level nuclear waste. The growing realization, especially since the breakup of the Soviet Union, of the extent of environmental contamination, both East and West, by the disposal of weapons-related waste contributes to that anxiety. Third, the credibility of the U.S. Government is at stake. For some two decades, the public has been told that a solution to the problem of permanent waste disposal is almost at hand. After this length of time, with still no tangible results, the assurances that permanence is just around the corner are wearing a little thin, as well they might.

NRC, of course, does not have the lead in solving the waste problem, but we are charged with the responsibility of licensing

DOE's facilities for long-term storage and disposal. That means that it is essential that we at NRC have the regulatory mechanisms in place to assure that our processes expedite rather than retard the achievement and implementation, at last, of a workable waste disposal program.

In sum, there is, I think, a limited but useful place for nuclear-powered electrical generation in this country's energy future, but it is not going to happen without some very tough intellectual work on the part of a number of different sectors of society. That includes (1) development and implementation of a truly national electricity strategy; (2) a more expansive approach to weighing costs and benefits at the state level; (3) use to the full extent possible of the more benign measures available, such as conservation and renewable resources; (4) a zero-based revisiting of long-held assumptions about nuclear technology and nuclear regulation; (5) improvements in the performance of some nuclear plants now operating; (6) a strong license renewal program at NRC; and above all, (7) delivery on decades of promises about a solution to the nuclear waste problem. It is a formidable agenda; but if we do not face up to it, and face up to it soon, the nation may someday look back and say that these were the years that the locusts ate.