

# **REGULATING -- FOR THE PEOPLE**

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**Remarks Before the ILK Scientific Symposium**

**April 26, 2001**

**Germany**

It is a real pleasure and privilege to participate in the ILK scientific symposium entitled „*Opportunities and Risks of Nuclear Power.*“ I will be presenting my individual views today. They do not necessarily represent the views of the U.S. Nuclear Regulatory Commission (NRC), except when indicated.

As inevitable as day and night, there is supply and demand, and there are imbalances that occur in supply and demand. The United States of America (US) is again experiencing that almost forgotten enemy: expensive and/or unreliable energy supply. Many times we have seen what happens when energy is costly, scarce, or not available when needed: society is disrupted, people suffer, or even die. Learning is difficult, but learning, even the hard way, we must do. America's dependence on energy is somewhat unique; solutions are needed for the short term and solutions are needed that will endure the test of time and crises. Therefore, the US is reviewing the strategic, economic, and environmental considerations of the nation's overall energy supply, and openly considering the contributions of nuclear power to meet the present and future needs of the country. In fact, all of a sudden, the word „nuclear“ is no longer taboo. The Administration and the Congress have taken leadership positions to ensure that

America's energy mix includes the reliability of supply and the steady costs that are now ascribed to operating nuclear power plants.

I will attempt to provide you with a summary of where we are in the two areas that have determined the viability of nuclear power generation: its economics and its safety. These two interdependent factors have seen major improvements in the last 10 years, and they are responsible for the present opportunity to properly position nuclear power in the present energy scenario.

For twenty years, the economics of nuclear power did not fulfill the early expectations of the US or the world, and only now is the picture becoming better. Commercial nuclear power did not really have much of a chance to meet expectations in the seventies and eighties. In the US, and most other places, nuclear power deployment took place in the worst possible time for large capital intensive projects (See Figure 1). The historically highest rates of interest and inflation, combined with the uncertainty in electricity demand and in regulatory requirements, resulted in increased costs and delayed construction, which further increased costs, which further delayed construction.... The capital costs of nuclear power plants, in terms of dollars per KWe-installed, were much higher than ever expected (See Figure 2). At that time, there was still hope that low production costs would make nuclear power competitive; however, particular constraints of electric rate regulation and requirements in nuclear regulation, specifically after TMI, made it difficult for the anticipated low production costs to

provide relief (See Figure 3). Compounding the problem, the price of yellow cake ( $U_3O_8$ ) remained high until 1984 (See Figure 4).

The situation has changed dramatically. Low inflation and low interest rates have been the norm for the last few years, and low production costs, including fuel, are now frequently highlighted in the press and in the halls of government. Rate deregulation in the US appears to be a positive development in many ways; nuclear plants' capital costs are being rapidly retired and competition is eliminating complacency. Also, industry consolidation is occurring rapidly. The result is a leaner, more efficient and economically competitive industry. The main contributing factor, by far, is the improved generation capability (See Figure 5). The plant capacity factor for US plants is at an all-time high and making headlines. Finally, the nuclear production costs, at \$0.0183/kw-hr, are now lower than coal, and the best performers in the fleet are approaching \$0.010/kw-hr (See Figure 6). Thus, there appears to be a convergence of favorable factors for enhancing present nuclear power generation and for considering new power plants.

Economics is a necessary part of the equation, but it is not sufficient by itself. The socio-political reality is that nuclear power needs to be safer than any other form of generation. In fact, it needs to be „safe“ in both actual and perceived terms. To achieve „safe“ status, the US nuclear power industry needs to overachieve both in actual safety performance and in how it is regarded.

According to the performance safety indicators used by the Nuclear Regulatory Commission (NRC), the nuclear industry has achieved better-than-ever performance (See Figure 7). Beyond individual safety indicators, I can tell you with assurance that, overall, the US nuclear power industry is performing with adequate safety margins and that the role of the NRC in providing reasonable assurance for the protection of public health and safety, using established safety criteria at our disposal, is being fulfilled.

The combination of good economics and excellent safety has been achieved by two frequently antagonistic and now often synergistic forces: private industry moved by market forces that include competitive costs and avoidance of regulatory shutdowns by the use of a „safety first“ criterion, and the independent regulator’s focus on real safety. The NRC responded responsibly to the need for predictable and equitable regulation, with real safety as the priority, in a manner that was responsive to the interests of the people of the US.

The improved industry performance enabled the NRC to initiate and implement reforms that are progressively more safety-focused. This focus allowed industry to deal with non-safety significant issues and even issues with low safety significance using „high grade“ commercial requirements. Furthermore, it allowed, and some would say even forced, the industry to concentrate resources on the issues important to safety. And, without magic, safety and cost competitiveness became supporters of each other, with the clear

and unmistakable proviso that safety is first. The list of profound changes and accomplishments, many done under the mantle of the so-called risk-informed regulation, would occupy the rest of this meeting. Five of them stand out: the revised rule on changes, tests, and experiments for nuclear power facilities (10 CFR § 50.59); the new risk-informed maintenance rule (10 CFR § 50.65 (a)(4)); the revised reactor oversight process; the new guidance on the use of PRA in risk-informed decision-making (Regulatory Guide 1.174); and the revised license renewal process (10 CFR Part 54) (See Figure 8). All of these and most of the other regulatory improvements conform to the Commission's decision to increase the licensees' and our attention to real safety within the boundaries of four major outcomes: maintaining or improving safety, increasing effectiveness and efficiency, increasing public confidence, and reducing unnecessary regulatory burden.

A look at license renewal is indicative of the profound changes made to regulatory effectiveness and efficiency. The picture for the survival of nuclear power was not pretty in 1997; predictions of the accelerated demise of half of the fleet were abundant (See Figure 9). The Commission undertook the task of determining what was protective of public health and safety, with due consideration of the national interest. The resulting improvements in the license renewal process that the Commission put in place, including changes to the hearing process, assured the nation that a fair, equitable, and safety-driven

process would be used. US nuclear plants were initially licensed for 40 years and license renewal authorizes an additional 20 years of operation, essentially by verifying the adequacy of licensee aging management programs. Today, 5 licenses have been renewed and 5 are being processed. Twenty-eight other licensees have already expressed their intention to apply for renewal of their licenses. The NRC is completing these license renewal approvals approximately 24 months after receiving the applications. The industry indicates that at least 80% of the fleet will renew their licenses.

I mentioned risk-informed regulation. So, what is risk-informed regulation?

(See Figure 10)

**Risk-informed regulation is an integral, increasingly quantitative approach to regulatory decision making that incorporates deterministic, experiential and probabilistic components to focus on issues important to safety, which avoids unnecessary burden to society.**

This is my definition of risk-informed regulation. This definition can also be used for risk-informed operations, risk-informed maintenance, risk-informed engineering....

Risk-informed regulation is a systematic upgrade of a functional regulatory regime that became outmoded. Risk-informed regulation, slowly and often painfully, replaces the not-so-well-founded prescriptions with what is better

known, and preferably quantified. Risk-informed regulation recognizes that the safety of our installations is the primary responsibility of the operator, with the regulator firmly in the role of implementing society's demand for protection of public health and safety and the environment. It is not a probabilistic recipe, but a comprehensive methodology that uses state-of-the-art know-how, including deterministic (with defense-in-depth), probabilistic and operational safety experience components. None of the components is perfect nor do they need to be; the whole is much better than any of the parts.

Now, I would like to discuss the role of regulation. Regulation is a tool of society to implement what society needs, in an orderly, equitable and fair manner.

I believe that the role of regulation is to provide a meaningful and useful framework for the protection of rights, health, safety and the environment.

Regulation is done only for the people, with their best interests as the essential objective; it is done for the common good, with full consideration of the national interest. I know this sounds like a remark from Karl Marx; it is actually taken from Ronald Reagan's principles. A truly democratic republic is the strongest form of government because individual rights and quality of life are dominant drivers. Democracy offers the best chance for freedom, and the free market, within a democratic society, offers the best chance for the pursuit of happiness. The combination of a democratic society and a free market provides the most

powerful combination for achieving fairness, equity, and the protection of rights, property, health and safety.

Moreover, I strongly believe that the free flow of information is crucial in a democracy. I also believe that the free flow of information is crucial for a free market to operate for the benefit of all. (See Figure 11)

Along with the democratic and free market cornerstones sits a force that feeds on information and that can be used to build or to destroy, to add checks and balances or to skew, to advance democracy and improve quality of life or to arrest the democratic and the free market forces. It is called regulation. ...And what a good thing it can be to enhance democracy and its benefits! ...And what a bad thing it can be if misguided, if uncontrolled, or if it is driven by anything other than the common good.

Good regulation provides for the proper exercise of democratic and free market processes to enhance the common good. It is established to provide a framework that allows for the conduct of individual, industrial, commercial, financial, and other activities. Although all regulations restrict, regulation should not deter beneficial activities, but frame them and guide them. Thus, the minimal amount of regulation that achieves the primary objective is best for our society. That said, we should exercise the words of President Ronald Reagan, „trust, but verify.“

Regulatory actions need to be based on facts, but facts and figures that are placed carefully in the proper context and supported by the best available knowledge and experience. Again, I call this risk-informed regulation.

Poor regulation, on the other hand, focuses more on restricting, limiting, and controlling, losing sight of the common good. This is in direct contradiction to the fundamentals of a democratic society and the free marketplace. Poor regulation can create the illusion of being „protective“ while stripping freedom, all the way to the individual.

It is frequently too easy to do a little more „regulation,“ to appear a bit more „protective,“ and to add another ounce of „conservatism.“ More regulation can appear enticing, but I am convinced that the right goal in our society should be to have less and better regulation. I believe this to be true because we have powerful self-correcting forces that will act promptly in favor of the people. These self-correcting forces are inherent to democracy itself, and include a free market system and the free flow of information.

Regulations need to result in a benefit, or they will result in a loss. There are no benefit-neutral regulations. (See Figure 12)

And that brings us to assurance of adequate protection of public health and safety from the risk of the peaceful uses of nuclear energy and radiation. The NRC is not in the business of zero risk. We are responsible for assuring that the risk is understood, that it is managed, and that it is low. Zero is not an option, it is

a disruption. Now, with risk-informed regulation, we know how to mix and match deterministic and probabilistic regulation, how to add requirements and how to decrease the unnecessary ones -- and we have the will to do it. We are learning how to define adequate protection in more precise terms, and to define it in terms that make sense to the American people.

Finally, I started my remarks with a status of what is presently occurring in the US. Let me leave you with a statement that represents the essence of the debate taking place in the Congress of the United States. Sometimes, a statement carries meaning beyond its intended purpose. I believe the renewed interest in exploring nuclear power is captured in a provision of the US Senate bill S.472, the Nuclear Energy Electricity Supply Assurance Act of 2001, introduced by Senator Domenici. Section 304 deals with prohibition of discrimination against emission-free electricity. I am opposed to all discrimination, in whatever form it takes, because it harms the irreplaceable fabric of society: its people. I believe that the debate in the United States will eventually become international in scope and I hope that every source of power is given equal treatment under the law, for the common good.

I look forward to continuing our discussions, here and afterwards.