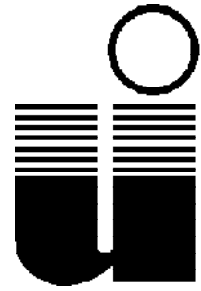


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The Outlook for US Nuclear Plants in Competitive Electricity Markets

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The Nuclear Energy Institute (NEI) has been accused over the last couple of years of being overly optimistic about the future of the nuclear industry, particularly in light of the onset of competitive electricity markets in the United States and elsewhere in the world. However, we do not believe that we have been, or are being, overly optimistic. Rather, we believe we are taking a realistic view of the future, and in so doing recognising the new business paradigm that faces all forms of generation in competitive electricity markets. With the passage of the Energy Policy Act of 1992, and the subsequent orders by the Federal Energy Regulatory Commission (FERC), wholesale competition fully exists today in the US electricity markets. All of our states are looking at the benefits of retail competition, and 18 states have already acted through legislation and/or regulation to provide for customer choice in the retail electricity market.

In the USA we are in the process of seeing both the electricity business and the nuclear energy business go through significant change – we would say reinvention. In 1996 and 1997, 24 investor-owned utility mergers or acquisitions were announced, twelve of which have already been consummated, nine are pending and three have been withdrawn. We are seeing a major reinvention of the electricity utility business as a result of both federal and state regulatory actions (e.g. requiring divestiture of generating capacity, formation of independent system operators etc.), and of business decisions being made by the

companies (e.g. formation of energy supply companies, expanded services through wires and pipes etc.). A recent study prepared for the Utility Data Institute found that in the past 18 months, 23 electricity utilities have reported the sale, or intent to sell, some 81 300 MWe of capacity, with a book value of US\$18 billion. Clearly, we are seeing major change in the business of providing electricity in the United States.

We are also seeing significant changes with regard to the nuclear energy business in the United States – changes that we believe will result in both a stronger and a more competitive nuclear business and one that operates our plants even more safely and reliably.

Let me now discuss the US nuclear industry and how it, and the regulatory and policy framework within which it must operate, is changing to provide a solid foundation for the future. Let me also be clear that, in the USA and globally, we still face a significant challenge in the area of high level radioactive waste disposal, and that as an international industry we need to continue to support the strengthening of our non-proliferation infrastructure, if nuclear energy is to fulfil its potential for providing electricity to the world's population.

I will start with a few facts about the current situation in the United States:

- Baltimore Gas and Electric and Duke Power have filed licence renewal applications with the Nuclear Regulatory Commission (NRC). They are the first two utilities in our industry's history

to do so. At least five other utilities have indicated their intent to pursue licence renewal in the next couple of years.

- GPU recently sold its Three Mile Island Unit 1 to AmerGen Energy Co., another historic first for our industry. I expect we will be hearing about the sale of the Pilgrim plant in the near future.
- 1997 performance indicators collected for the World Association of Nuclear Operators (WANO) by the Institute of Nuclear Power Operations (INPO) demonstrate continued exceptional and improving performance of US nuclear power plants.
- Utilities in the Midwest and in New York are pursuing the development of strategic alliances and/or nuclear operating companies.
- Increasingly stringent and costly Clean Air Act regulations and compliance issues in the United States are bringing to light the economic advantages of emission-free nuclear energy, both in terms of our national energy mix and in terms of corporate financial strategies.
- The US Enrichment Corporation was successfully privatised and the Westinghouse nuclear business was recently purchased.
- Senator Frank Murkowski, chairman of the Senate Energy and Natural Resources Committee, in a memo to committee members, recommended that Congress establish an “emission-free portfolio standard” for electricity generation. This portfolio would maintain existing emission-free power sources and replace them with zero-emission sources when they reach the end of their operating lives. Senator Murkowski also discussed several regulatory issues that must be resolved “to remove existing impediments that inhibit nuclear power’s ability to compete”.
- Senator Pete Domenici, chairman of both the Senate Budget Committee and the Senate Energy and Water Development Appropriations Committee, has delivered a number of speeches supporting nuclear energy. At Harvard University the Senator stated that, “The President’s (clean air) goals are not achievable without seriously impacting our economy. What the President should have said is that we need nuclear energy to meet this goal.”
- Moody’s Investor Service recently upgraded the bond rating of 12 nuclear operating utilities and issued seven downgrades. During the same 18-month period, five non-nuclear utilities were upgraded and four were downgraded.

The few facts mentioned above are important because they are indicative of both an industry that is positioning itself to be successful in a competitive market, and of a situation where key policy makers and evolving environmental policies are moving towards providing an impetus for greater use of nuclear energy.

Success in continuing those positive trends and in achieving the outcome that would result in nuclear energy fulfilling its potential as a safe, clean, reliable source of electricity will require the industry to effectively marshal its resources to meet its obligations and to allow it to engage in the policy making deliberations. In this regard, at NEI’s annual meeting in May 1998, in order to chart a future course for nuclear energy, NEI unveiled its Strategic Direction for Nuclear Energy in the Twenty-First Century. This Strategic Direction is composed of eight compass points that define the activities and policy initiatives the industry and government should pursue.

The commitment to achieving the outcomes identified in the Strategic Direction encompasses the activities of NEI, INPO and the Electric Power Research Institute (EPRI). All of these organisations are using the Strategic Direction to provide a basis for the development of their annual business plans and budgets. While all of the compass points are essential to contribute to a successful nuclear programme, let me focus the rest of this paper on the three which are most relevant to the question of competitiveness. Nevertheless, I will continue to touch on some aspects of all of the compass points.

Economic Performance and Competition

One of the key goals of the Strategic Direction is that the industry must create business conditions and foster policies that position nuclear power plants for a competitive, restructured electricity industry.

We often hear people say that nuclear power plants cannot compete with other generating sources. Nothing could be further from the truth. Certainly, some individual plants will not be competitive. It will depend on their circumstances. But across the board, our existing plants represent a highly competitive technology. New Advanced Light Water Reactors should also be extremely competitive with all other large sources of new baseload capacity.

As the United States transitions to a competitive electricity market it is important to recognise that

while recovery of potential stranded costs is extremely important, future competitiveness is not related to stranded costs but is related to the “to-go” costs, which comprise production cost, plus incremental new capital costs, plus general and administrative (G&A) costs, plus profits. With respect to the issue of stranded costs, in the United States to date, recovery of stranded costs has been generally handled in a responsible way by state and federal regulators. Nuclear plant stranded cost comprises about one-third of the overall US\$200 billion estimated total stranded cost exposure, and a significant portion of the nuclear exposure has already been addressed by the states that have acted.

Turning to the current and future competitiveness of existing US nuclear plants, let me give you some facts, based on 1996 data, the latest year for which we have reliable cost data. Competition already exists in the US market, and electricity generators of all types are starting to question releasing cost information that could be used by competitors.

In 1996, 68% of US nuclear plants had production costs under two cents per kilowatt-hour, and 17% had production costs under 1.5 cents/kWh. That same year, the average industry-wide production cost of 1.91 cents/kWh was only marginally more expensive than coal at 1.82 cents/kWh, and it was significantly less expensive than existing natural gas and oil plants, at 3.38 and 4.14 cents/kWh respectively.

Unlike alternative generating sources, the figures for nuclear generation include the cost of waste disposal and decommissioning. Even when you add in estimates for “to-go” capital, G&A and profits, you find almost all of the plants can produce electricity for 3 cents/kWh or less, which is still competitive with the most efficient new combined cycle gas plants. Looking across the industry, we see that while real progress has been made in achieving greater economic efficiencies, significant opportunities still exist, particularly for the third and fourth quartile performers to become more efficient.

It is also important to note that our most efficient plants are generally also our safest and most reliable plants. Therefore, improving efficiency does not require sacrificing either safety or reliability – and in fact should enhance both safe and reliable operation. Regarding operating and maintenance (O&M) cost reductions that may still be achievable, our best performing plants are spending less than

half as much on O&M as the fourth quartile, and only 60% of the expenditures incurred by the third quartile.

The recent decisions by nuclear utilities to pursue licence renewal are indicative of the growing understanding of the financial benefits of existing plants in a competitive business environment. As the electricity generation business transitions from a regulated monopoly, where earnings were keyed to assets (or the rate base), to one where profits are tied to the difference between market price and your cost to produce electricity, nuclear plant licence renewal becomes much more desirable from a business perspective. Competition increases the benefits of nuclear plant licence renewal.

Before moving on to discuss how changes in US Clean Air Act policies may further enhance the value and competitiveness of US nuclear plants, let me be clear that we do expect to have some of our plants shutdown either prematurely, or when their 40 year operating licence expires. In fact, we have already seen this happen for plants that were not performing well and required significant additional investments, or that were good performers but could not bring their costs into a competitive range, or because of uncertainty in the regulatory process. In all cases it was because of the business situation that the company found itself in. These are business decisions influenced by a number of factors, including plant specific economics.

Environmental Benefits – The Hidden Value

Let me now turn to the Strategic Direction Compass Point that looks for “Recognition of the Intrinsic Economic Value of Emissions Free Nuclear Energy”. For years, little or no attention was paid to the fact that nuclear energy produced trillions of kilowatt-hours of electricity without contributing to air pollution problems in the United States and abroad. It is now beginning to be recognised by supporters and detractors alike that nuclear energy provides nearly 20% of America’s electricity, while also contributing significantly to meeting clear air goals.

Between 1973 and 1996, nuclear energy met 40% of the increased demand for electricity in the United States. At the same time, it avoided the emission of 80 million tonnes of sulphur dioxide and over 34 million tonnes of nitrogen oxides. In 1996 alone, nuclear plants avoided the emission of 5.3 million tonnes of SO₂ or more than 50% of the SO₂ cap established by the 1990 amendments to the Clean Air Act. Annually, our nuclear plants

currently avoid the emission of 147 million tonnes of carbon and about 2.5 million tonnes of NO_x.

Fossil fuelled power plants are already subject to heavy and increasingly stringent regulatory and enforcement burdens under the Clean Air Act in the United States, and the Administration has also made clear its desire to increase that burden by expanding the list of pollutants regulated by the Environmental Protection Agency (EPA). The EPA's current method of regulation in the acid rain programme is a "cap and trade" compliance system for sulphur dioxide emissions, whereby harmful emissions beyond the specified caps must be offset by reductions in SO₂ emissions from other sources using an SO₂ allowance system created by the 1990 amendments.

In other words, if a company wants to exceed its pollution limit, it can purchase the right to do so from companies that have reduced emissions. There is irony in this approach, since in order to participate a company must actively pollute the atmosphere. Because nuclear plants do not emit air pollutants they are not participants in the "cap and trade" process. NEI recently sponsored a study that showed that the SO₂ emissions avoided because of nuclear energy's increased contribution to electricity supply between 1990 and 1995 allowed coal fired plants to effectively bank about 480 000 tonnes of SO₂ allowances, with a market value of about US\$60 million.

One of the industry's goals is to gain appropriate economic recognition for this hidden environmental value of nuclear energy. We believe tradeable credits should be earned not only on the basis of reduced pollutant emissions, but as a function of avoided emissions as well. As the EPA looks to increase controls on ozone production in the atmosphere, and as the Clinton Administration looks towards satisfying its Kyoto carbon reduction commitments, the use of cap and trade systems, specifically including those that would give nuclear and other non-emitting sources credit, are being discussed as part of the policy formulation process.

In the area of ozone control, the use of a fuel neutral NO_x cap and trade programme has been estimated by one major utility, First Energy, to provide between 0.3–0.5/kWh economic benefit to nuclear plants. In the area of carbon abatement, some estimates for benefits to nuclear plants have ranged to twice the potential value of NO_x credits. Furthermore, as Senator Murkowski has advocated, existing and future emission-free sources of electricity such as nuclear energy, hydropower and other renewable sources should be fostered

and preserved through the establishment of an emission-free portfolio standard.

We also need to recognise that because of the Clean Air Act, non-emitting sources like nuclear energy are likely to benefit fossil fuel plants and other industrial or mobile air pollution sources in the area of the nuclear plants. In the context of the Clean Air Act, if the air is cleaner because of the operation of a nuclear plant, the pollution control requirements on other sources are likely less stringent than would otherwise be required, and the economic development opportunities in the area are likely better than otherwise would exist.

Conversely, if the nuclear plant shuts down, there could be an impact on other generating plants and sources of air pollution in the area, which could result in increasing the cost for those operations. Additionally, it is also possible that limitations on economic development in the area may occur. As you can see, converting the hidden value of nuclear's environmental benefits into economic value and having it recognised in public policy space would benefit both existing and future nuclear plants in the United States, and likely also benefit many of the current fossil fuel sources.

Reforming the Regulatory Process

I will now turn to an area that is critical to the future of nuclear energy in the USA, that is an effective safety-focused regulatory framework.

US nuclear plants are performing at exceptional levels of safety and reliability, and all trends indicate continued improvements in plant performance. Within the context of exceptional plant performance, both the industry and the public still need and demand a credible and effective regulatory oversight and licensing process to ensure adequate protection of public health and safety.

Let me be absolutely clear – a credible and effective NRC is essential to the continued success of the US nuclear programme. But let me be equally clear that revolutionary, not evolutionary, change is required for the NRC to fulfil this role, particularly with the industry moving into a more competitive electricity market.

The Strategic Direction calls for a regulatory process that is objective and based on requirements with a clear connection to public health and safety. The NRC should establish performance expectations that are directly linked to public health and safety, and that can be measured objectively. The same approach should be used in the inspection and enforcement programme, the process that supplies most of the input for plant assessments.

The agency should also establish a firm, safety-based threshold for measuring plant performance. There has never been such a threshold. Rather, the regulatory bar has been continually raised. But after 2000 operating-years of experience in the United States alone, the basis exists to set performance based thresholds that provide adequate protection of public health and safety.

The industry is not alone in recognising the need for change. As mentioned earlier, key members of Congress realise that nuclear energy must be part of America's future. A growing number of them are beginning to realise that the current regulatory system can be more effective in providing adequate protection of public health and safety while being less burdensome to licensees.

On 30 July 1998, the Senate Subcommittee on Nuclear Safety held a hearing on the NRC's regulatory programme. Each of the NRC commissioners testified, along with industry representatives, such as Jim Rhodes, Chairman and CEO of INPO, and Joe Colvin, NEI President and CEO. The Senate subcommittee members made it clear that they are intensely interested in seeing improvements in the NRC's regulatory programme. In fact, a follow-up hearing has already been scheduled for 28 January 1999.

NRC Chairman Shirley Ann Jackson has requested input from the industry. She also has asked the NRC staff to identify a "manageable" set of priorities for near term action. She told the staff that these priorities are to be based on work already underway. That is an important point. The industry has been frustrated because previous initiatives to change the regulatory process tended to languish at the agency.

At this time, Congressional policy-makers, the industry, other stakeholders, and the NRC are engaged in a "new partnership" that is working to identify an improved, objective, risk-informed, performance-based regulatory process. We are encouraged by the action already taken by the

Commission to provide specific policy direction to Licensing Boards, to provide greater clarity and accountability to the directions they want the staff to take, and to look at replacing the Systematic Assessment of Licensee Performance (SALP) and watch list process with a more objective safety based assessment and oversight process.

NEI is fully committed to working with the NRC and other interested parties to define and implement the changes required in the regulatory process. And for the following reasons, we are also cautiously optimistic about the prospects for achieving meaningful change in the regulatory process:

- Key policy makers including those in the Congress are interested.
- Nuclear energy is getting a great deal of attention because of Clean Air Act and global warming issues, and electricity deregulation.
- The Chairman, Commissioners and senior staff at NRC are demonstrating a real commitment to reforming the regulatory process, and we have no doubt that with Chairman Jackson's leadership and the commitment of the others they can be successful in implementing the necessary changes.

Conclusion

I will conclude by indicating that the US nuclear programme is facing both opportunities and challenges as the electricity market becomes competitive. We see significant opportunities for continued operation and for licence renewal of our existing plants, and we see increased chances for the ordering of new plants in the middle of the next decade. We see positive signs related to nuclear energy getting policy support and economic recognition for its environmental benefits. Finally, we believe the opportunity for significantly improving and reforming the effectiveness and credibility of the regulatory process has begun and can be achieved sooner rather than later.