





Robert G. Card, Under Secretary  
U.S. Department of Energy  
1000 Independence Avenue, S.W.  
Washington, DC 20585

September 9, 2002

Dear Under Secretary Card:

It is becoming increasingly clear that nuclear energy is no longer just an optional part of our nation's energy mix – it has become a necessary component of a balanced energy portfolio that provides energy security and cleaner air for the American people.

The Administration has taken important steps forward, in calling for the expansion of nuclear energy as a major component of our National Energy Policy and launching new programs like Nuclear Power 2010 to implement the Policy. As noted by Secretary Abraham earlier this year, it will take a "new public-private partnership" between government and industry for the U.S. to see new nuclear plants coming on-line within the next decade.

Following our recent discussions on this topic, we have prepared a white paper that summarizes our views on the conditions needed for deployment of new nuclear energy plants in the United States. Attached is a summary table of the issues and solutions, along with the white paper itself.

We look forward to working with DOE, to begin implementing these recommendations.

Sincerely,

Don Hintz  
President  
Entergy Corporation

W. George Hairston, III  
President & CEO  
Southern Nuclear Operating Company

Jack Skolds  
President & CNO  
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**CONDITIONS NEEDED FOR NEW NUCLEAR PLANT CONSTRUCTION IN THE U.S.**

<i>ISSUES RELATED TO ALL NEW UNITS</i>	<i>SOLUTIONS</i>
Need for a level playing field with other generating sources by crediting nuclear energy's environmental benefits as a non-emitting source of electricity	<ul style="list-style-type: none"> <li>• Establish nuclear energy as "green", i.e., sustainable, non-emitting, and economical</li> <li>• Include nuclear energy in any federal programs that adopt portfolio standards, credits, or trading systems</li> <li>• Allow access to tax-exempt financing</li> <li>• Provide investment tax credits, accelerated depreciation, and decommissioning funding changes</li> <li>• Encourage states to allow power purchase agreements w/ premium for sustainable, non-emitting sources</li> </ul>
<i>ISSUES RELATED TO FIRST NEW UNITS</i>	<i>SOLUTIONS</i>
Risk of licensing delays during construction and startup	<ul style="list-style-type: none"> <li>• Federal government assumes responsibility for any extraordinary costs resulting from the initial use of the new licensing process</li> </ul>
Inability to attract project financing	<ul style="list-style-type: none"> <li>• Federal loan guarantee *</li> <li>• Federal direct loans</li> <li>• Federal equity participation in the project</li> </ul>
Uncertainty in revenues from power generation	<ul style="list-style-type: none"> <li>• Federal power purchase agreement w/ premium for sustainable, non-emitting sources for some initial period of operation</li> </ul>
Time-to-market (from decision to construct until operation) needs to be reduced	<ul style="list-style-type: none"> <li>• Complete licensing steps (Early Site Permit, Design Certification, and Combined Operating License) before decision to construct, under Nuclear Power 2010 program</li> <li>• Complete other critical path activities related to design, testing, infrastructure, etc., under Nuclear Power 2010 program</li> <li>• Focus on technologies that have realistic chance of operation near 2010: AP1000 and ABWR</li> </ul>
First-time costs for licensing, engineering, infrastructure organization, construction planning, etc.	<ul style="list-style-type: none"> <li>• DOE cost-share with industry in Nuclear Power 2010 program</li> </ul>

\*Note: A loan guarantee for the entire plant cost during construction could allow entire project to be debt financed, with loan converted to commercial debt after plant begins operation.

## CONDITIONS NEEDED FOR DEPLOYMENT OF NEW NUCLEAR ENERGY PLANTS IN THE UNITED STATES

### Introduction

This paper is intended to summarize the issues that need to be addressed before new nuclear energy plants can be deployed in the U.S., along with potential solutions. The first topic, concerning the need to level the playing field, is applicable to all new nuclear projects. The remaining topics apply only to the first group of units that are deployed.

### The Need to Level the Playing Field by Crediting Nuclear Energy as a "Green" Energy Source

The current fleet of U.S. nuclear plants produce some of the most reliable, lowest cost electricity in the power industry – without contributing to greenhouse gas emissions. The Energy Information Administration (EIA) reports that their improved performance has been the single largest contribution to greenhouse gas emission reductions under the voluntary reporting program.

The Administration and Congress are considering amendments to existing laws and regulations affecting clean air standards in the U.S., along with ways to reduce carbon dioxide emissions. Several bills have been introduced in Congress – the most recent of which is the Administration's proposed legislation implementing the President's Clear Skies initiative. Construction of new nuclear plants must be a key component of any programs that fulfill the President's Clear Skies initiative. The Department needs to assure that the importance of nuclear energy is reflected in the energy/environmental policies and legislation issued by the government.

The environmental benefits of nuclear energy are generally acknowledged by government officials. Unlike renewables, however, there is no market mechanism that provides financial recognition of nuclear energy's benefits as a non-emitting form of electricity generation. For example, many wind-generation projects are being pursued across the U.S. today because the federal government considers it to be in the national interest to provide a \$17 per megawatt-hour incentive. Currently the Administration and Congress are considering establishing a renewable portfolio standard requiring that a minimum percentage of a company's generating capacity be based on non-hydro renewable sources. Although the term "renewable" is used, the actual desired goal is better stated as "economical, non-emitting, sustainable energy" – a goal that is certainly met by nuclear energy.

The Administration needs to shift the debate about "green" energy to focus upon the desired end-state (economical, non-emitting, sustainable energy supplies) and decrease the specific emphasis on "renewables". In doing so, the Department needs to assure that nuclear energy is included in any federal programs, policies, or legislation that results in portfolio standards, credits, or trading systems. Any such program, however, should be forward-looking (i.e., applicable to future

plants) and not penalize the large and important base of existing fossil fueled plants that provide the bulk of the nation's electricity today.

In addition, there are other ways to help level the playing field for new nuclear plants that have been discussed (and even proposed in energy legislation) - e.g., (1) allowing access to tax-exempt financing, (2) providing investment tax credits during construction, (3) accelerated depreciation, (4) accumulation of decommissioning funds over plant operating lifetime, and (5) federal policies or regulations that encourage states to allow power purchase agreements that include a premium for electricity generated from sustainable, non-emitting sources.

### **Challenges Associated with Constructing the First New Nuclear Units in the U.S.**

In an increasingly deregulated power market, almost all new generating capacity being built in the U.S. today uses natural gas. In the current regulatory and business climate, market conditions clearly favor the construction of smaller natural gas plants -- with substantially lower capital costs, as well as shorter construction schedules and payback periods. As long as fuel prices remain low, natural gas plants also offer the lowest overall generating costs, which include capital costs. Even though natural gas plants produce lower levels of air pollutants and greenhouse gases than coal plants, they still produce substantial air emissions.

Industry cannot commit to construct large baseload generating plants, using other fuel sources (e.g., nuclear or coal), until a financial/regulatory environment exists that reflects the realities of the deregulated market. To address this economic reality, the reactor suppliers are making substantial investments to develop and license new plant designs that will substantially lower capital costs. Even then, there are challenges associated with constructing and operating new U.S. nuclear plants, which must be addressed before power companies can justify (to their stockholders and regulators) commitment to such a venture. In light of the clear national interests involved, the U.S. government should play a pivotal role.

The business case study prepared for the Department by Scully Capital provides a good assessment of the potential competitiveness of new nuclear plants in the U.S.-- including the financial challenges associated with constructing the first units. Their report is correct in its conclusion that government participation and support will be needed for industry to be able to deploy the first new nuclear plant units. After that, follow-on nuclear energy projects should be able to compete on a level playing field with other energy sources, as discussed earlier.

Any cooperative effort between government and industry to launch the first new nuclear plant project must be strategically planned to assure that expansion of the nuclear option does not end with one or two demonstration units. Building a single plant does not, in itself, restore the nuclear option. Success of the first new plant projects will be measured by seeing follow-on projects that can compete in the marketplace without continued government support. Demonstrating economic viability is the primary goal. These initial projects will play an important role in establishing an infrastructure of suppliers, fabricators, constructors, operators, and financiers that will be willing to build and operate follow-on plants.

Issues that must be addressed for the first new nuclear plant project include:

*Risk of licensing delays during construction and startup*

In spite of the NRC's one-step licensing process, there is still a risk of prolonged delays in construction or startup, resulting from acts of the regulator or intervenors. Firm legal precedents do not yet exist. This can be addressed by having the federal government assume responsibility for any extraordinary costs resulting from the initial use of this new licensing process on the first units.

*Inability to attract project financing*

Unlike current natural gas plants, the first new nuclear units are not expected to be able to attract project financing (i.e., when the project itself serves as the collateral for the loan). Instead, they would have to be financed by corporate debt and equity. Considering the large sums of funding needed and the relatively long time period before construction is completed, this would result in a serious dilution of earnings-per-share for the plant buyer - a situation that would be unacceptable to shareholders, especially in the deregulated marketplace. This can be addressed for the first nuclear units by any combination of (1) federal loan guarantees, (2) federal direct loans, similar to the Department of Transportation's TIFIA program, or (3) significant federal equity participation in the project.

Of these three potential solutions, a government loan guarantee for the entire plant cost during the construction period might be the simplest and most effective. Such a guarantee could allow the entire project to be debt financed. Once the plant is completed and begins operation, the government-backed debt can be converted to more typical commercial debt and equity financing that does not require government backing.

*Uncertainty in revenues for power generation*

Compared to the natural gas plants being built today, large baseload plants (e.g., nuclear plants) will require longer timeframes for licensing and construction, followed by longer timeframes to recover the capital investments. This results in the need for plant buyers to forecast revenues farther into the future, with little opportunity to later reduce generating costs if the actual revenues do not meet expectations. In addition, the first units will cost more to construct than follow-on units, since they will be at the beginning of the construction learning curve. In the end, the profitability of the project is at increased risk. This can be addressed for the first nuclear units by a federal power purchase agreement with a floor price that reflects a premium for electricity from sustainable, non-emitting sources. The premium can be limited to some initial period of operation.

*The Need to Reduce the Time-to-Market*

If a nuclear plant were ordered today, it would take a minimum of eight to ten years to complete licensing, construction, and startup. For nuclear plants to be a practical alternative, it is essential that the time-to-market (i.e., from the decision to construct until commercial operation) be reduced to five years or less. This will make it necessary to have essentially completed all NRC licensing activities -- Early Site Permit (ESP), Design Certification (DC), and Combined Operating License (COL) -- prior to the decision to proceed with the project, along with other critical path activities, e.g., part of the first-time engineering, establishment and qualification of a

supplier/fabricator infrastructure, development of a legal/financial framework for construction and ownership of the plants, etc.

The Department's solicitations for cost-shared programs under the Nuclear Power 2010 should focus upon supporting these objectives:

- *ESPs*: With three contracts awarded, this program is already on track.
- *Reactor Technology Development*: The Department should move quickly to issue this solicitation. The solicitation should allow as much work scope as possible in the areas of DC, COL-related issues, and design/fabrication/construction planning that would affect the critical path schedule for constructing units. The solicitation should provide for the possibility that a selected project could include multiple COL applications to NRC, as part of the work scope.
- *COLs*: If COL applications are not pursued under the Reactor Technology Development projects, the Department should be prepared to issue a separate solicitation on COL projects as early as FY-04.

#### *First Time Costs*

Prior to constructing the first units of a new plant design, several hundred million dollars must be spent to develop a fully detailed plant design, obtain the various NRC approvals, develop a highly detailed construction plan, and, establish an infrastructure of suppliers, fabricators, and constructors. These first-time costs would have to be included in the cost of the first units unless they can be covered separately. This issue can be addressed by maximizing the amount of federal cost sharing on these activities with industry under the Nuclear Power 2010 initiative.

#### *Recommended Priorities for Advanced Reactor Technologies*

The Department's primary focus of advanced reactor funding support should be on the Nuclear Power 2010 program, to further the readiness of projects that have the most realistic chances of being placed into operation in the 2010 timeframe. The plant designs most likely to fulfill this criterion are Westinghouse's AP1000 and General Electric's ABWR. The time necessary to complete development, engineering, and licensing of the other designs simply precludes near-term deployment. However, the Department should continue longer-term research and development funding for future reactor technologies, e.g., gas-cooled reactors and Generation IV designs.

#### *The Next Step*

This paper summarizes a number of complex issues that will require development of more detailed solutions. To shorten the time to market, government and industry should proceed forward with the Nuclear Power 2010 program while, in parallel, working together to flesh out and implement solutions to the remaining issues.