Delivering the Nuclear Promise: Advancing Safety, Reliability and Economic Performance

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Foreword

William Levis
President and Chief Operating Officer, PSEG Power

Executive Sponsor, Delivering the Nuclear Promise: Advancing Safety, Reliability and Economic Progress

Together, We Can Meet This Challenge

As the head of PSEG’s Power Group, I am proud to tell the story of the value that nuclear energy provides to our customers in New Jersey and the entire nation. Nuclear energy is carbon-free and large-scale, and our industry has delivered on its promise to generate energy safely and reliably. Yet nuclear energy still is not economically competitive in many electricity markets. That’s our industry’s most significant challenge and the one promise that we have yet to deliver.

When the Three Mile Island accident stunned the industry, we demonstrated a strong commitment to safety through actions at each of our stations and the development of the Institute of Nuclear Power Operations (INPO). The result: Overall, our industry is exceeding industry and U.S. Nuclear Regulatory Commission goals for safety and INPO is the model globally for other industry organizations striving for excellence in safety.

When many states began to deregulate electricity markets in the 1990s, we collected and implemented efficiency and reliability measures at U.S. reactors that transformed them into the most dependable power producers on the grid. The result: Average industry capacity factor has been at or near 90 percent for more than a decade.

Part of our response to deregulation in the ‘90s was to implement best practices that reduced costs, improved plant reliability and made many facets of our plant operations more efficient. But even as costs declined in some areas, they increased in others—sometimes dramatically.

We have spent billions on safety and security upgrades in response to 9/11 and the Fukushima Daiichi accident.

In fact, there has been a 28 percent increase in total generation costs for U.S. reactors during the past decade—to an average of $36.27 per megawatt-hour in 2014.

That’s why the industry’s initiative—“Delivering the Nuclear Promise: Advancing Safety, Reliability and Economic Performance”—is critical. The three-year program will identify efficiency measures and adopt best practices and technology solutions to improve operations, reduce generation costs and prevent premature reactor closures. Industry teams, led by chief nuclear officers, will identify improvements to programs such as work management, security and engineering. The goal is to implement these efficiency initiatives in a planned and thoughtful way and realize their economic benefits over the next two years.

We are analyzing the 10 areas of our operations to determine where we can implement these ideas quickly. Some issues will require regulatory changes and we will work closely with the appropriate regulatory agencies as we move forward.
While it is essential that we achieve some changes in the way we do business with these regulatory agencies, it is more important that we find efficiencies within our control—at each and every site—to prove to ourselves and others that it can be done.

At the same time, we will continue to work with NEI and other industry partners to gain greater compensation for nuclear plants in competitive market policies and in state implementation plans for the Clean Power Plan. This is about competing against market forces and advancing our industry. It’s about preserving our industry today and positioning our industry for the future. We must compete and win.

In all cases, we must maintain our commitment to safety in our facility operations and the reliability of the nuclear energy fleet. Success will be evident when we demonstrate we can improve our already high levels of safety and reliability while reducing costs such that our plants are economic and continue to provide value to our customers and our communities for decades to come.

This is the challenge for our industry, and all employees have a role to play. I hope you will join the thousands of your peers who will be involved at their nuclear plant sites and across working groups to support this. We value your active participation, including your ideas to change processes or drive efficiency in facility operations. Many thanks in advance for your good ideas and support.
Situation Assessment: Reinventing the U.S. Nuclear Energy Industry

The nuclear energy industry is facing an unprecedented situation. While average U.S. nuclear power plant reliability is at extraordinary high levels, total electric generating costs have increased 28 percent in the last 12 years. Between 2002 and 2014, fuel costs increased 25 percent, capital expenditures by 109 percent, and operating costs by 13 percent (in 2014 dollars per megawatt-hour).

The industry’s goal is not merely to tamp down the increases that occurred over the last decade, but to identify opportunities to rethink operating practices, improve efficiency and reduce costs to help keep nuclear power competitive in a changing electricity market—all while advancing safety at the facilities.

The industry has a two-part strategy to address cost performance and improve productivity: 1. Reduce costs, and 2. Increase revenues. On the cost side, NEI and the industry have focused on optimizing industry or regulatory requirements that have been layered over decades.

Throughout this process, we are maintaining industry standards for excellence in safety, yet developing more efficient approaches to meeting and exceeding those standards.

On the revenue side, the industry is taking steps to gain value for the attributes of nuclear energy, many of which are not fully valued or recognized in competitive electricity markets. These attributes must be rewarded through a two-step approach to market reforms: changes to capacity markets and improved energy price formation in energy markets. Unless they are recognized and compensated, additional nuclear plants will be prematurely closed and the reliability of the electric grid threatened in some regions.

Today’s situation both in the regulatory and market regimes is unsustainable. A “business as usual” approach will not successfully address the dual challenges of rising costs and inadequate revenue.

Purpose and Organization of the Strategic Plan

Companies that operate America’s nuclear energy facilities are partnering on a multiyear strategy to transform the industry and ensure its viability for consumers as well as the essential role it plays in protecting our environment. This strategy—“Delivering the Nuclear Promise: Advancing Safety, Reliability and Economic Performance”—will advance the industry’s excellence in safety and reliability, assure future viability through bold efficiency improvements and innovation, and drive regulatory and market changes so that nuclear energy facilities are fully compensated for their value.

Industrywide teams have analyzed the cost drivers common to all nuclear plants and will redesign programs and processes to improve their efficiency and effectiveness. The goal of this initiative is to provide companies that operate nuclear power plants with innovative solutions, enabling a significant reduction in operating expenses across the industry by 2018, while continuing to advance safety and reliability.

The industry is steadfast in its resolve that it will not compromise safety in a more diligent and focused pursuit of innovation and efficiency. In fact, safety reviews are built into the analysis process.

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2002–14 INCREASE 25% 109% 13% 28%

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This initiative will help ensure that nuclear energy remains a vital, innovative and cost-effective part of America’s increasingly clean electricity portfolio by achieving the following outcomes:

- Advance the fundamentals of industry operation and training that have resulted in high levels of safety, and sustain this commitment to excellence through safety enhancements that will be derived during this transformation process.

- Coupled with lower uranium fuel prices and reduced capital spending, redesign nuclear power plant processes to improve efficiency and effectiveness to enable a 30 percent reduction in electric generating costs, on average industrywide.
  - 30 percent reduction by January 2018.

- Drive changes in federal regulation at the NRC and the Federal Energy Regulatory Commission and in organizations like independent system operators so that industry is able to monetize the value that nuclear power plants provide.

- Optimize resourcing throughout the nuclear enterprise to spur greater efficiencies at nuclear energy facilities and among suppliers.

- Analyze technological and operational changes that could enhance safety and provide greater efficiency.

- Leverage technology to ensure widespread industry adoption of innovative tools and techniques that could reduce costs.

- Recognize the cultural shift among the millennial-based workforce that provides incentives for innovation.

- Engage the industry workforce in the strategic plan through a broad-based industrywide communications plan.

The industry is steadfast in its resolve that it will not compromise safety.

**Governance**

Industry chief executive officers and the boards of directors for NEI, INPO and the Electric Power Research Institute are providing overall governance and oversight of the initiative, and a steering committee comprised of chief nuclear officers and senior representatives of the industry organizations are leading the operation of the initiative.

The steering committee includes representatives of all nuclear operating companies, either directly or through operating alliances. The committee has established the structure, priorities and accountabilities for the initiative, and CNO-led teams are proposing improvement opportunities and recommended levels of industry accountability to the steering committee.
Improvement opportunities approved by the steering committee are transmitted to companies operating nuclear power plants through efficiency bulletins.

**Building Blocks of the Strategic Plan**

This strategic plan is structured as four building blocks. Taken together, these building blocks form the foundation on which a revitalized nuclear energy industry can prosper. Each building block represents a major area that requires focused and coordinated attention and includes an action plan, with a list of organizations responsible for implementing parts of the building block and providing input and assistance.

**Building Block 1: Analyze cost drivers and identify opportunities to improve efficiency**

**Building Block 2: Leverage federal and state policies to ensure monetary recognition of nuclear energy’s value**

**Building Block 3: Redesign nuclear power plant processes to improve efficiency while advancing the fundamentals of safe, reliable operation**

**Building Block 4: Implement a communications strategy to ensure industry engagement in the initiative**

Under this building block, the industry will gather the data necessary to perform this kind of analysis, leverage existing organizations and resources like the Electric Utility Cost Group (EUCG), and identify opportunities to improve efficiency and reduce costs without compromising safety performance. NEI and EUCG will play supporting roles.

**Objectives**

- Collect and analyze data on costs and cost trends across the industry to identify priorities for improvements in efficiency and changes to industry practices.
- Identify technology options that have the potential to reduce costs, ensure industry awareness of those options, and drive broad industry adoption.
- Industry initiatives and regulatory mandates are implemented in a cost-effective manner that appropriately reflects their impact on public health and safety.

**Building Block 2**

**Leverage Federal and State Policies to Ensure Monetary Recognition of Nuclear Energy’s Value**

**Purpose**

The industry has two major opportunities to generate additional revenue for nuclear energy facilities:

1. Reforms to capacity markets and energy markets in those parts of the country that have restructured and are controlled by regional transmission organizations; and

2. The U.S. Environmental Protection Agency’s Clean Power Plan (or other comparable programs that may emerge), which is designed to reduce carbon emissions from existing carbon-emitting power plants. Ultimately, the Clean Power Plan, properly implemented, should increase the value of carbon-free generating capacity.
Objectives

- Policy changes at the federal and state level avoid premature shutdown of operating nuclear plants.
- Develop and implement mechanisms in competitive markets that value the attributes of nuclear power plants.
- Leverage the Clean Power Plan to increase awareness of nuclear energy’s value in preventing air pollution, particularly carbon emissions.
- Ensure that implementation of the Clean Power Plan helps to preserve existing nuclear generating capacity and provides an incentive for power uprates at existing facilities, second license renewal and new nuclear plant construction.

Building Block 3
Redesign Nuclear Power Plant Processes to Improve Efficiency While Advancing the Fundamentals of Safe, Reliable Operation

Purpose

This building block captures the industry initiative to identify and improve upon key cost drivers to the production of electricity at nuclear power plants. Redesign of station processes is a necessary outcome to achieve key objectives of this building block.

Cost reduction and efficiency improvement efforts will be complemented by the advancement of safe and reliable domestic nuclear operations via INPO performance objectives and criteria, which encompass industry standards of excellence and other recognized industry standards.

Objectives

- Using the cost analysis from Building Block 1, determine the ways and means to improve efficiency and reduce costs for a typical nuclear station by 30 percent in two years.
- Advance safe and reliable nuclear electricity production that is consistent with industry standards of excellence and established safety goals and metrics (as measured by station capability factory, critical component failures and other safety measures).
- Develop procedures and processes to facilitate discrete industry efficiency initiatives. Ensure industry standards of excellence are reflected in process changes.
- Advance industry leadership capability to achieve the highest levels of safety, reliability and process efficiency.
- Identify for resolution regulatory or other external requirements that serve as a barrier to safe and efficient operation.

Building Block 4
Implement a Communications Strategy to Ensure Industry Engagement in the Initiative

Purpose

This building block has two primary purposes:

1. Ensure consistent communication to the industry that aligns nuclear plant operators around the objectives of the strategy and provides updates to the industry’s workforce; and
2. Advocate for changes in markets or regulatory bodies that generate additional value for nuclear power plants or for regulatory changes needed to implement refined plant processes, etc.

Objectives

- Develop a communication strategy and collateral materials to communicate to industry and external stakeholders the value that can be derived from this initiative to maintain industry excellence in safety, improve efficiency and accrue additional value for nuclear energy facilities.
• Communicate the strategic value and objectives of the initiative to federal and state regulators, legislators and other stakeholders to drive an understanding that it will maintain industry’s commitment to excellence in safety while ensuring the availability of existing reactors into the future.

• Develop a change management process that can be implemented industrywide to support broad employee acceptance and participation in the recommendations to streamline processes and increase efficiency at nuclear power plant sites.

The Clean Power Plan, properly implemented, should increase the value of carbon-free generating capacity.