

Job Creation in the Nuclear Renaissance



Updated April 2009

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Job Creation in the Nuclear Renaissance

Foreword

June 17, 2008

The United States consumes more energy than any other nation. As an economic and technological leader, we rely on energy to maintain our position in today's global economy. Yet, with a growing population dependent on technology, our use of electricity will only increase in the years and decades ahead.

According to the U.S. Department of Energy, the United States will need 21 percent more electricity by 2030. While conservation initiatives and energy efficiency will help, they will not be enough. Nuclear power can play a vital role in our nation's diverse energy portfolio. Nuclear energy is an environmentally clean, safe, economic and reliable supply of electricity that can be used to meet our growing electricity demands. It can also provide a needed jolt to our nation's economy.

The Clean and Safe Energy (CASEnergy) Coalition has prepared this white paper, *Job Creation in the Nuclear Renaissance*, which closely examines the significant economic opportunities that the nuclear energy industry creates. As the paper makes clear, a renewed focus on nuclear energy will help our nation meet both future electricity demand and carbon emissions reduction goals, as well as create tens of thousands of jobs needed to build and operate new reactors.

The paper's message is compelling and timely, providing new insight into nuclear energy as an economically viable supply of carbon-free electricity and a source of tens of thousands of high-paying jobs. We hope this information will further the growing dialogue of nuclear energy.

Handwritten signature of Thomas R. Carper in black ink.

Thomas R. Carper
U.S. Senator

Handwritten signature of George V. Voinovich in black ink.

George V. Voinovich
U.S. Senator

Handwritten signature of James E. Clyburn in black ink.

James E. Clyburn
Member of Congress

Handwritten signature of Fred Upton in black ink.

Fred Upton
Member of Congress



CASEnergy Coalition
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June 17, 2008 – Job Creation in the Nuclear Renaissance, Foreword

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Executive Summary

Electricity—it is ubiquitous and yet it goes unnoticed except when it is absent. Harnessing the power of the atom to generate electricity is indeed a modern necessity that brings light to darkness, heat to winter, cool to summer and power to cutting edge technology.

Our nation has moved from an agricultural to an industrial to a digital economy, transforming the United States into a global economic and technology leader. If we wish to maintain this position, we will need sources of electricity that are economical, that we can rely on for years to come, and that do not adversely affect the environment.

Nuclear energy provides stability amid economic turmoil and is a vital part of our electricity portfolio.

This paper provides a close examination of the numerous economic opportunities provided by the nuclear energy industry through highly skilled jobs needed to keep today's plants in operation, as well as those needed in the decades ahead to build and operate new reactors.

A GROWING NEED FOR ELECTRICITY

Americans consume more electricity than any other nation. In 2007, electric power generation in the United States totaled more than four trillion kilowatt-hours—an increase of more than 20 percent from the 3.3 trillion kilowatt-hours generated in 1995.¹ Population growth and a technology-driven economy are pushing electricity needs to even greater levels. According to the most recent estimate by the U.S. Department of Energy (DOE), by 2030 America's demand for electricity will grow by 21 percent.

Even with the promotion of energy efficiency and conservation initiatives, electricity demand will rise. This is due in part to the high-tech advances and data storage needs of our digital economy.

For example, in 2006, computer servers and data centers in the United States used approximately 61 billion kilowatt-hours of electricity,² an amount which could power the entire state of Wisconsin for a year. Data center electricity use has more than doubled since 2000 and amounts to about \$4.1 billion in electricity costs.³

1 U.S. Energy Information Administration, Net Generation by Energy Source by Type of Producer, 1995 through 2006, Table 1.1

2 U.S. Environmental Protection Agency

3 U.S. Department of Energy, 2007

Among the wide range of fuel sources used in our nation's electricity mix, nuclear energy plays an important role. Nuclear power plants in 2007 generated 807 billion kilowatt-hours of electricity,⁴ or about 20 percent of the nation's electricity production.

THE OUTLOOK FOR NEW CONSTRUCTION

Nuclear energy technology was developed in the United States in the early 1950s. From those early beginnings until the late 1970s, the industry grew rapidly. However, despite the promise nuclear energy offered, mismanagement of some early projects, escalating costs, fears, misperceptions and a complicated licensing process stalled the growth of the industry from the late 1980s.

Industry performance in ensuing years, however, has been exemplary, with America's nuclear plants generating electricity at record levels; average output at today's 104 reactors is now at more than 90 percent capacity. In addition, the nuclear industry has become a model for American industrial safety. With growing public preference—nearly two-thirds of the public favors the use of nuclear energy—the industry is experiencing a resurgence. In the past few years, rising electricity demand, environmental

considerations and the passage of the Energy Policy Act of 2005 have bolstered interest in the industry.

There is growing public appeal of nuclear energy's benefits—no air pollutants or greenhouse gases, stable fuel costs, high levels of efficiency and reliability, and low electricity production costs. The prospects of a carbon-constrained economy in the near future augur well for non-greenhouse emitting energy sources. Among those, nuclear energy—a baseload power source with growth potential today—holds the most promise. For these reasons, the nuclear industry is poised to begin construction on advanced-design reactors.



⁴ U.S. Energy Information Administration, Nuclear Power Generation

NEW NUCLEAR PLANTS PROVIDE JOBS AND ECONOMIC STIMULUS

Currently, 17 companies and consortia are considering more than 30 new reactors in the United States. This new era of nuclear energy will translate into tens of thousands of jobs created to construct, maintain and support new reactors.

Both plant construction and operation will create thousands of jobs in communities surrounding the plants. Depending on the building technique selected, the Nuclear Energy Institute (NEI) anticipates new reactors planned will require thousands of

workers for construction, engineering and project management—as many as 2,400 per project at peak periods. At the end of 2008, NEI estimated private new nuclear plant investment had created 14,000-15,000 new jobs.⁵

- How does the industry satisfy the demand for additional workers at newly constructed facilities?
- How does the industry replace the graying work force at existing facilities?
- How will educational needs of the new nuclear work force be met?

Moreover, construction of new nuclear reactors will provide a substantial boost to suppliers of commodities like concrete and steel, and to the manufacturers of hundreds of components. These components include pumps, valves, piping, tubing, insulation, reactor pressure vessels, heat exchangers and many more.

For example, some industry sources project that a single new nuclear power plant, depending on the reactor design, will require up to:

- 3,000,000 cubic yards of concrete
- 500,000 tons of structural and reinforcing steel
- 30 to 150 miles of nuclear-grade piping

PROPOSED NEW NUCLEAR PLANT SITES



SOURCE: CAMBRIDGE RESEARCH ASSOCIATES

⁵ New Nuclear Plants: An Engine for Job Creation, Economic Growth. Nuclear Energy Institute White Paper, Jan. 2009

- 320,000 fasteners
- More than 700,000 electrical components
- 1,400 to 2,200 pumps
- More than 11,000 nuclear-grade valves
- More than 1,800 miles of cable

These construction projects and the subsequent operation of these reactors are long-term drivers of economic growth in their communities and states. "If the industry were to build 33 to 41 new advanced reactors through 2024, this would create about 38,000 nuclear manufacturing jobs in the United States," according to a 2004 report from Idaho National Lab & Bechtel Power Corporation.⁶ Already, each reactor generates an estimated \$430 million a year in total output for the local community, and nearly \$40 million per year in total labor income.⁷

Once new reactors are built, additional workers will enter the industry to operate and maintain the new power plants. Depending on the design, numbers of reactors that are co-located and staffing strategy, 400 to 700 new workers would be needed for each new reactor.⁸ If the companies were to complete the more than 30 reactors now under consideration, 12,000 to 21,000 new jobs would be added to the U.S. market.

In addition to staffing new reactors, more job opportunities will be available due to retiring workers. Just as America's economy must adjust as baby boomers retire, so too must the nuclear industry. The impending retirement of millions of baby boomers may have a pronounced impact on the nuclear industry.

Thirty-five percent of the current work force may be eligible to retire within five years.⁹ By 2012, the industry will provide opportunities for approximately 19,600 workers to replace retirees and 6,300 to account for other attrition. However, demand to replace retiring workers should be high. Jobs in nuclear plants pay substantially more than average salaries in areas where plants are located.

For example, the following are median annual salaries for select positions:

- Senior Reactor Operator: \$85,426
- Reactor Operator: \$77,782
- Electrical Technician: \$67,517
- Mechanical Technician: \$66,581¹⁰

The industry and educators alike are energizing new programs to develop and train the next generation of workers. Positions in the

6 U.S. Job Creation Due to Nuclear Power Resurgence in the United States—Volume 1, Idaho National Engineering Laboratory and Bechtel BWXT Idaho, LLC, November 2004.

7 "Nuclear Power Plant Contributions To State and Local Economies," Nuclear Energy Institute Fact Sheet, January 2008.

8 "Nuclear Power Plant Contributions To State and Local Economies," Nuclear Energy Institute Fact Sheet, January 2008.

9 "Nuclear Industry's Comprehensive Approach Develops Work Force for the Future," Nuclear Energy Institute Fact Sheet, April 2008.

10 EAP Data Information Solutions, April 2007.

industry pay well because they require specialized training and a significant knowledge base.

Particular focus should be placed on promoting and expanding science, technology, engineering and math programs, and on developing interest in and a focus on the skilled trades.

Electricity demand is growing; the current work force is aging and new power plants are on the horizon. A close examination of work force projections, education needs and training opportunities will help to set a prudent course of action for the future. The backdrop of rising energy prices, a widespread desire to lessen the effects of global climate change, and a slowing economy in need of job growth make nuclear energy a logical choice for our electricity needs going forward. This new era for nuclear power will indeed help create much-needed jobs and bolster other American industries that can supply the materials for construction and technology needed to build and operate the plants.

The information outlined in this paper provides data and analyses of the nuclear industry work force opportunities and challenges, as well as the economic benefits that will bolster economies at the local, state and national level.
