



NUCLEAR ENERGY INSTITUTE

New Nuclear Plants: An Engine for Job Creation, Economic Growth

The nuclear energy industry can play an important role in any program to stimulate creation of new jobs and economic expansion, providing both near-term and lasting employment and economic benefits.

Nuclear energy is one of the few bright spots in the U.S. economy – expanding rather than contracting. This reflects a consensus that:

1. any credible program to address climate change must include carbon-free technologies such as nuclear energy and renewable energy sources, and
2. the United States needs new baseload generating capacity.

For these reasons, financing support for new nuclear power plant construction should be included in any legislative package to provide stimulus for energy infrastructure development and job creation.

Job Creation Already Underway in the Nuclear Energy Sector

The U.S. electric power industry is developing the first new nuclear projects in the United States since the late 1970s. These new reactor projects are in the early stages of development and start of construction is still three to five years away.¹ Even so, the prospect of new nuclear plant construction already has stimulated significant investment and job creation among companies that supply equipment and services to the nuclear industry.

- At the end of 2008, NEI estimates that private investment in new nuclear power plants has created an estimated 14,000-15,000 jobs. Over the last several years, the nuclear industry has invested over \$4 billion in new nuclear plant development, and plans to invest approximately \$8 billion in the next several years to be in a position to start construction in 2011-2012.
- This near-term job creation is the leading edge of a larger surge in the medium- to long-term (2011 and beyond). With sufficient investment stimulus and financing support, job creation will continue to expand over the next five years and beyond. The number of new jobs will expand dramatically

Nuclear Power Plants Provide More Jobs Than Other Sources of Electricity <i>(operations jobs per 1,000 megawatts of generating capacity)</i>	
Nuclear	500
Coal	220
Natural gas	60
Wind	90
<i>Source: Ventyx and U.S. Department of Energy (numbers are averages)</i>	

¹ Some 17 companies and consortia are considering building more than 30 nuclear power plants. The U.S. Nuclear Regulatory Commission is actively reviewing 13 combined license applications from 12 companies and consortia for 22 nuclear power plants.

after 2011 when the first wave of these new nuclear projects starts construction.

Absent investment stimulus, the current pace of job creation will slow and the prospect of tens of thousands of new U.S. jobs could recede into the distant future or disappear completely.

These jobs represent a range of opportunities – from skilled craft employment in component manufacturing and plant construction, to engineering and operation of new facilities.

Near-Term, Medium-Term, Long-Term Job Creation

Job creation in the U.S. nuclear industry can be divided into three time periods:

- *Pre-Construction (2009-2011):* These are jobs being created now in anticipation of new nuclear plant construction. The power companies planning new nuclear plants are already hiring workers for site preparation activities. The companies in the supply chain, which provide equipment and services, are gearing up to meet expected demand. Companies are expanding existing manufacturing facilities and engineering centers or building new ones in North Carolina, Indiana, Pennsylvania, Virginia, Tennessee and Louisiana, among other states. Virtually all of these are high-quality skilled craft and engineering jobs. At the end of 2008, NEI estimates that private investment in new nuclear power plants has created 14,000-15,000 jobs. Over the last several years, the nuclear industry has invested over \$4 billion in new nuclear plant development (See Appendix I, *Job Creation in the Nuclear Supply Chain*, on page 4 for more detail.)
- *Construction (2011-2016):* These are jobs that will be created when new nuclear plant construction starts in earnest around 2011. Construction of a new nuclear power plant represents 1,400-1,800 jobs during construction, with peak employment as high as 2,400 jobs. Given sufficient investment stimulus, approximately eight new plants are expected to start construction around 2011. They represent almost 20,000 direct construction jobs. If all 26 plants now pursuing licenses are built, they would represent approximately 62,000 construction jobs. Construction of a new nuclear power plant will also provide a substantial boost to suppliers of commodities like concrete and steel and manufacturers of hundreds of plant components. A single new nuclear power plant requires approximately 400,000 cubic yards of concrete, 66,000 tons of steel, 44 miles of piping and 300 miles of electric wiring and 130,000 electrical components. Supplying these needs will create even more jobs.
- *Operation (post 2016):* These are jobs that will be created when the new plants start commercial operation. A new nuclear plant will represent approximately 700 permanent jobs for several generations of workers (since nuclear plants are expected to operate for 60 years). These jobs pay 36 percent more than average salaries in the local area. The permanent jobs at the nuclear plant create an equivalent number of additional jobs in the local area to provide the goods and services necessary to support the nuclear plant workforce (e.g., car dealers, dry cleaners, food service, etc.). The average nuclear plant generates approximately \$20 million per year in state and local taxes. These tax payments support schools, roads and other state and local infrastructure. The average nuclear plant also generates approximately \$75 million per year in federal taxes. (See Appendix II, *Economic and Employment Benefits of New Nuclear Plants*, on page 7 for more detail.)

Financing Support is Key To Near-Term Job Creation

The pace of new nuclear plant development, and of job creation in this sector of the economy, depends on the financing support available from the federal government – particularly in today’s tight credit markets. The Energy Policy Act of 2005 authorized the Department of Energy to provide loan guarantees to projects that reduce, avoid or sequester greenhouse gas emissions. The program provides essential financing support for clean energy projects, including renewable energy, energy efficiency projects and advanced nuclear power plants.

The clean energy loan guarantee program authorized by the 2005 Energy Policy Act was an important step in the right direction, but only a small step. That program was designed to jump start construction of just a few clean energy projects with high technical risk. That goal remains as valid now as it was in 2005, but today we face an additional challenge – financing large-scale deployment of clean energy technologies. The \$18.5 billion in loan volume² currently authorized for new nuclear power projects might support three projects, at best. It does not come close to supporting the four to eight new nuclear power projects that will be ready to start construction over the next several years, much less the other renewable energy and advanced coal-based technologies that must be deployed.

The U.S. electricity industry must invest between \$1.5 trillion and \$2 trillion in new power plants, transmission and distribution systems, and environmental controls to meet an expected 25 percent increase in electricity demand by 2030. To put these numbers in perspective: the value of our entire electric power supply and delivery system today is only \$750 billion.

To meet this challenge, the loan guarantee program must have sufficient financing capability and loan guarantee authority to ensure that capital flows to clean technology deployment – renewables, advanced coal-based systems, nuclear and other clean fuels – in the electric sector.

² “Loan volume” is not an appropriation. It simply authorizes an agency to issue loan guarantees up to that amount. The 1990 Federal Credit Reform Act created a standardized way of accounting for loan and loan guarantee programs in the federal budget. Federal agencies that provide loans and loan guarantees are required to calculate a “cost,” following standardized protocols. That “cost” is the expected payments by the federal government less expected revenues received by the federal government. In most loan guarantee programs, this cost appears in the federal budget as an appropriated amount. The energy loan guarantee program created by the 2005 energy legislation took a different and innovative approach. It is self-financing, by requiring that the company receiving the loan guarantees pay the cost of the guarantee and all administrative fees and costs incurred by the agency in administering the program.

Appendix I
Job Creation in the Nuclear Supply Chain: Individual Projects

Charlotte, N.C.

Toshiba will open its national project management and engineering center in Mecklenburg County, investing \$2.8 million. The company sells the Advanced Boiling Water Reactor (ABWR) to be constructed in the United States and provides engineering, licensing, construction management, maintenance, and other services for nuclear power plants.

- *194 new jobs*

Charlotte, N.C.

Westinghouse is expanding its Charlotte-based workforce to focus on balance-of-plant engineering, and Boiling Water Reactor (BWR) instrumentation and control system development and project execution.

- *100 new jobs*

Newport News, Va.

AREVA and Northrop Grumman Shipbuilding are building a new manufacturing and engineering facility in Newport News, Va., to supply the growing American nuclear energy sector. The 300,000-square-foot facility represents an investment of more than \$360 million, and will manufacture heavy components, such as reactor vessels, steam generators and pressurizers.

- *More than 500 skilled hourly and salaried jobs*

Lake Charles, La.

Global Modular Solutions, a joint venture of Shaw Group and Westinghouse, completed construction of a 600,000-square-foot module fabrication facility at the Port of Lake Charles to produce structural, piping and equipment modules for new nuclear plants using the Westinghouse AP1000 technology. Operations began in mid-2009.

- *1,400 workers or more at full capacity*

Fort Mill, S.C.

URS Corporation opened a new URS Nuclear Energy Center, the headquarters for the company's commercial nuclear energy engineering and construction business, which provides licensing, design, engineering, procurement and construction services for new nuclear power plants as well as for critical stages in the development of nuclear fuel cycle facilities.

- *More than 400 nuclear professionals are being hired over the next several years*

Wilmington, N.C.

GE Hitachi Nuclear Energy is investing \$704 million to expand its 1,600-acre campus near Wilmington. The company is adding new manufacturing, training, simulation and testing facilities. The project also could include a commercial uranium-enrichment facility that would use a new laser process.

- *900 new jobs over the next five years*
- *Average wage of about \$85,000 a year, more than double the New Hanover County average of \$33,226*
- *GE Hitachi already employs more than 2,000 in New Hanover County.*

Turtle Creek, Pa.

Holtec manufactures dry fuel storage canisters and high-tech racks for electric utilities in the United States and around the world. Last year, Holtec added 90,000 square feet to its manufacturing division.

- *75 new jobs last year*
- *500 new hires in the next three to five years, including manufacturing and welding engineers, production workers and machinists*

Chattanooga, Tenn.

Alstom is building a new manufacturing facility in Chattanooga to manufacture steam turbines for fossil and nuclear plants, gas turbines, generators and related equipment. The project represents an investment of more than \$200 million.

- *Approximately 350 jobs*

Mt. Vernon, Ind.

Lynchburg, Va.

Babcock & Wilcox Nuclear Power Generation Group, Inc., a subsidiary of The Babcock & Wilcox Co., provides nuclear power plant products, services and construction for utilities worldwide. Headquartered in Lynchburg, Va., the new company focuses on current and future needs of existing nuclear plants and provides capabilities to support construction of new plants. B&W NPG primary capabilities include design engineering, manufacturing, field service and construction.

- *300 skilled trade workers, primarily for the Mt. Vernon manufacturing facility*
- *100 engineers, primarily at the Lynchburg facility, for field service and new reactor projects*

Cheswick, Pa.

Curtiss Wright (Curtiss Wright Flow Control Corp.) completed construction in mid-2009 on a \$62 million, state-of-the-art, multipurpose Large Manufacturing Complex in Cheswick, PA. The nine-story, 48,000-square-foot facility is being used to build commercial nuclear reactor coolant pumps as well as support the production and testing of other new large products.

- *80 jobs from engineering positions to skilled machinists and assemblers*
- *Curtiss Wright currently employs approximately 700 in Cheswick*

Cranberry Woods, Pa.

Westinghouse is nearing completion of a new facility in Cranberry Woods, Pa., that will house the company's Nuclear Power Plant Business unit. New employees are expected to begin working at the facility in 2009. Employees currently located at existing facilities in Monroeville and Churchill will follow in a second-phase move, with all employees expected to be in the new facility by year-end 2010.

- *At least 1,000 local workers during the next five years*

Job Creation: Totals by Major Suppliers

Areva

- *Has hired about 350 people this year throughout its locations in the U.S.*
- *Anticipates adding 200 to 250 more employees in 2009*

Westinghouse

- *Has hired 3,000 people in the past three years*
- *Expects to add 400 to 500 per year for the foreseeable future to meet expected demand from new nuclear plant construction*

Shaw Group

- *Plans to hire an additional 5,000 professional and craft workers over the next 12 months because of global growth in its power, energy and chemicals, and fabrication and manufacturing divisions*
- *Opportunities in the power division include engineering and design for next-generation nuclear plants*

Job Creation at Fuel Cycle Facilities

Eunice, N.M.

LES began construction on its uranium enrichment facility in 2006. It is scheduled to begin full commercial operations in 2009. Total construction cost is approximately \$3 billion.

- *1,100 construction jobs*
- *244 operations jobs have already been created and an additional 60 are expected to be added when the facility is fully operational*

Piketon, Ohio³

USEC began construction on the American Centrifuge Plant in 2007 and expects to begin commercial operations in 2010 and continue to expand capacity through 2012. The plant is expected to cost \$3.5 billion.

- *Approximately 1,000 construction jobs*
- *420 jobs when commercial operation begins*
- *6,300 total direct and indirect jobs being created at the site and at suppliers and manufacturers across the country*

Bonneville County, Idaho³

Areva expects to begin construction on its uranium enrichment facility in 2011. Plant design and construction will take 8 to 10 years, at a cost of \$2 billion.

- *1,000 to 1,250 construction jobs, as well as an additional 450 to 500 indirect and induced jobs*
- *Operations and management of the plant will create 250 to 400 jobs, as well as an additional 400 to 600 indirect and induced jobs*

³ Construction of these projects depends on loan guarantees from the U.S. Department of Energy.

Appendix II

Economic and Employment Benefits of New Nuclear Plants⁴

Nuclear Plant Employment

- 1,400 – 1,800 jobs during construction on average (with peak employment as high as 2,400 jobs at certain times)
- Approximately 700 permanent jobs when the plant is operating: These jobs pay 36% more than average salaries in the local area.
- The 700 permanent jobs at the nuclear plant create an equivalent number of additional jobs in the local area to provide the goods and services necessary to support the nuclear plant workforce (e.g., car dealers, dry cleaners, food service, etc.).

Nuclear Plant Economic Benefits

- The average nuclear plant generates approximately \$430 million a year in total output for the local community, and nearly \$40 million per year in total labor income. These figures include both direct and secondary effects. The direct effects include the plant's spending for goods, services and labor. The secondary effects include the subsequent spending attributable to the plant and its employees, as plant expenditures filter through the local economy. Analysis shows that every dollar spent by the average nuclear plant results in the creation of \$1.07 in the local community.
- The average nuclear plant generates approximately \$20 million per year in state and local taxes. These tax payments support schools, roads and other state and local infrastructure.
- The average nuclear plant generates approximately \$75 million per year in federal taxes.

New Nuclear Plant Construction

- A new nuclear plant represents an investment of \$6-8 billion (depending on plant size), including interest during construction.
- Construction of a new nuclear power plant will provide a substantial boost to suppliers of commodities like concrete and steel and manufacturers of hundreds of components. For example, a single new nuclear power plant requires approximately:
 1. 400,000 cubic yards of concrete—five times as much concrete as in the foundation and floor slabs of the 100-story Sears Tower in Chicago
 2. 66,000 tons of steel
 3. 44 miles of piping and 300 miles of electric wiring
 4. 130,000 electrical components.

⁴ These estimates are based on normalized averages from analyses of the economic and employment impact of 22 U.S. nuclear power plants (Millstone, Indian Point, Wolf Creek, Diablo Canyon, Palo Verde, McGuire, Catawba, Oconee, Grand Gulf, PPL Susquehanna, Salem, Hope Creek, Oyster Creek, Braidwood, Byron, Clinton, Dresden, LaSalle, Quad Cities, Three Mile Island, Limerick, and Peach Bottom.). The figures are calculated per megawatt of installed capacity and reflect a nominal 1,000-megawatt plant size. In practice, new nuclear plants are larger than 1,000 megawatts, so the economic benefits listed here understate the benefits that new nuclear plants will produce. The analyses employ the IMPLAN model for estimating direct and indirect economic and employment effects of industrial activity. IMPLAN is widely used by U.S. government agencies.