Backgrounder

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Washington Subsidies Not Necessary to Rebuild U.S. Nuclear Industry

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Concerns over global warming, energy dependence, and rising fuel prices are leading many to seek out alternatives to fossil fuels. Nuclear power is one available alternative that could help reduce dependence on foreign energy sources that is both emissions-free and affordable. Aside from the regulatory hurdles, one difficulty with employing nuclear technology is that the U.S. no longer has the industrial infrastructure to support a broad expansion of nuclear power. Some Members of Congress have suggested that federal government handouts, using the euphemism "incentives," are necessary to get the nuclear industry up and running again. This is simply not the case. The nuclear industry has already begun its expansion. Instead, Congress should concentrate on guaranteeing regulatory stability, opening foreign commercial nuclear markets, and developing a sustainable, free-market approach to nuclear waste management.

Nuclear Expansion Can Reduce Costs of CO_2 Reductions

The Lieberman–Warner climate-change bill (S. 3036, originally introduced as S. 2191 in 2007) introduced in Congress earlier this year would have mandated drastic reductions in America's CO_2 emissions. A recent Heritage Foundation analysis estimated that the bill would have cost the U.S. economy between $1.8 trillion and $4.8 trillion by 2030, along with lost manufacturing jobs exceeding 2 million in certain years.[1] Although the bill died a quick and justified death, a new version of the bill will most certainly be introduced in the coming year.

Talking Points

- Federal government intervention distorts the risks for industries, causing them to either make investments they would not have otherwise, or discounting the costs for investments that they would have made anyway.
- Congress should take steps that promote industrial independence, not create the kind of dependency that is inherently incompatible with long-term business planning.
- The private sector has already begun to invest in the nuclear industry without federal government subsidies.
- Nuclear education programs are beginning to grow throughout the educational system.
- The federal government should concentrate on establishing a regulatory environment that is conducive to commercial nuclear growth, overhauling the spent nuclear fuel management regime, and opening foreign markets.

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While the Heritage analysis shows the economic impact of the Lieberman–Warner bill under a likely mix of energy sources based on today's policies, other analyses study how alternative energy mixes can mitigate the costs of CO_2 reductions. While these analyses differ, they all point to the same result: Nuclear power is critical to reducing CO_2 emissions affordably. Not only does the U.S. need nuclear power, but an enormous amount of nuclear power is needed quickly. An Environmental Protection Agency (EPA) analysis assumes a 150 percent increase in nuclear power by 2050 to meet Lieberman-Warner CO_2 reduction targets.[2] While meeting this demand would require a substantial industrial effort, it is minuscule in comparison to an Energy Information Agency (EIA) analysis that suggests that the U.S. must increase its nuclear capacity by 268 gigawatts of new nuclear power by 2030 in order to meet the same objectives.[3]

Today, the U.S. has 104 operating nuclear reactors with a total capacity of approximately 100 gigawatts. New reactors would likely be larger on average than existing reactors. Assuming that the average new reactor would produce about 1.3 gigawatts of electric power, the EPA analysis would require nearly 50 new reactors, while the EIA's analysis would require about 200 over the next 25 years.

The problem is that the United States has not ordered the construction of a new reactor since the mid-1970s, and today does not have the industrial infrastructure to build even a single reactor with all-domestic components. The U.S. industrial and intellectual base atrophied as the nuclear industry declined over the past three decades. Large forging production, heavy manufacturing, specialized piping, mining, fuel services, and skilled labor all must be reconstituted. Simply expanding domestic capabilities will not be enough, however, to support a broad nuclear expansion. The U.S. will also need to maximize its access to foreign capabilities and human resources to achieve CO_2 reductions with nuclear energy.

Washington Help Is Not Necessary

Having recognized the discrepancy between the capacity required to support a broad nuclear expansion and what exists today, many in Congress have sought to take action to grow America's nuclear industrial base. Unfortunately, many of their proposals are little more than industry handouts. They largely consist of taxpayer-subsidized workforce programs and manufacturing-expansion tax breaks.

But these programs are not necessary. The potential market for new nuclear reactors and the services necessary to keep them running is so large that the private sector is already beginning to expand. Those that invest wisely today will be the ones best positioned to take advantage of the emerging nuclear markets in the future. Federal government intervention only distorts the risk of these companies, causing them to either make investments that they would not have otherwise, or discounting the costs for investments that they would have made anyway. Either case leads to an inefficient marketplace that would ultimately lead to a weaker overall industry.

Instead, Congress should take steps that free industry to pursue nuclear energy (and other energy) projects. A stable regulatory environment is far more important to the long-term health of the nuclear industry than any short-term government subsidies. Congress should take steps that promote industrial independence, not create the kind of dependency that is inherently incompatible with long-term business planning. The Heritage Foundation released a list of 10 steps that the federal government could take to create such an environment.[4]

The most critical of these steps is to transfer nuclear waste management responsibility to the pri-

1. William W. Beach, David W. Kreutzer, Ben Lieberman, and Nicolas D. Loris, "The Economic Costs of the Lieberman–Warner Climate Change Legislation," Heritage Foundation *Center for Data Analysis Report* No. 08-02, May 12, 2008, at *http://www.heritage.org/Research/EnergyandEnvironment/cda08-02.cfm*.
2. U.S. Environmental Protection Agency, "EPA Analysis of the Lieberman–Warner Climate Change Security Act of 2008," March 14, 2008, at *http://www.epa.gov/climatechange/economics/economicanalyses.html* (November 5, 2008).
3. U.S. Department of Energy, Office of Integrated Analysis and Forecasting, "Energy Market and Economic Impacts of S. 2191, the Lieberman–Warner Climate Security Act of 2007," April 2008, at *http://www.eia.doe.gov/oiaf/servicerpt/s2191/pdf/sroiaf(2008)01.pdf* (November 4, 2008).

vate sector. The current government-controlled system does not work and is obsolete in today's nuclear renaissance. The nuclear industry is best positioned to develop economically rational, sustainable approaches to spent-fuel management.[5] In addition, Congress and the Administration need to be much more effective in opening international markets to U.S. suppliers. While America's leaders bicker about the virtues of nuclear power, other countries, such as Russia and France, are busy developing business opportunities around the world, situating themselves in positions of authority as new rules for nuclear commerce and nonproliferation emerge.[6] Finally, Congress should undertake a series of pro-market initiatives, such as removing commodity tariffs[7] and increasing H1-B visa quotas.[8] These would help lower costs and increase access to the resources required to support a broad nuclear expansion.

Jobs, Jobs Everywhere

Industrial and educational sectors are already positioning themselves for additional nuclear business. Although there is not a good deal of quantitative data available to date, there is ample evidence to demonstrate that private companies are expanding their workforce, enrichment and manufacturing facilities are expanding capacity, universities are increasing the size of their nuclear engineering programs, and the private-sector is implementing craft-labor workforce programs. Most important, all this is in response to market demand for safe nuclear power—without a single federal government incentive program specifically for nuclear power.

The growing opportunities in the nuclear business are widely recognized. *U.S. News & World Report* recently called nuclear engineering the new hot job; the industry also needs "tradesmen and mechanical, electrical, chemical, and civil engineers with the know-how to run and build nuclear facilities."[9] Companies in the United States are responding accordingly.

For instance, AREVA, one of the world's leaders in nuclear energy, is expanding its headquarters in Lynchburg, Virginia, by 500 jobs, a 25 percent increase.[10] Nine hundred technical jobs will come to Wilmington, North Carolina, which pay roughly $50,000 more than the average annual salary in North Carolina's New Hanover County.[11] URS Corporation, a company that provides a wide variety of nuclear services from design and engineering to construction, recently opened a nuclear energy center in South Carolina and plans to hire 400 nuclear experts over the next few years.[12]And in 2006, General Electric built a technology center in North Carolina that "will serve as GE's nerve center for advanced reactor technology."[13]

4. Jack Spencer, "Nuclear Power Needed to Minimize Lieberman–Warner's Economic Impact," Heritage Foundation *WebMemo* No. 1944, June 2, 2008, at *http://www.heritage.org/Research/EnergyandEnvironment/wm1944.cfm*.
5. Jack Spencer, "A Free-Market Approach to Managing Used Nuclear Fuel," Heritage Foundation *Backgrounder* No. 2149, June 23, 2008, at *http://www.heritage.org/Research/EnergyandEnvironment/bg2149.cfm*.
6. Jack Spencer, "Saving the NPT and the Nonproliferation Regime in an Era of Nuclear Renaissance," testimony before the Subcommittee on Terrorism, Nonproliferation, and Trade, Committee on Foreign Affairs, U.S. House of Representatives, July 24, 2008, at *http://www.heritage.org/Research/EnergyandEnvironment/tst072908b.cfm*.
7. Daniella Markheim, "Why Free Trade Works for America" Heritage Foundation *Backgrounder* No. 2024, April 16, 2007, at *http://www.heritage.org/Research/tradeandeconomicfreedom/bg2024.cfm*.
8. James Sherk and Guinevere Nell, "More H-1B Visas, More American Jobs, A Better Economy," Heritage Foundation *Center for Data Analysis Report* No. 08-01, April 30, 2008, at *http://www.heritage.org/Research/Labor/cda08-01.cfm.*
9. Alison Go, "The New Hot Job: Nuclear Engineering," *U.S. News & World Report*, August 14, 2008, at *http://www.usnews.com/articles/education/2008/08/14/the-new-hot-job-nuclear-engineering.html* (November 4, 2008).
10. "Areva to Expand, Bring 500 New Jobs to Lynchburg" *Virginia Business,* June 6, 2008, at *http://www.virginiabusiness.com/index.php/news/article/areva-to-expand-bring-500-new-jobs-to-lynchburg/955/* (November 4, 2008).
11. John Murawski and Jonathan B. Cox, "Nuclear Revival Bringing 900 Jobs" *The News & Observer*, May 1, 2008, at *http://www.newsobserver.com/business/story/1056591.html* (November 4, 2008).
12. Press Release, "URS Dedicates New Nuclear Energy Center in Fort Mill, South Carolina" URS Corporation, May 6, 2008, at *http://www.wgint.com/news/news_releases/details.php?newsID=351* (November 4, 2008).

This expansion is filtering throughout the nuclear supply chain. For example, Columbiana Hi Tech, which provides the nuclear industry with transportation and storage equipment, is planning to add up to 40 people to its staff of 75.[14] Pennsylvania Governor Ed Rendell commended the Curtiss–Wright Corporation for its $62 million expansion to build nuclear reactor coolant pumps that will create 80 new jobs. Curtiss–Wright will also explore and test new products to produce nuclear energy.[15]

This private-sector investment has been taking place for a few years now. Another integral player in the nuclear industry, Westinghouse, expanded its labor supply by 3,000 people over the past five years, including 1,300 last year alone, and intends to hire several hundred more in the near future.[16] Westinghouse also recently announced, along with The Shaw Group, that it will build the first commercial nuclear module fabrication and assembly facility in the United States. The facility will manufacture components for new and modified reactors and will bring 2,900 jobs to the state of Louisiana.[17]

Even the federal government is preparing for a nuclear renaissance. The Nuclear Regulatory Commission (NRC) processes nuclear facility license applications and sets regulations that are meant to ensure safe commercial nuclear operations. Being prepared to efficiently process new applications to provide effective oversight will require significant manpower increases. The NRC has hired over 400 employees over the past two years to handle new plant licensing and plans to hire about 200 per year for the next few years to support new plant activities as well as to fulfill other obligations.

The Industrial Renaissance Has Begun

Adequate investment in nuclear manufacturing and infrastructure is critical for a rapid expansion, and it has already begun. In 2007, Alstom, a global leader in power generation, invested $200 million in a new facility in Chattanooga, Tennessee, that will significantly expand manufacturing and engineering capacity.[18]

America's new nuclear plants will need to be fueled with enriched uranium and the U.S. has very limited uranium enrichment capabilities. But that is about to change. While America's limited domestic enrichment is currently provided by USEC's plant in Paducah, Kentucky, the company is building a new $3.5 billion plant in Piketon, Ohio. USEC estimates that the American Centrifuge Project will create 3,300 jobs in Ohio as well as an additional 3,000 direct and indirect jobs for USEC's suppliers to expand appropriately to manufacture the centrifuge machine parts.[19] AREVA recently selected Idaho

13. Press Release, "GE Energy's Nuclear Business Breaks Ground on New Technology Center," General Electric, May 16, 2006, at *http://news.thomasnet.com/companystory/486097* (November 4, 2008).
14. "Nuclear Demand: GSO Firm Growing to Meet Demands of Nuclear Industry," *The Business Journal*, June 27, 2008, at *http://www.bizjournals.com/triad/stories/2008/06/30/story3.html?b=1214798400%5E1659953* (November 4, 2008).
15. "Governor Rendell Says Curtiss–Wright Boosting PA's Manufacturing Industry with $62 Million Expansion in Allegheny County: Project Will Create 80 Jobs in Cheswick, Retain 700 Jobs Statewide," State of Pennsylvania, November 5, 2007, at *http://www.state.pa.us/papower/cwp/view.asp?A=11&Q=469059* (November 4, 2008).
16. John Delano, "Westinghouse: Nuclear Energy in Renaissance" May 28, 2008, at *http://kdka.com/local/Westinghouse.nuclear.power.2.735210.html* (November 4, 2008), and Bonnie Pfister, "Westinghouse Signs Contract to Build Nuclear Plants," *Pittsburgh Tribune-Review*, May 28, 2008, at *http://www.pittsburghlive.com/x/pittsburghtrib/business/s_569626.html* (November 4, 2008).
17. "Gov. Jindal, The Shaw Group, Inc., and Westinghouse Announce Module Fabrication and Assembly Facility in LA," Southern Governors Association, August 26, 2008, at *http://www.southerngovernors.org/SGA-Today/tabid/67/ctl/ArticleView/mid/824/articleId/2861/default.aspx* (November 4, 2008).
18. "Alstom Signs Agreement with Exelon to Supply Nuclear Steam Turbine Retrofit Equipment," Europetrole, June 19, 2008, at *http://www.euro-petrole.com/ne_03_actualite_i_details.php?idNews=2351* (November 4, 2008).
19. "American Centrifuge Project Creating Thousands of U.S. Jobs," Market Watch, August 19, 2008, at *http://www.marketwatch.com/news/story/american-centrifuge-project-creating-thousands/story.aspx?guid=%7B70A3DFFE-FF28-4887-B458-259B53ACF455%7D&dist=hppr* (November 4, 2008).

Falls, Idaho, to build its $2 billion enrichment facility. It hopes to begin operations by 2014 and to operate at full capacity by 2019.[20] GE-Hitachi plans to build a Global Laser Enrichment facility in Wilmington, North Carolina, with construction beginning in 2009.[21] Finally, Louisiana Energy Service's (LES) $1.5 billion National Enrichment Facility in Eunice, New Mexico, began construction in 2006 to start operations by 2009 and reach full capacity by 2013.

New nuclear plants are built with very large, often called "heavy," nuclear components. Although U.S. companies once led the world in the manufacture of these components, domestic capacity was not maintained as the construction of new nuclear plants was halted. This, however, has begun to turn around. In 2006, the Babcock & Wilcox Companies acquired its N-Stamp certification, which allows it to provide these components to the commercial sector.[22] In October, AREVA and Northrop Grumman Shipbuilding announced plans to build a heavy manufacturing facility in Newport News, Virginia, that will supply newly constructed AREVA-designed nuclear power plants. The $363 million investment is expected to create 540 jobs.[23]

While acting without federal government funding may sound risky to some, the companies that make good investments today will be better positioned as nuclear energy leaders tomorrow. The bottom line is that companies do not need the federal government to tell them where to invest. Indeed, the private sector is already organizing itself to identify investment opportunities. The Edison Welding Institute recently put together a consortium of nuclear companies to identify supply-chain weaknesses, to prioritize objectives, and to improve quality.[24] Similarly, the Nuclear Energy Institute has implemented a comprehensive nuclear-suppliers program that is achieving similar goals. These associations are how industry will determine—without interference from Washington—where capabilities must be strengthened.

A Nuclear Awakening

Large universities and local community colleges are expanding to meet industry's demands for more engineers and skilled laborers. According to the Nuclear Engineering Enrollments and Degrees Survey of 2006, the most recent study available, "The number of B.S. degrees granted in 2006 by nuclear engineering programs increased by almost 30% over 2005, reflecting the substantial increases in enrollments reported in recent years. The number of B.S. degrees in 2006 is the highest reported in the last ten years."[25]

It is no wonder that major universities are ramping up their nuclear engineering programs. The nuclear industry's high demand for engineers begets higher salary offers, which in turn, result in greater enrollment in nuclear engineering. Purdue University, a school historically known for its nuclear engineering program, has almost tripled its enrollment in this program since the year 2000 to 135 students.[26] Texas A&M has one of the fastest-growing nuclear engineering departments in the country, the University of Florida has continued increased

20. "Areva Selects Enrichment Site," *World Nuclear News*, May 7, 2008, at *http://89.151.116.69/NN-Areva_selects_US_enrichment_site_070508.html* (November 4, 2008).
21. *Ibid.*
22. Press Release, "UniStar Nuclear Adds U.S. Manufacturing Partner for its Planned Nuclear Power Plants," The Babcock & Wilcox Company, August 1, 2006, at *http://www.babcock.com/news_and_events/2006/20060801a.html* (November 4, 2008).
23. Chris Flores and Hugh Lessig, "540 Jobs, $363 Million in Nuclear Reactor Deal," *Dailypress.com*, October 24, 2008, at *http://www.dailypress.com/news/dp-local_announcement_1024oct24,0,328059,print.story* (November 5, 2008).
24. "Edison Welding Institute Plans Nuclear Fabrication Consortium Kick-off Meeting," *The Earth Times,* June 4, 2008, at *http://www.earthtimes.org/articles/show/edison-welding-institute-plans-nuclear-fabrication-consortium-kick-off-meeting,420021.shtml* (November 4, 2008).
25. "Nuclear Engineering Enrollments and Degrees Survey, 2006 Data," Oak Ridge Institute for Science and Education, 2007, at *http://orise.orau.gov/sep/files/NE_E_D_Brief60_03-07.pdf* (November 4, 2008).
26. Press Release, "Purdue's Nuclear Engineering Helps in Industry Resurgence," Purdue University, May 1, 2008, at *http://www.purdue.edu/uns/x/2008a/080501BraltsNuclear.html* (June 19, 2008).

enrollment as well as an increase in its research grant awards, and a total of 31 schools continue to offer a degree in nuclear engineering.[27] Other schools, such as the University of Virginia, are re-establishing their nuclear engineering programs and expect to generate a great deal of interest.[28] The upward trend in the number of nuclear engineering students is also generating a high demand for quality professors.

In addition to large university nuclear program expansions, community colleges are beginning to collaborate with private companies to offer education and training in skilled and craft labor. Duke Energy recently donated $1.25 million to North Carolina State University's College of Engineering, which will create a professorship in engineering and advocate the teaching of engineering in grade schools and high schools.[29]

Progress Energy, a utility, recently awarded a $60,000 grant to Florence-Darlington Technical College's Advanced Welding and Cutting Center to meet the increased demand for pipe welders, who have critical skills for nuclear plant construction.[30] The New Jersey-based Public Service Enterprise Group (PSEG) piloted an entry-level technical-trade program at Mercer County Community College that provides training and education for specific technical jobs. Additionally, PSEG is reaching out to high school students to discuss opportunities in the nuclear and electric power industry.[31]

While these investments may seem inadequate relative to the enormous industrial expansion required for a broad nuclear renaissance, it is important to put them into context. Despite all of the talk in recent years about expanding nuclear power, no construction on new plants has begun to date. So at least until now, investment appears to be staying ahead of market demand. In other words, lack of resources is not the culprit for the lack of new nuclear plants.

If nuclear power expands significantly, however, there may indeed be some lag time before delivery of certain capabilities and components. That should be expected as the industry rebuilds itself. Suppliers will respond, as they have already begun to do, and the industry will stabilize over time as orders are placed and backlogs grow. This will allow the industry to grow at a rational and deliberate pace that is consistent with market realities. This is the type of growth that will ensure the long-term health and sustainability of the nuclear industry.

An International Expansion

International competition to become the global leader in commercial nuclear technology is emerging. AREVA, a French company, is not only expanding in other countries, such as the United States, but also in France, where the nation has long received 80 percent of its electricity from nuclear power. In fact, AREVA recently proposed to hire 100 retired engineers per year in France while the company trains younger talent.[32]

Rolls Royce in the United Kingdom, which already has 2,000 workers in the nuclear industry, is planning to significantly increase its role; chief executive Sir John Rose said, "The expansion of the civil nuclear market represents an exciting opportunity which builds on our extensive nuclear capabilities."[33]

27. "Nuclear Engineering: About the Department," Texas A&M Engineering, at *http://nuclear.tamu.edu/home/about/main/index.php* (November 4, 2008), and "Nuclear and Radiological Engineering," University of Florida, at *http://www.nre.ufl.edu/geninfo/status_of_department.php* (November 4, 2008).
28. Mark Tenia, "Need for Nuclear Employees Grows as Schools Look to Fill Demand," 19News WCAV.tv, August 19, 2008, at *http://www.charlottesvillenewsplex.tv/news/headlines/27153024.html* (November 4, 2008).
29. "Duke Energy Donates $1.25M for Green-Energy Education," *Charlotte Business Journal*, June 2, 2008, at *http://www.bizjournals.com/charlotte/stories/2008/06/02/daily7.html* (November 4, 2008).
30. Shireese Bell, "Florence-Darlington Offers Pipe Welding Academy," SCNow.com, June 5, 2008, at *http://www.scnow.com/scp/news/local/pee_dee/article/florence_darlington_offers_pipe_welding_academy/7380/* (November 4, 2008).
31. Angela Neville, "Generation Next: Strategies for Recruiting Younger Workers," *Power*, Vol. 152, No. 7 (July 2008).
32. "Jobs for the Old," *The Economist*, July 17, 2008, at *http://www.economist.com/business/displaystory.cfm?story_id=11751160* (November 4, 2008).

Japan Steel Works, the world's sole supplier of the ultra-heavy large forgings, which most commercial reactors require, is also preparing to meet global demand. These forgings, which can weigh over 600 tons, are what are used to manufacture the large reactor pressure vessels, steam generators, and other components needed for a reactor.[34] Japan Steel Works invested $400 million to increase its capacity from the ability to produce about five pressure vessels a year to reach eight and a half by 2010.[35] Other companies are considering entering this market as well. The Indian manufacturer Larsen & Toubro may expand its domestic large forging capability to help meet the growing international demand.[36]

Most foreign governments subsidize their national nuclear industries. However, this should *not* be used as a reason to justify federal government subsidies in the U.S. Indeed, it will be other countries' government support and the inefficiency that ultimately comes with it that will allow a leaner, more efficient U.S. industry to compete around the world. For that to happen, however, America's companies must have access to those foreign markets. That is why, instead of distorting investment risk through incentive programs, Congress and the Administration should be focusing on tough problems, such as how to ensure that U.S. companies can gain access to foreign markets.

Conclusion

While the desire to help re-establish the United States as a leader in commercial nuclear power is commendable, it is critical that congressional action not do more harm than good. That is why Congress should not provide handouts in an attempt to spur investments in nuclear energy. Congress can best ensure the sustainability of a strong U.S. nuclear industry by simply providing a stable regulatory environment, authorizing industry to handle its own spent nuclear fuel, and opening foreign markets. As is already becoming the trend, the private sector will take action.

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33. "R-R's Nuclear Power Plant Ambitions," Derbyshire.co.uk, July 17, 2008, at *http://www.thisisderbyshire.co.uk/news/R-R-s-nuclear-power-plant-ambitions/article-223884-detail/article.html* (November 4, 2008).
34. Mycle Schneider and Antony Froggatt, "The World Nuclear Industry Status Report 2007," Commissioned by the Greens-EFA Group in the European Parliament, December 14, 2007, p. 14, at *http://www.greens-efa.org/cms/topics/dokbin/206/206749.pdf* (November 4, 2008).
35. Todd Crowell, "Japan Steel Works May Have Too Much of a Good Thing," *The Asia Sentinel*, July 1, 2008, at *http://www.asiasentinel.com/index.php?option=com_content&task=view&id=1296&Itemid=32* (November 4, 2008).
36. "Indian Manufacturer Looks Outwards," *World Nuclear News*, July 16, 2008, at *http://www.world-nuclear-news.org/C_Indian_manufacturer_looks_outwards_1607083.html* (November 4, 2008).