NUCLEAR ENERGY

AFFIRMATIVE

NEGATIVE

Inherency – Lack of Capital

Lack of investment capital is the major hurdle for constructing new nuclear plants

Gelinas, Fellow, Manhattan Institute, '7

[Nicole Gelinas, the Searle Freedom Trust Fellow at the Manhattan Institute and a contributing editor of City Journal. She is a Chartered Financial Analyst (CFA) and a member of the New York Society of Securities Analysts. "Nuclear Power: The Investment Outlook," Energy Policy & the Environment Report, No. 1, June 2007, http://www.manhattan-institute.org/html/eper_01.htm download date: 11-8-08]

As the partial meltdown at the Three Mile Island nuclear power station in 1979 fades from memory and as demand for electricity grows, executives at some electricity generation companies hope to order and build new nuclear plants in the United States for the first time in over three decades. But nuclear power executives must overcome a significant roadblock before they can start to build: for bank lenders, bond investors, and other sources of project capital, the exceptional risks of investing in new nuclear power projects continue to outweigh the potential rewards, according to many of the nearly two dozen participants in an evening discussion preceding the Manhattan Institute's March 28, 2007, conference, "Is the Atom the Answer? Meeting America's Energy Needs."[1]

The nuclear bulls hope to benefit from fundamental changes in the industry that have taken place since companies built their first generation of domestic nuclear plants. First, and most recently, the federal government offers an improved regulatory climate as well as generous new incentives to encourage new nuclear construction.

Second, deregulation of the power markets means that the mechanisms for recouping risky investments in new sources of generation have changed. While deregulation still sometimes works better on paper than in real life, power executives in most states, particularly in the Southeast, generally can expect to pass through new construction costs to their ratepayers.

Third, "fleet" companies now specialize in operating portfolios of nuclear power plants. Companies that carve a niche out of nuclear operations, rather than operating just one or two nuclear plants as in a past era, can achieve economies of scale, unlocking more value from their assets than single-nuke operators.

Finally, the possibility—even the high probability—of a national constraint on carbon emissions, whether a carbon tax or a cap on such emissions, arriving in the U.S. in the next couple of years could potentially change both the politics and economics of new nukes.

But, as the discussion participants concluded, the obvious hurdle looms: key sources of financing are reluctant to step forward in today's political, regulatory, economic, and investment climate to take on the very real risks of investing money in these capital-intense projects, whose costs could easily exceed $1 billion per reactor[2] when the time horizons for financing payback still outlast most political and economic cycles.

Inherency – Lack of Capital

Lack of financing and credit blocks new nuclear projects in status quo -- Need more government support

Gelinas, Fellow, Manhattan Institute, '7

[Nicole Gelinas, the Searle Freedom Trust Fellow at the Manhattan Institute and a contributing editor of City Journal. She is a Chartered Financial Analyst (CFA) and a member of the New York Society of Securities Analysts. "Nuclear Power: The Investment Outlook," Energy Policy & the Environment Report, No. 1, June 2007, http://www.manhattan-institute.org/html/eper_01.htm download date: 11-8-08]

Despite these bright fundamentals, skepticism abounds, particularly within the financing community. This skepticism could be a deal breaker, because nuclear fleet owners, with small market caps—"these are not ExxonMobil," one attendee noted—do not have the resources to finance capital-intensive new nukes with equity or with corporate-level debt. In recent history, new construction in the power generation sector has been financed mostly with nonrecourse debt, meaning that banks and bondholders, rather than shareholders, take the bulk of the risk.

So far, Wall Street isn't biting. "The asymmetry of risk is just too large for Wall Street to finance these projects over time horizons that exceed political and economic cycles…. Utilities [are] willing to make this investment, but I don't see [the debt markets] stepping up and funding this program.… The markets aren't going to support it," said one veteran from Wall Street's power-financing industry who came to the discussion. While the financier characterized the 2005 subsidies as "helpful," he said that it's unlikely that the sector will get off the ground without a far more comprehensive "federally based insurance scheme" that, in effect, would eliminate virtually every risk except, perhaps, commercial risk.

Inherency – Loan Guarantees

No new authorized Loan Guarantees for Nuclear Energy in SQ – Industry is desperate for more Congressional funding

Block, Union of Concerned Scientists, '8

[Jon, Project Manager, Nuclear Energy and Climate Change at Union of Concerned Scientists, Juris Doctor degree, cum laude, from Vermont Law School and member of the Bar of the United States Supreme Court, February 21, 2008, "Nuclear Industry Eyes a Smaller Renaissance," *Beyond the Barrel by Marianne Lavelle*, download date: 11-4-08 http://www.usnews.com/blogs/beyond-the-barrel/2008/2/21/nuclear-industry-eyes-a-smaller-renaissance/comments/#10555]

"In the energy bill Congress passed in December, lawmakers gave the industry $18 billion in loan guarantees. But the industry says that to finance eight plants and put them into service by 2016, it would need double that amount."
This is incorrect. The Energy Bill had zilch for nuclear power. Likewise the Omnibus Appropriations bill. The Report of the bill Appropriations bill had "language"--but that is non-binding language--what lawyers call "dicta."
So--there is currently no more appropriated for nuclear than there was in the 2005 EPACT bill. Moreover, the actual statutory language in the Appropriations bill (the "law" part, not the dicta) requires both the DOE to (1) come back to the Appropriations Committee for approval of its solicitations for projects to receive loan guarantees before issuing such notices and (2) come back if it makes any changes in the solicitation.
The bill only extends the period for getting a guaranteed loan to FY2009---not long enough for DOE to get more than one or maybe two guaranteed loan solicitations out.
(I'd be happy to send you the Bill and Report as PDFs if you'd like to read them.)
This situation is the reason that the nuclear industry is still desperate to get more loan guarantee money put into the budget and into some kind of specific authorization.

Inherency – Loan Guarantees

No new big Congressional funding for nuclear energy loan guarantees – only one or two reactors have support in the status quo

Block, Union of Concerned Scientists, '7

[Jon, Project Manager, Nuclear Energy and Climate Change at Union of Concerned Scientists, Juris Doctor degree, cum laude, from Vermont Law School and member of the Bar of the United States Supreme Court, "Nuclear Power Loan Guarantees Shrivel," UCS Backgrounder, December 18, 2007, http://www.ucsusa.org/assets/documents/nuclear_power/nuclear-power-loan-guarantees-backgrounder.pdf download date: 11-07-08]

The nuclear industry is touting the passage of the omnibus appropriations bill as a victory, but in fact Congress did not rally behind loan guarantees for nuclear power. The industry was lobbying for $50 billion in loan guarantees to attract reluctant Wall Street investors. It didn't get it.
When the budget-battle dust settled, Congress officially gave nuclear little to crow about. The only indication that lawmakers support loan guarantees for particular energy sources is in a paragraph-long "report" that accompanied the omnibus bill. This nonbinding paragraph spelled out the limit for loan guarantees for various energy sources. It set a ceiling of $38.5 billion, with capped amounts of $18.5 billion for new nuclear reactors, $2 billion for new nuclear fuel uranium enrichment facilities, $6 billion for coal-based power generation with carbon capture and storage, $2 billion for coal gasification, and $10 billion for renewable energy development.
Significantly, the funding levels in the report "are recommended obligation levels and not an appropriation of funds," Rep. Peter Visclosky (D-Ind.) wrote in a December 17 "dear colleague" letter. Visclosky is chairman of the House Energy and Water Appropriations Subcommittee.
In his letter, the congressman pointed out that the omnibus bill merely restated 2005 energy legislation provisions, which require the Department of Energy to obtain approval from the House Appropriations Committee for any plan to solicit loan guarantee applications.
Given the projected costs of building new reactors, the measure is hardly a victory for the nuclear industry. Cost estimates have escalated to as much as $12 billion to $18 billion for the kind of twin unit facilities most utility applicants favor. Under this recommended program, a successful nuclear loan guarantee applicant could do little more than fund one or two projects.
Although the report's loan guarantee language appears to favor nuclear power and fossil fuels over clean renewable energy sources, the nuclear industry got less than it asked for -- and more than it deserves.

Solvency – PTC & Loan Guarantees

Production Tax Credit and Loan Guarantees for Nuclear Energy would revitalize Nuclear Energy industry in the U.S.

Portney, Economics Prof, Arizona, '8

[Paul R., Dean of the Eller College of Management and Halle Chair in Leadership and Professor of Economics at the University of Arizona. Ph.D. in Economics from Northwestern. From 1972 through June of 2005, Portney was with Resources for the Future (RFF), an independent and non-partisan research and educational organization in Washington, D.C., that specializes in energy and the environment. From 1986-1989 he headed two of its research divisions, in 1989 became its vice president, and was named president and CEO in 1995. *Nuclear Power: Clean, Costly, and Controversial*, download date: 10-18-08 www.heartland.org/custom/semod_policybot/pdf/16924.pdf]

Yucca Mountain notwithstanding, the real policy question facing the United States is this: should the government take steps to facilitate the construction of at least some new nuclear plants in the United States, or should it leave this decision solely to the privately owned companies that build virtually all of the nation's electricity generating capacity? Some type of federal assistance would enable the companies building the first handful of plants (likely in consortia) to overcome the "first-of-a-kind" costs that can make them much more expensive than subsequent units. If these latter units then became as cheap as some vendors suggest, their upfront costs would be quite competitive with new clean coal and even pulverized coal units and perhaps even competitive with natural gas plants on an all-in basis if gas prices remain high. Not surprisingly, the industry is seeking such government assistance in the form of a contribution toward the cost of building the first new plants, like the production tax credit afforded to wind power and other emission-free sources, as well as possible loan guarantees and other protections.

Government subsidies are not the only way to ensure that nuclear power gets to compete as a clean and secure source of electricity generation, of course. In the same way that the conventional air pollution problems associated with coal fired generation have been substantially internalized through federal emissions-control requirements, so too could the comparable externalities associated with climate change. This could be done through a carbon tax or through a mandatory cap-and-trade program that forced both coal- and gas-fired plants to reduce their carbon dioxide emissions. Similarly, the energy security costs associated with an increasingly international market for natural gas could be internalized through an appropriate tax. Once these external costs had been internalized, along with those associated with nuclear power and other sources of electricity generation, of course, the government could step aside and let nuclear battle with coal, natural gas, wind, biomass, solar, and any other means of power production one could think up.

Far from the "dead duck" nuclear power was once proclaimed to be, it has arisen phoenix-like from the ashes.

Solvency – Uranium Supplies

Plenty of Uranium available – thousand years of supply

Sutherland, Chief Scientist, Edutech Enterprises, '6

[John K., a retired health physicist who worked with radiation for almost 20 years in the non-nuclear industry, and then spent 20 years in various aspects of radiation protection at a CANDU nuclear power plant. "Nuclear Cycles and Nuclear Resources," 6-27-03, Energy Pulse, http://www.energypulse.net/centers/article/article_display.cfm?a_id=374 download date: 11-08-08]

Defined recoverable reserves at the beginning of 1999, were about 3.95 million tonnes of U at about $80/kg. World production is about 41,000 tonnes/a, suggesting a resource life of about 100 years at the present rate of use - mostly in the Open Cycle. If we use a base figure of 50,000 kWh of electricity from each kilogram of natural (not enriched) uranium, and assume that the natural refined uranium cost is $80 (it is actually about $30), then the raw fuel cost of electricity is less than 0.2 cents/kWh. Obviously, there is considerable tolerance for fuel price increases with uranium, where there is no such leeway for any other significant resource. Unlike fossil fuels, a much higher price for uranium is tolerable, with little effect on the price of electricity. Any significant increase in the price of uranium immediately adds millions of tonnes to the estimated uranium reserve picture. Even a modest price increase (coupled with existing improvements in extraction by in-situ leaching) could result in at least a ten fold increase in terrestrial reserves (including uranium in coal deposits, in phosphates, in alum shale and in many base metal deposits as well as other formations), and pushes the defined reserves higher, and extends the resource life to at least 1,000 years, or far beyond the reasonably expected resource life of any fossil fuel.

Solvency – Air Pollution

Nuclear Energy solves air pollution

Portney, Economics Prof, Arizona, '8

[Paul R., Dean of the Eller College of Management and Halle Chair in Leadership and Professor of Economics at the University of Arizona. Ph.D. in Economics from Northwestern. From 1972 through June of 2005, Portney was with Resources for the Future (RFF), an independent and non-partisan research and educational organization in Washington, D.C., that specializes in energy and the environment. From 1986-1989 he headed two of its research divisions, in 1989 became its vice president, and was named president and CEO in 1995. *Nuclear Power: Clean, Costly, and Controversial*, download date: 10-18-08 www.heartland.org/custom/semod_policybot/pdf/16924.pdf]

What accounts for the second look that nuclear power is getting from energy experts and even some environmental advocates? First, it is free from some of the serious air pollution problems that can accompany coal-fired and, to a lesser extent, natural gas-fired electricity generation. This includes both conventional pollutants, such as sulfur dioxide, hydrocarbons, and nitrogen oxides—and mercury, cadmium, and other heavy metals present in coal. While emissions of all these pollutants have been reduced significantly since the 1970 Clean Air Act took effect, electricity generation is still a major source of them all.

Solvency – Climate

Nuclear Energy does not generate greenhouse gases, solves climate change

Portney, Economics Prof, Arizona, '8

[Paul R., Dean of the Eller College of Management and Halle Chair in Leadership and Professor of Economics at the University of Arizona. Ph.D. in Economics from Northwestern. From 1972 through June of 2005, Portney was with Resources for the Future (RFF), an independent and non-partisan research and educational organization in Washington, D.C., that specializes in energy and the environment. From 1986-1989 he headed two of its research divisions, in 1989 became its vice president, and was named president and CEO in 1995. *Nuclear Power: Clean, Costly, and Controversial*, download date: 10-18-08 www.heartland.org/custom/semod_policybot/pdf/16924.pdf]

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Solvency – Climate
(answer to bias claims)

Even the IPCC Chairman and Nobel Prize winner endorses Nuke Power to solve climate

Times of India '8
[“Nuclear energy a must to curb global warming,” Article date: August 26, 2008, download date: 11-27-08 timesofindia.indiatimes.com/Mumbai/Nuclear_energy_a_must_to_curb_global_warming_/articleshow/3405575.cms]

MUMBAI: "Climate change, such as global warming, is for real. The biggest challenge today for the human race is to safeguard our planet from it," Dr R K Pachauri, chairman of the Intergovernmental Panel on Climate Change (IPCC), has said.
Speaking at the 51st graduation function of BARC Training School in Trombay, Dr Pachauri, who last year received a Nobel Peace Prize on behalf of the IPCC, emphasised the need for nuclear energy sources in order to minimise the effects of global warming. "Nuclear energy is the best option to curb carbon emissions," said Pachauri , who is also the director general of The Energy and Resource Institute (TERI).
He gave the worrying example of the world's largest island, Greenland, near North Pole, where ice mountains are melting at a faster rate today. "This can cause rise in sea levels across the planet, including Mumbai," he said.
As the 127 students received their graduation certificates to become scientific officers at BARC and they were very much aware of the new age of "nuclear renaissance and energy-environment correlation" .
Computer science engineer and Homi Bhabha awardee, Urvashi Karnani, said: "India's N-deal will globalise our existing nuclear technology to take us forward . As a scientist, it will open several new avenues in my research work, keeping in mind the eco-concerns ."
Another Homi Bhabha awardee, electronics engineer Saurav Mukhopadhyay, said that India's latest nuke deal is exciting for young researchers who can dedicate their lives in this pursuit, instead of taking the first flight abroad to make easy money.

Solvency – Natural Gas Dependency

Nuclear Power solves foreign dependency – domestic uranium ends for natural gas imports

Portney, Economics Prof, Arizona, '8

[Paul R., Dean of the Eller College of Management and Halle Chair in Leadership and Professor of Economics at the University of Arizona. Ph.D. in Economics from Northwestern. From 1972 through June of 2005, Portney was with Resources for the Future (RFF), an independent and non-partisan research and educational organization in Washington, D.C., that specializes in energy and the environment. From 1986-1989 he headed two of its research divisions, in 1989 became its vice president, and was named president and CEO in 1995. *Nuclear Power: Clean, Costly, and Controversial*, download date: 10-18-08 www.heartland.org/custom/semod_policybot/pdf/16924.pdf]

A second advantage of nuclear power has to do with energy security. Concerns have existed since the early 1970s about the extent to which the United States is dependent upon petroleum imports to fuel our transportation sector, particularly from countries in the Middle East. For the first time, a concern about possible import dependence has begun to extend to the electricity generation sector. This is not because petroleum is used for electricity generation—its role there has almost disappeared. Rather, the concern is that natural gas production in the United States cannot keep pace with demand growth and that an ever-greater share of the natural gas we use for home heating and industrial production, as well as for electricity generation, will have to come from abroad (including from some of the same countries whose share of world oil reserves makes us nervous). Because of the likely adequacy of North American uranium reserves, this is not a concern for nuclear power (nor is it for coal, for which domestic reserves are ample).

Solvency – Foreign Oil Dependency

Nuclear Energy can reduce oil imports and dependency

Wingo and Burnett, National Center for Policy Analysis, '8

[Ross, Research Assistant at the National Center for Policy Analysis, and H. Sterling Burnett, Ph.D. Senior Fellow at NCPA, "Nuclear Renaissance: Atoms to Power the Future," Brief Analysis No. 635, October 21, 2008, http://www.ncpa.org/pub/ba/ba635/ba635.pdf download date: 11-30-08]

Nuclear Power Uses Secure Fuel Sources. Nuclear power can reduce America's dependency on foreign fuels. High gas prices have already encouraged the development of hybrids and electric plug-in vehicles. If these vehicles are adopted in significant numbers, nuclear-generated electricity could displace some of the imported oil currently used to power American cars. This would improve national security, as the United States would depend less on oil rich countries that have interests opposed to our own. Furthermore, America has an abundant domestic supply of uranium fuel.

Reliable – YES

Nuclear Power is very reliable – suitable for baseload power

Wingo and Burnett, National Center for Policy Analysis, '8

[Ross, Research Assistant at the National Center for Policy Analysis, and H. Sterling Burnett, Ph.D. Senior Fellow at NCPA, "Nuclear Renaissance: Atoms to Power the Future," Brief Analysis No. 635, October 21, 2008, http://www.ncpa.org/pub/ba/ba635/ba635.pdf download date: 11-30-08]

Nuclear Power Is Reliable. Another EIA report notes that if greenhouse gas emissions are limited, a dramatic shift from fossil fuels to alternative energies will be required. In that case, the EIA recommends that the United States add approximately 268 gigawatts of new nuclear power, or approximately 200 additional reactors.

Why does the EIA specifically recommend nuclear energy? Today, coal and natural gas-fired generators provide critical baseload power — the constant current required to keep electricity flowing day and night with little or no down-time. In a CO2-constrained world, coal and natural gas use will be reduced because they emit greenhouse gases. Unlike many other forms of alternative energy, nuclear power is reliable and can serve as baseload power.

<u>SAFETY – YES</u>

Nuclear Energy is safe – risks of explosion, terrorist attack, and waste are all easily prevented

Tucker '8

[William, veteran writer whose work has appeared in major newspapers and publications, such as the Atlantic Monthly, the New York Times, the Wall Street Journal, and The New Republic. "Let's Have Some Love for Nuclear Power," Wall Street Journal, July 21, 2008, http://online.wsj.com/article/SB121659839296769061.html download date: 11-30-08]

If we are now going to choose nuclear power as a way to resolve both our concerns about global warming and our looming energy shortfalls, we are first going to have to engage in a national debate about whether or not we accept the technology. To begin this discussion, I suggest redefining what we call nuclear power as "terrestrial energy."

Every fuel used in human history -- firewood, coal, oil, wind and water -- has been derived from the sun. But terrestrial energy is different.

Terrestrial energy is the heat at the earth's core that raises its temperature to 7,000 degrees Fahrenheit, hotter than the surface of the sun. Remarkably, this heat derives largely from a single source -- the radioactive breakdown of uranium and thorium. The energy released in the breakdown of these two elements is enough to melt iron, stoke volcanoes and float the earth's continents like giant barges on its molten core.

Geothermal plants are a way of tapping this heat. They are generally located near fumaroles and geysers, where groundwater meets hot spots in the earth's crust. If we dig down far enough, however, we will encounter more than enough heat to boil water. Engineers are now talking about drilling down 10 miles (the deepest oil wells are only five miles) to tap this energy.

Here's a better idea: Bring the source of this heat -- the uranium -- to the surface, put it in a carefully controlled environment, and accelerate its breakdown a bit to raise temperatures to around 700 degrees Fahrenheit, and use it to boil water. That's what we do in a nuclear reactor.

Because the public first became aware of nuclear energy through warfare, reactors have always been thought of as "silent bombs." But <u>nuclear plants cannot explode. The fissionable isotope of uranium must be enriched to 90% to create a weapon. In a reactor it is only 3%. You could not blow up a nuclear reactor if you tried.</u>

<u>Nor is the threat of terrorists crashing an airplane into a reactor and setting off a holocaust very plausible. The Department of Energy once crashed an F-4 jet going 500 miles per hour into a concrete wall the thickness of a nuclear containment structure. The plane vaporized while the concrete was barely dented. (You can watch it on YouTube: "Plane crashes into wall.")</u>

<u>Finally, the problem of radioactive waste has been absurdly exaggerated. More than 95% of the material in a spent fuel rod can be recycled for energy and medical isotopes.</u>

<u>We have a nuclear waste problem in this country because we gave up reprocessing in the 1970s. The fear was that terrorists or foreign nationals would steal plutonium from American reactors to build bombs. This is a bit like worrying that terrorists will steal all the gold from Fort Knox. Other countries have built bombs in the intervening years. They didn't need American plutonium to do it.</u>

SAFETY – YES

Nuclear Power is safe – decades of operation and transport of material without a single domestic fatality

DeMint, U.S. Senator, '8

[Jim, U.S. Senator, R-South Carolina, member of the Energy and Natural Resources Committee, "We have an efficient, clean energy alternative," August 31, 2008, Herald-Journal (Spartanburg, S.C.), http://www.goupstate.com/article/20080831/NEWS/808290242/1132/OPINION&title=We_have_an_efficient__clean_energy_alternative download date: 10-21-08]

Furthermore, concerns over the safety of nuclear workers and the public are based on speculation, not the facts. Even with the Three Mile Island incident in 1979, no one has ever died in the United States from a radiation-related accident in domestic nuclear power programs. And the false notion that we cannot handle or transport this material safely or securely is not supported by the facts. Over the past 30 years, more than 3,000 shipments of commercial nuclear fuel have covered more than 1.7 million miles of America's roads and railway without a single radiological leak.

SAFETY – YES

Empirically Safe – Fifty years of civilian and naval use of nuclear energy in U.S. prove

Wingo and Burnett, National Center for Policy Analysis, '8

[Ross, Research Assistant at the National Center for Policy Analysis, and H. Sterling Burnett, Ph.D. Senior Fellow at NCPA, "Nuclear Renaissance: Atoms to Power the Future," Brief Analysis No. 635, October 21, 2008, http://www.ncpa.org/pub/ba/ba635/ba635.pdf download date: 11-30-08]

Traditionally, nuclear power critics have focused on two potential threats to human health: 1) the risk that dangerous levels of radiation will escape from a plant due to equipment failure or human error, and 2) the risk posed to human health from nuclear waste. Yet, in more than 50 years of experience with nuclear power in the United States, no deaths or negative health effects have been conclusively linked to radiation leaks from nuclear plants or from spent fuel. In addition, the U.S. Navy has operated nuclear-powered vessels for 50 years. Despite the fact that hundreds of thousands of navy personnel have served in close quarters with nuclear power plants and radioactive material, there have been no radiation-caused deaths.

SAFETY – YES

Health risk from waste and accidents is minuscule. Nuclear Energy is safer than fossil fuels

Sutherland, Chief Scientist, Edutech Enterprises, '06

[John K., a retired health physicist who worked with radiation for almost 20 years in the non-nuclear industry, and then spent 20 years in various aspects of radiation protection at a CANDU nuclear power plant. "The Inevitable Nuclear Resurgence, and the Inevitable Panic Attacks," April 21, 2006, http://www.energypulse.net/centers/article/article_display.cfm?a_id=1250 download date: 11-06-08]

The facts about even high-level nuclear wastes of any kind are very simple, and easily understood:
1. Nuclear waste has neither injured nor killed anyone in the last 60 years of nuclear energy use. No one. It is 100% safely managed and cannot cause any exposure to the general public.
Compare that envious safety record with the alleged hundreds of thousands of pollution deaths each year from the almost entirely unmanaged wastes associated with our use of fossil fuels and burning dung.
The average number of deaths from coal mining accidents throughout the world each week, and regularly reported on the inner pages in most newspapers, exceeds the total numbers of nuclear power related deaths in the entire 60 year history of the nuclear power industry; nuclear accidents included. From that empirical (observed) point of view alone, this makes nuclear power at least 3,000 times safer than coal.
In addition, the annual numbers of pollution related deaths worldwide (3 million per year WHO), from burning fossil fuels (50,000 per year in the U.S. if an MIT study is to be believed), make fossil fuels millions of times more dangerous than nuclear power operation and waste disposal. These facts alone bring the so-called waste safety issue into stark perspective, and reveal it as a truly minuscule issue about which there is a lot of noise, and a great deal of emotional misinformation, but little substance.

SAFETY – YES

Waste can be safely moved and stored

Sutherland, Chief Scientist, Edutech Enterprises, '06

[John K., a retired health physicist who worked with radiation for almost 20 years in the non-nuclear industry, and then spent 20 years in various aspects of radiation protection at a CANDU nuclear power plant. "The Inevitable Nuclear Resurgence, and the Inevitable Panic Attacks," April 21, 2006, http://www.energypulse.net/centers/article/article_display.cfm?a_id=1250 download date: 11-06-08]

Nuclear waste from nuclear power facilities is very low volume; less than the size of a golf ball per person, per year, from all facilities. It is also easily managed and safely moved into storage. I have monitored and supervised it being done on several occasions. We've also been doing that safely for the last 60 years too, and it can continue indefinitely and safely.
There are approximately 40,000 tonnes of solid and managed nuclear 'wastes' produced each year from ALL of the world's nuclear facilities.
Now compare that number, with the approximately 25 billion tonnes of 'radioactive' wastes from fossil fuel use, or about 4 tonnes per person each year. And YES, they are also radioactive, though at a very low level. These are mostly thrown into the atmosphere to affect us all. They are also partially blamed for what is regarded in some hand-wringing circles as the greatest threat to humanity; Global Warming, even if the other health effects from fossil fuel use didn't exist.
The radiation dose to residents living around an operating coal burning facility is up to 20 times higher than that of residents who live around an operating nuclear power facility. Fortunately, they are both still minor compared with other radiation doses from nature and medicine. Coal burning plants produce much more nuclear waste per megawatt, than does a nuclear power plant, but we neither manage it well, nor consider it as nuclear waste. We've just got used to it without being terrified of it. However, it will constitute an extremely valuable nuclear fuel source over the next few hundreds of years.

SAFETY – YES

Turn: Nuclear plant emits less radioactivity than a coal plant. Replacement of coal means a net decrease

Rhodes and Beller 2000

[Richard L. Rhodes is the author of The Making of the Atomic Bomb, Dark Sun, and other books. He has been awarded grants from the Ford Foundation, the Guggenheim Foundation, the MacArthur Foundation and the Alfred P. Sloan Foundation among others. He is an affiliate of the Center for International Security and Cooperation at Stanford University. He also frequently gives lectures and talks on a broad range of subjects to various audiences, including testifying before the U.S. Senate on nuclear energy. Denis Beller is a nuclear engineer and Technical Staff Member at the Los Alamos National Laboratory. "The Need for Nuclear Power," *Foreign Affairs*, January/February 2000, lexis-nexis]

AMONG SOURCES of electric-power generation, coal is the worst environmental offender. (Petroleum, today's dominant source of energy, sustains transportation, putting it in a separate category.) Recent studies by the Harvard School of Public Health indicate that pollutants from coal-burning cause about 15,000 premature deaths annually in the United States alone. Used to generate about a quarter of the world's primary energy, coal-burning releases amounts of toxic waste too immense to contain safely. Such waste is either dispersed directly into the air or is solidified and dumped. Some is even mixed into construction materials. Besides emitting noxious chemicals in the form of gases or toxic particles -- sulfur and nitrogen oxides (components of acid rain and smog), arsenic, mercury, cadmium, selenium, lead, boron, chromium, copper, fluorine, molybdenum, nickel, vanadium, zinc, carbon monoxide and dioxide, and other greenhouse gases -- coal-fired power plants are also the world's major source of radioactive releases into the environment. Uranium and thorium, mildly radioactive elements ubiquitous in the earth's crust, are both released when coal is burned. Radioactive radon gas, produced when uranium in the earth's crust decays and normally confined underground, is released when coal is mined. A 1,000-megawatt-electric (MWe) coal-fired power plant releases about 100 times as much radioactivity into the environment as a comparable nuclear plant. Worldwide releases of uranium and thorium from coal-burning total about 37,300 tonnes (metric tons) annually, with about 7,300 tonnes coming from the United States. Since uranium and thorium are potent nuclear fuels, burning coal also wastes more potential energy than it produces.

SAFETY – YES

Nuclear energy is safer overall for human health than fossil fuels

Rhodes and Beller 2000

[Richard L. Rhodes is the author of The Making of the Atomic Bomb, Dark Sun, and other books. He has been awarded grants from the Ford Foundation, the Guggenheim Foundation, the MacArthur Foundation and the Alfred P. Sloan Foundation among others. He is an affiliate of the Center for International Security and Cooperation at Stanford University. He also frequently gives lectures and talks on a broad range of subjects to various audiences, including testifying before the U.S. Senate on nuclear energy. Denis Beller is a nuclear engineer and Technical Staff Member at the Los Alamos National Laboratory. "The Need for Nuclear Power," *Foreign Affairs*, January/February 2000, lexis-nexis]

The production cost of nuclear electricity generated from existing U.S. plants is already fully competitive with electricity from fossil fuels, although new nuclear power is somewhat more expensive. But this higher price tag is deceptive. Large nuclear power plants require larger capital investments than comparable coal or gas plants only because nuclear utilities are required to build and maintain costly systems to keep their radioactivity from the environment. If fossil-fuel plants were similarly required to sequester the pollutants they generate, they would cost significantly more than nuclear power plants do. The European Union and the International Atomic Energy Agency (IAEA) have determined that "for equivalent amounts of energy generation, coal and oil plants, . . . owing to their large emissions and huge fuel and transport requirements, have the highest externality costs as well as equivalent lives lost. The external costs are some ten times higher than for a nuclear power plant and can be a significant fraction of generation costs." In equivalent lives lost per gigawatt generated (that is, loss of life expectancy from exposure to pollutants), coal kills 37 people annually; oil, 32; gas, 2; nuclear, 1. Compared to nuclear power, in other words, fossil fuels (and renewables) have enjoyed a free ride with respect to protection of the environment and public health and safety.

SAFETY – YES

TURN: Exposure to low-level radiation actually improves health and reduces cancer rates

Rhodes and Beller 2000

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Even the estimate of one life lost to nuclear power is questionable. Such an estimate depends on whether or not, as the long-standing "linear no-threshold" theory (LNT) maintains, exposure to amounts of radiation considerably less than preexisting natural levels increases the risk of cancer. Although LNT dictates elaborate and expensive confinement regimes for nuclear power operations and waste disposal, there is no evidence that low-level radiation exposure increases cancer risk. In fact, there is good evidence that it does not. There is even good evidence that exposure to low doses of radioactivity improves health and lengthens life, probably by stimulating the immune system much as vaccines do (the best study, of background radon levels in hundreds of thousands of homes in more than 90 percent of U.S. counties, found lung cancer rates decreasing significantly with increasing radon levels among both smokers and nonsmokers). So low-level radioactivity from nuclear power generation presents at worst a negligible risk. Authorities on coal geology and engineering make the same argument about low-level radioactivity from coal-burning; a U.S. Geological Survey fact sheet, for example, concludes that "radioactive elements in coal and fly ash should not be sources of alarm." Yet nuclear power development has been hobbled, and nuclear waste disposal unnecessarily delayed, by limits not visited upon the coal industry.

SAFETY – YES – ACCIDENTS

Nuclear accidents are rare, cause few deaths, and can be prevented with good design

Rhodes and Beller 2000

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No technological system is immune to accident. Recent dam overflows and failures in Italy and India each resulted in several thousand fatalities. Coal-mine accidents, oil- and gas-plant fires, and pipeline explosions typically kill hundreds per incident. The 1984 Bhopal chemical plant disaster caused some 3,000 immediate deaths and poisoned several hundred thousand people. According to the U.S. Environmental Protection Agency, between 1987 and 1996 more than 600,000 accidental releases of toxic chemicals in the United States killed a total of 2,565 people and injured 22,949.

By comparison, nuclear accidents have been few and minimal. The recent, much-reported accident in Japan occurred not at a power plant but at a facility processing fuel for a research reactor. It caused no deaths or injuries to the public. As for the Chernobyl explosion, it resulted from human error in operating a fundamentally faulty reactor design that could not have been licensed in the West. It caused severe human and environmental damage locally, including 31 deaths, most from radiation exposure. Thyroid cancer, which could have been prevented with prompt iodine prophylaxis, has increased in Ukrainian children exposed to fallout. More than 800 cases have been diagnosed and several thousand more are projected; although the disease is treatable, three children have died. LNT-based calculations project 3,420 cancer deaths in Chernobyl-area residents and cleanup crews. The Chernobyl reactor lacked a containment structure, a fundamental safety system that is required on Western reactors. Postaccident calculations indicate that such a structure would have confined the explosion and thus the radioactivity, in which case no injuries or deaths would have occurred.

These numbers, for the worst ever nuclear power accident, are remarkably low compared to major accidents in other industries. More than 40 years of commercial nuclear power operations demonstrate that nuclear power is much safer than fossil-fuel systems in terms of industrial accidents, environmental damage, health effects, and long-term risk.

SAFETY – AFF – WASTE
(AT: Radioactive waste harms health)

TURN: Trades-off with more deadly fossil fuel waste. Nuclear waste is small volume and can be safely contained

Rhodes and Beller 2000

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The high-level waste is intensely radioactive, of course (the low-level waste can be less radioactive than coal ash, which is used to make concrete and gypsum -- both of which are incorporated into building materials). But thanks to its small volume and the fact that it is not released into the environment, this high-level waste can be meticulously sequestered behind multiple barriers. Waste from coal, dispersed across the landscape in smoke or buried near the surface, remains toxic forever. Radioactive nuclear waste decays steadily, losing 99 percent of its toxicity after 600 years -- well within the range of human experience with custody and maintenance, as evidence by structures such as the Roman Pantheon and Notre Dame Cathedral. Nuclear waste disposal is a political problem in the United States because of wide-spread fear disproportionate to the reality of risk. But it is not an engineering problem, as advanced projects in France, Sweden, and Japan demonstrate. The World Health Organization has estimated that indoor and outdoor air pollution cause some three million deaths per year. Substituting small, properly contained volumes of nuclear waste for vast, dispersed amounts of toxic wastes from fossil fuels would produce so obvious an improvement in public health that it is astonishing that physicians have not already demanded such a conversion.

WEAPONS PROLIFERATION – AFF ANSWER

Processed Plutonium is too complex and toxic for terrorists to process and use. No diversion has ever occurred.

Rhodes and Beller 2000

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MOST OF THE URANIUM used in nuclear reactors is inert, a nonfissile product unavailable for use in weapons. Operating reactors, however, breed fissile plutonium that could be used in bombs, and therefore the commercialization of nuclear power has raised concerns about the spread of weapons. In 1977, President Carter deferred indefinitely the recycling of "spent" nuclear fuel, citing proliferation risks. This decision effectively ended nuclear recycling in the United States, even though such recycling reduces the volume and radiotoxicity of nuclear waste and could extend nuclear fuel supplies for thousands of years. Other nations assessed the risks differently and the majority did not follow the U.S. example. France and the United Kingdom currently reprocess spent fuel; Russia is stockpiling fuel and separated plutonium for jump-starting future fast-reactor fuel cycles; Japan has begun using recycled uranium and plutonium mixed-oxide (MOX) fuel in its reactors and recently approved the construction of a new nuclear power plant to use 100-percent MOX fuel by 2007.
Although power-reactor plutonium theoretically can be used to make nuclear explosives, spent fuel is refractory, highly radioactive, and beyond the capacity of terrorists to process. Weapons made from reactor-grade plutonium would be hot, unstable, and of uncertain yield. India has extracted weapons plutonium from a Canadian heavy-water reactor and bars inspection of some dual-purpose reactors it has built. But no plutonium has ever been diverted from British or French reprocessing facilities or fuel shipments for weapons production; IAEA inspections are effective in preventing such diversions. The risk of proliferation, the IAEA has concluded, "is not zero and would not become zero even if nuclear power ceased to exist. It is a continually strengthened nonproliferation regime that will remain the cornerstone of efforts to prevent the spread of nuclear weapons."

WEAPONS PROLIFERATION – AFF ANSWER

TURN: System for recycling plutonium would reduce proliferation risk over status quo

Rhodes and Beller 2000

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Ironically, burying spent fuel without extracting its plutonium through reprocessing would actually increase the long-term risk of nuclear proliferation, since the decay of less-fissile and more-radioactive isotopes in spent fuel after one to three centuries improves the explosive qualities of the plutonium it contains, making it more attractive for weapons use. Besides extending the world's uranium resources almost indefinitely, recycling would make it possible to convert plutonium to useful energy while breaking it down into shorter-lived, nonfissionable, nonthreatening nuclear waste.
Hundreds of tons of weapons-grade plutonium, which cost the nuclear superpowers billions of dollars to produce, have become military surplus in the past decade. Rather than burying some of this strategically worrisome but energetically valuable material -- as Washington has proposed -- it should be recycled into nuclear fuel. An international system to recycle and manage such fuel would prevent covert proliferation. As envisioned by Edward Arthur, Paul Cunningham, and Richard Wagner of the Los Alamos National Laboratory, such a system would combine internationally monitored retrievable storage, the processing of all separated plutonium into MOX fuel for power reactors, and, in the longer term, advanced integrated materials-processing reactors that would receive, control, and process all fuel discharged from reactors throughout the world, generating electricity and reducing spent fuel to short-lived nuclear waste ready for permanent geological storage.

WEAPONS PROLIFERATION – AFF ANSWER

No Link: Nuclear energy is not the gateway to nuclear weapons prolif

Sutherland, Chief Scientist, Edutech Enterprises, '6

[John K., a retired health physicist who worked with radiation for almost 20 years in the non-nuclear industry, and then spent 20 years in various aspects of radiation protection at a CANDU nuclear power plant. "The Inevitable Nuclear Resurgence, and the Inevitable Panic Attacks," April 21, 2006, http://www.energypulse.net/centers/article/article_display.cfm?a_id=1250 download date: 11-06-08]

Nuclear wastes do NOT represent a significant proliferation threat. It is far easier to make a nuclear weapon by enrichment of uranium-235 (Iran) - which does not require a reactor - than to make a weapon from spent fuel from a commercial reactor. Military reactors, dedicated to weapons production, and easily detected, and useless for producing electricity, can produce weapon-useable fuel. Today, this has practically nothing to do with commercial nuclear power.

Market Solutions Counterplan – Solvency

Counterplan is better than AFF incentives ensure long-term growth of commercial nuclear power. Acting to ensure regulatory stability, opening foreign markets, free-market approach to waste will best spur private sector growth. Incentives will distort the market and cause decline.

Spencer and Loris, Heritage Foundation, '8

[Jack Spencer, Research Fellow in Nuclear Energy and Nicolas D. Loris is a Research Assistant in the Thomas A. Roe Institute for Economic Policy Studies at The Heritage Foundation. November 10, 2008 "Washington Subsidies Not Necessary to Rebuild U.S. Nuclear Industry," Backgrounder #2207 - Heritage Foundation, http://www.heritage.org/Research/EnergyandEnvironment/bg2207.cfm download date: 11-30-08]

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 CO2 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 CO2 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 intro-duced in the coming year.

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 CO2 reductions. While these analyses differ, they all point to the same result: Nuclear power is critical to reducing CO2 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 Lieber-man-Warner CO2 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 CO2 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 gov-ernment could take to create such an environment.[4]

↓↓ Spencer & Loris continues ↓↓

↓↓ **Spencer & Loris continues** ↓↓

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 incen-tive 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 facili-ties."[9] Companies in the United States are respond-ing 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]
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 com-mercial nuclear module fabrication and assembly facility in the United States. The facility will manu-facture 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 engineer-ing 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 Falls, Idaho, to build its $2 billion enrichment facil-ity. 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 begin-ning 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. 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 Sur-vey 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]

↓↓ **Spencer & Loris continues** ↓↓

↓↓ Spencer & Loris continues ↓↓

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 Univer-sity, a school historically known for its nuclear engi-neering program, has almost tripled its enrollment in this program since the year 2000 to 135 stu-dents.[26] Texas A&M has one of the fastest-growing nuclear engineering departments in the country, the University of Florida has continued increased 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 techni-cal 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]

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 com-panies 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 reestablish 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 mar-kets. As is already becoming the trend, the private sector will take action.

Market Solutions CP - Solvency
(nuclear waste specific)

AFF's government-directed program on nuclear energy would be harmful in the long run. Allowing market solutions to waste disposal is crucial to the rebirth and overall long-term success of nuclear energy industry.

Spencer, Heritage Foundation, '8

[by Jack Spencer, Research Fellow in Nuclear Energy, "A Free-Market Approach to Managing Used Nuclear Fuel," June 23, 2008, Backgrounder #2149, http://www.heritage.org/Research/EnergyandEnvironment/bg2149.cfm download date: 12-1-08]

The success of a sustained rebirth of nuclear energy in the U.S. depends largely on disposing of nuclear waste safely. New nuclear plants could last as long as 80 years, but to reap the benefits of such an investment, a plant must be able to operate during that time. Having a practical pathway for waste disposal is one way to ensure long-term plant operations. Establishing such a pathway would also mitigate much of the risk associated with nuclear power, but as long as the federal government is responsible for disposing of waste, it is the only entity with any incentive to introduce these technologies and practices.

The problem is that the federal government has never been able to fulfill its current waste disposal obligations, much less introduce new and innovative methods of waste management. Although the Department of Energy under its current leadership has opened the door to reform, that leadership will soon be replaced when the new President appoints his own team. Administrations come and go, but inflexible rules and bureaucracies that oversee waste management seem to endure forever, making it impossible for the government to respond effectively to a rapidly changing industry. When it does attempt to respond, it often acts in ways that make no business sense and are inconsistent with the actual state of the industry.

Many of these efforts culminate in large government programs. While some of these programs have some near-term benefit insofar as they demonstrate political support for nuclear power, encourage private and public research and development, and develop the nuclear industry, they inevitably do more harm than good. They are run inefficiently, are often never completed, cost the taxpayers billions of dollars, and are often not economically rational. Furthermore, they often forgo long-term planning, and this leads to unsustainable programs that ultimately set industry back by providing fodder for anti-nuclear critics and discouraging progress in the private sector.

Introducing market forces into the process and empowering the private sector to manage nuclear waste can solve the problem, but this will require major reform. The federal government will need to step aside and allow the private sector to assume the responsibility for managing used fuel, and the private sector should welcome that responsibility.

The primary goal of any strategy for used-fuel management should be to provide a disposition pathway for all of America's nuclear waste. The basic problem with the current system is that every nuclear power plant needs a place to put its waste, and Yucca Mountain is simply not big enough to hold it all under the current used-fuel management regime.

In other words, permanent geologic storage capacity is a finite resource on which the industry depends. If used-fuel management were a market-based system, this storage capacity would carry a very high value. A new system should price geologic storage as a finite resource and fold any costs into a fee for emplacing nuclear waste in Yucca Mountain.

Repealing the Mil. The key to this new approach will be to transform how waste management is financed. Once market-based pricing is in place, the fee that nuclear energy consumers pay to the federal government for waste management should be repealed. Under the current system, consumers pay for waste disposition through a flat fee, called the mil, that is paid to the federal government at the rate of 0.1 cents per kilowatt-hour of nuclear-generated electricity. This fee as currently assessed has no market rationale. It is simply a flat fee that rate payers pay to the federal government. It has never been changed, not even for inflation.

In a market-based system, instead of paying a pre-set fee to the federal government to manage used fuel, nuclear power operators would fold waste-management costs into the operating cost, which would be reflected in the price of power. This cost might be higher or lower than the current fee; more important, it would reflect the true costs of nuclear power.

Pricing Geologic Storage as a Scarce Resource. The idea would be to price the space available in Yucca Mountain according to a set of relevant variables, including heat content of the waste, predicted production of used fuel, repository capacity, and lifetime operation costs. Each of these variables would help to determine the price of placing a given volume of waste in Yucca at any specific time.

↓↓ Spencer '8 continues ↓↓

↓↓ Spencer '8 continues ↓↓

As the repository is filled, the fee to emplace additional fuel would obviously increase. The fee could also increase, depending on the formula, as new plants are constructed or old plants' licenses are renewed because they would produce additional used fuel, thereby increasing the demand for repos-itory space. Prices would be lower for waste that radiates less heat. Prices would fall if Yucca's capacity is expanded or if waste is reduced through alternative processes.
This would create a market for repository space. The fee could be structured in a number of ways. One example would be to charge a floating fee according to a predetermined formula. Under this scenario, the fee would shift constantly as the price variables change. For example, a volume of waste with less heat content would cost less to emplace than a similar amount with a higher heat profile. An alternative to a floating fee might be one that resets at timed intervals, such as once a year.
The exact structure and implementation of the fee could be determined at some future point. One simple option would be to divide the capacity available in Yucca by the lifetime costs to give a price to emplace an amount (e.g., a ton) of waste in the repository. As the repository was filled, the price per ton would increase.
Nuclear power operators could then decide, given the price to place waste in Yucca, how to manage their used fuel. As the price to access Yucca goes up, so will the incentive for nuclear operators to do something else with their used fuel. This should give rise to a market-based industry that manages used fuel in the U.S.
The market would dictate the options available. Some operators may choose to keep their used fuel on site to allow its heat load to dissipate, thus reducing the cost of placing that waste into Yucca. Companies may emerge to provide interim storage services that would achieve a similar purpose. The operators could choose options based on their particular circumstances.
As prices change and business models emerge, firms that recycle used fuel would likely be established. Multiple factors would feed into the eco-nomics of recycling nuclear fuel. Operators would make decisions based not only on the cost of placing waste in Yucca, but also on the price of fuel.
If a global nuclear renaissance does unfold, the prices for uranium and fuel services will likely rise. This would place greater value on the fuel resources that could be recovered from used fuel, thus affecting the overall economics of recycling. Instead of the federal government deciding what to build, when to build it, and which technology should emerge, the private sector would make those determinations.
Some nuclear operators may determine that one type of recycling works for them, while others may decide that a different method is more appropriate. This would create competition and encourage the development of the most appropriate technologies for the American market.
Such a market for repository space could give rise to a broader market for geologic storage. As waste production causes Yucca storage costs to rise, companies could emerge that provide additional geologic storage at a lower price. This additional space would in turn reduce the value of the space available in Yucca.
Alternatively, as Yucca fills, nuclear operators may decide to develop additional geologic storage facilities in a joint venture. While this may seem unlikely, given the problems associated with opening Yucca Mountain, other communities may be more receptive to hosting a repository once a reliable safety record is established and the economic benefits of hosting a repository are demonstrated. The federal government would still take title to any waste placed in future repositories once they are decommissioned.
Predicting how a market might evolve is impossible, but unlike the government-run process that led to the Yucca Mountain site--a process mired in politics--private entities would establish the path forward by working with government regulators. Private entities would also be able to pursue their plans without having to contend with as much of the bureaucratic inertia that accompanies government-run operations.
Most important, this system would encourage the introduction of new technologies and services into the market as they are needed, as opposed to relying on the federal government. New technologies would not be hamstrung by red tape or overregulation.

High Total Costs

Best studies show that Nuclear Plants are not cost competitive overall

Portney, Economics Prof, Arizona, '8

[Paul R., Dean of the Eller College of Management and Halle Chair in Leadership and Professor of Economics at the University of Arizona. Ph.D. in Economics from Northwestern. From 1972 through June of 2005, Portney was with Resources for the Future (RFF), an independent and non-partisan research and educational organization in Washington, D.C., that specializes in energy and the environment. From 1986-1989 he headed two of its research divisions, in 1989 became its vice president, and was named president and CEO in 1995. *Nuclear Power: Clean, Costly, and Controversial*, download date: 10-18-08 www.heartland.org/custom/semod_policybot/pdf/16924.pdf]

There is a third attraction to nuclear power, though it currently pertains only to those plants that are already in operation— once built and paid for (a big qualification, as we'll see below), these plants are extremely inexpensive to operate. Indeed, the incremental cost of generating electricity from an existing nuclear plant is on the order of 1.5 cents for each kilowatt-hour (kWh) of electricity generated. This compares with about 2 cents/kWh for a conventional coal plant and, at current natural gas prices, about 3.5 cents/kWh for a natural gas plant. With the average retail cost of electricity in the United States currently standing at 7.5 cents/kWh, the 100 or so nuclear units in the country are quite profitable.

The Case Against

Despite those advantages, the last nuclear plant to commence operation in the United States began generating electricity in 1996, and no new plant has been started since 1973. Four liabilities have accounted for this disappointing record.

First and perhaps foremost, although nuclear plants are cheap to operate once they are up and running, they are by far the most expensive to build. Based on recent construction costs in Japan and Korea and on estimates from the vendors who would likely build plants in the United States, a new 1,000-megawatt (MW) nuclear power plant would cost on the order of $2 billion and take five years to build. By contrast, a new 1,000-MW pulverized coal plant would cost $1.2 billion and take three to four years to build, and a new clean coal plant (one in which the coal is first converted to cleaner burning natural gas) would cost about $1.4 billion and take four years. Illustrating why natural gas has been the fuel of choice for most of the recent growth in electricity generation, a new 1,000-MW combined-cycle gas turbine can be built in less than two years at a cost of $500 million.

The longer construction time and higher capital cost of a new nuclear plant currently more than offset its operating cost advantage. According to a recent report by experts at the Massachusetts Institute of Technology, the "all-in" costs (capital plus operating) of electricity from a new nuclear plant operating for 40 years at 85 percent capacity would be 6.7 cents/kWh. This compares with 4.2 cents/kWh for a coal plant and 4–5.6 cents/kWh for a new gas turbine, depending on the assumed price for natural gas. Even if it faced no other obstacles, then, nuclear power would have a formidable economic challenge to overcome.

Plutonium Immobilization CP

Plutonium Immobilization is best option to reduce risk of terrorist acquisition and proliferation. This competes with the Aff plan since the counterplan mandates that nuclear fuel destined for nuclear energy plants instead be converted into secure but unusable storage form

Makhijani, President, Institute for Energy and Environmental Research, '1

[Arjun, Ph.D. in Engineering (specialization: nuclear fusion) from the University of California at Berkeley; Author of three scholarly books on energy. “Reducing plutonium storage risks in light of September 11, 2001,” op-ed written October 2001. http://www.ieer.org/op-eds/pustg.html download date: 11-2-08]

The terrorist attacks of September 11, 2001 pointed up potential risks associated with a variety of facilities both in the United States and abroad. The security of plutonium, which is highly radioactive and can also be used to make nuclear weapons, surely belongs in any short list of the top priorities for attention. Yet, while the U.S. government has taken some action to increase the security around plutonium storage installations, it has done nothing to do restore the most important single program that could greatly reduce plutonium storage risks. That program is called plutonium immobilization. Its proposed budget stands at exactly zero, as it was before September 11.

A great deal of plutonium that became surplus to military requirements after the end of the Cold War is stored in a variety of forms and buildings at several nuclear weapons production sites in the United States. The same is true of Russia, which also has a large stock of commercial plutonium, also usable for nuclear weapons. While prevention of attack through improved security is imperative, it is also necessary to minimize the consequences of an attack should one occur. By the latter criterion, current methods of plutonium storage are sorely inadequate. It is necessary to put plutonium into a different physical form that would (i) limit to as small an area as possible and (ii) enable easier recovery with less danger to workers and the public, even in case of an attack similar in scale to that of September 11.

Immobilization is an approach that mixes plutonium with a non-radioactive material and puts the mixture into a ceramic form that is highly resistant to fire and dispersal in the form of fine particles. The ceramic hockey-puck like storage form is put into a steel cylinder and molten glass is then poured around it. The resulting steel canisters with glass logs containing the plutonium-laced ceramics can then be stored underground on-site at one or more large nuclear weapons plants in silos a few tens of feet deep. With carefully thought out technical specifications, the offsite consequences could be minimized even in case of an attack on the scale of September 11. Minimizing the potential for severe offsite impacts would also be the best preventive measure against attack, since it would make plutonium storage sites unattractive as terrorist targets. The risk of theft or illicit sale would also be greatly reduced.

Plutonium immobilization uses technology that is reasonably well understood and is similar to that now used for high-level radioactive liquid waste, which is, in some ways, more difficult to process than plutonium. For instance, glass logs containing high-level waste are produced and stored in individual silos at the Department of Energy's Savannah River Site in South Carolina. The Bush administration eliminated funding for immobilization of plutonium because it wanted to focus on the conversion of surplus weapons plutonium into a nuclear reactor fuel. Not only that, the U.S. also proposed to finance a similar plutonium fuel program in Russia. The entire policy was already problematic before September 11. But to persist now with in a plan that would put plutonium fuel on the highways and in commercial nuclear power sites in the United States and Russia is very risky, to say the least. It is to ignore one of the most important lessons of September 11 worst case scenarios that are plausible should not be ignored.

The problem of current U.S. plutonium policy goes even deeper. The Bush administration is not only persisting with a plutonium fuel program it inherited from the Clinton administration, but it proposes, as part of its energy plan, to spend money on developing commercial plutonium fuel as a normal part of the U.S. nuclear power system. This would reverse a quarter century of bipartisan nuclear non-proliferation policy though five previous administrations and exacerbate both proliferation pressures and vulnerabilities to terrorist attack.

It is stunning that the terrible events of September 11 have not led to an urgent reappraisal of plutonium storage, fuel, and plutonium-related energy policies. Cancellation of plutonium fuel programs and the re-institution of a plutonium immobilization program are among the most compelling needs of the time. The urgency is heightened by the upcoming summit of Presidents Bush and Putin, which will be occurring in a climate of cooperation not seen in some years. A change of direction at home would create a unique opportunity for President Bush to begin discussing with President Putin the terms of cooperation for a new joint U.S.-Russian plutonium security initiative based on immobilization that would reduce nuclear dangers for both countries and for the world.

Uniqueness/Inherency - Widespread Use Now

Nuclear Energy use already widespread in U.S. now

Portney, Economics Prof, Arizona, '8

[Paul R., Dean of the Eller College of Management and Halle Chair in Leadership and Professor of Economics at the University of Arizona. Ph.D. in Economics from Northwestern. From 1972 through June of 2005, Portney was with Resources for the Future (RFF), an independent and non-partisan research and educational organization in Washington, D.C., that specializes in energy and the environment. From 1986-1989 he headed two of its research divisions, in 1989 became its vice president, and was named president and CEO in 1995. *Nuclear Power: Clean, Costly, and Controversial*, download date: 10-18-08 www.heartland.org/custom/semod_policybot/pdf/16924.pdf]

Nuclear power—harnessing the energy that results from the splitting of atoms—enters the energy mix in the United States in the form of electricity generation. Currently, slightly more than 100 operating nuclear power plants together provide about one-fifth of the electricity we use to power our factories, office buildings, homes, schools, and shopping malls. This makes nuclear power the second-largest source of electricity generation in the country; coal accounts for more than half of electricity generation, and natural gas (the fastest growing source) for about one-sixth. Among all the developed countries in the world, nuclear power accounts for almost a quarter of electricity generation, a slightly larger share than in the United States.

Uniqueness/Inherency - Use Increasing in SQ

Nuclear Energy in the U.S. is already increasing in the status quo – licenses are being extended and new reactors planned

Spiegel Online '8

[Der Speigel is a German weekly magazine and Europe's largest weekly magazine with a circulation of more than one million per week. "THE US GOES NUCULAR: Prefab Reactors and Longer Life-Spans," Article Date: 7-11-08, By Frank Hornig in New York, http://www.spiegel.de/international/world/0,1518,565397,00.html download date: 10-22-08]

Indeed, for a long time, the 104 nuclear power plants still remaining in the United States seemed to be on their way out. Many of them will soon hit their 40th birthday when, according to US law, operating licenses automatically expire. But more than half of the plants have already received new licenses for two more decades of operation. A nuclear power plant like the Calvert Cliffs plant in Maryland, which went online in 1974, can now remain in operation until 2034 instead of 2014.
The United States derives only about one-fifth of its electricity from nuclear power plants, but if the energy companies have their way, this share will soon increase dramatically. About 30 new reactors are planned, with four of them already in the approval process. For some, this is not enough. Samuel Bodman, secretary of energy in the administration of President George W. Bush, wants to see the country build "130 or 230 additional units," he says. And Republican presidential candidate John McCain recently said that he supported building 100 new reactors. His Democratic rival, Barack Obama, is likewise not fundamentally opposed to an expansion of nuclear power.
International Partnerships
The US nuclear boom really got going in 2005, when Bush signed a new energy bill granting generous loan guarantees and tax allowances to companies applying for approval of new reactors. The list of companies rushing to embrace the deal is long: General Electric (GE) has entered into a nuclear partnership with Japanese power plant maker Hitachi; America's second-largest producer of electricity from nuclear energy, NRG, has joined forces with Toshiba to build two new reactors in Texas; and French nuclear power giant Electricité de France has entered into a joint venture with Constellation Energy, America's third-largest nuclear power producer. There are a number of other projects still in the planning stage.
But the nuclear boom is also leading to many problems. For instance, the federal agency that regulates the industry, the Nuclear Regulatory Commission (NRC), lacks the necessary personnel to quickly and efficiently handle the complex approval process. In the 1960s and 1970s, energy companies were routinely required to tear down steel and concrete structures before they were completed, because safety regulations were changing so quickly. To avoid the same problem today, regulators and energy companies plan to agree on two or three standard reactor models, which would mean that new nuclear power plants would essentially be constructed as prefabricated units.

Neg Solvency – Incentives Fail

Empirically, large government incentives fail to stimulate a nuclear energy boom

Ferguson, Council on Foreign Relations, '7

[Charles D., a fellow for science and technology at the Council on Foreign Relations, "Fight Fire With Fire?" *Washington Post*, Special to washingtonpost.com's Think Tank Town, April 30, 2007, http://www.washingtonpost.com/wp-dyn/content/article/2007/04/27/AR2007042701463.html download date: 11-30-08]

Can nuclear energy, which emits very few greenhouse gases, at least further clean up the atmosphere and reduce global warming by displacing coal-fired power plants? Coal-fired plants produce half of the U.S.'s electricity. It is no surprise that the United States relies so heavily on coal. America is the Saudi Arabia of coal reserves with an estimated supply of 250 years based on current demand. Still, nuclear power plants' operating costs compete favorably with coal and other power sources. But nuclear power's construction costs are much higher than coal's capital costs.

With the financial deck stacked against construction of new nuclear reactors, industry representatives have lobbied for and received billions of dollars of additional subsidies to try to stimulate growth. These subsidies have yet to trigger the long-awaited nuclear renaissance.

Neg Solvency – Delays

Long-term solvency – A decade for completion of any new reactor

Mariotte '8

[Michael, "NEI overly optimistic," February 22, 2008, "Nuclear Industry Eyes a Smaller Renaissance," *Beyond the Barrel by Marianne Lavelle*, http://www.usnews.com/blogs/beyond-the-barrel/2008/2/21/nuclear-industry-eyes-a-smaller-renaissance/comments/#10676 download date: 11-4-08]

As usual, the Nuclear Energy Institute is spreading overly optimistic projections. Moody's Investor Service already projects construction costs for new reactors of $5,000-$6,000/kw. The recent filing to the Florida Public Service Commission by FP&L ($12-$24 Billion for 2 reactors depending on which design is chosen) and Areva's real-world experience in Finland bears out Moody's projections.

Moreover, there is no chance any reactors will be on-line by 2016. Nuclear construction historically has taken far longer than projected, and again, the current Finnish experience confirms nothing has changed. The reactors applying now have a slim chance of completion by 2018--but I wouldn't bet any money on that.

Neg Solvency – Delays

Delayed solvency since key parts are scarce – won't be available for new reactors until after 2015

Spiegel Online '8

[Der Speigel is a German weekly magazine and Europe's largest weekly magazine with a circulation of more than one million per week. "THE US GOES NUCULAR: Prefab Reactors and Longer Life-Spans," Article Date: 7-11-08, By Frank Hornig in New York, http://www.spiegel.de/international/world/0,1518,565397,00.html download date: 10-22-08]

The industry that supplies parts for nuclear reactors is also a potential source of bottlenecks. It can only supply the necessary parts to build three to four new reactors a year. And for some especially important cast metal components, there is only one supplier worldwide, Japan Steel Works. The Japanese are the only ones capable of casting the enormous steel elements used in the reactor core in one piece and with the necessary precision, so that power plant producers are now forced to stand in line. Those that expect to have their reactors up and running by 2015 must have already ordered critical parts today.

Neg Solvency – Labor Shortage

Worker shortage blocks increase in nuclear sector

Reuters '7

[By Lisa Lambert, "Workers in short supply for U.S. nuclear power," article posting date: April 26, 2007, http://www.boston.com/news/education/higher/articles/2007/04/26/workers_in_short_supply_for_us_nuclear_power/ download date: 11-07-08]

When the top U.S. nuclear regulator addressed industry leaders in March, he spoke about a problem often neglected in public debates about nuclear energy: the threat of a labor shortage.
"Where are we going to get the educated and skilled workers to safely run the current fleet (of reactors) over extended lifetimes and the potential nuclear plants of the future?" asked Dale Klein, chairman of the Nuclear Regulatory Commission. "Where are they being educated? Where are they being trained?"
The U.S. government, energy experts and even some environmentalists see a revival of nuclear power as a clean energy alternative, but that resurgence may be held up by a lack of qualified workers.
As nuclear power went out of fashion in the wake of the Three Mile Island disaster in 1979, college nuclear engineering programs were shuttered and fewer workers have entered the field.
Some 103 reactors currently generate about 20 percent of U.S. electricity, with the last one coming on line in 1996 in Tennessee. That number could increase. A new focus on global warming, which most scientist say is caused by gases emitted by burning fossil fuels, has brought coal-, oil- and gas-fired generation under scrutiny. While nuclear reactors produce radioactive waste, they do not emit greenhouse gases, and energy experts say a new nuclear plant could break ground as early as 2010.
Financial incentives laced through a 2005 energy law have some excited about a "nuclear renaissance."
But the nuclear engineers and technicians who landed their jobs in the 1970s are retiring and there are few trained to take their places.
Carol Berrigan, who researches nuclear infrastructure for the Nuclear Energy Institute, the industry's lobby group, described the coming labor shortage as a "looming trend."
A 2005 study by the Institute found that half of the industry's employees were over 47 years old, while less than 8 percent of employees were younger than 32. Most Americans retire after turning 65, and the survey found more than a quarter of nuclear workers were already eligible to stop working.
Even the government's regulator, the NRC, is scrambling to add 200 new employees this year just to monitor the sector, Klein said.
CORPORATE RAIDING
The number of nuclear engineering majors at colleges around the country has risen to 1,800 last year from just 500 in 1998, according to the Energy Department, but that is still not enough to feed current needs.
Companies have realized they must abandon their usual strategy of raiding each other's worker pool and seek new talent, said Mike Pasono, head of recruiting for Nuclear Management Company, which operates three reactors.
Pasono makes a job offer sometimes a year before a college student graduates. There are so few nuclear majors that he gives positions to electrical and mechanical engineers.

Neg Solvency – Labor Shortage

Shortage of skilled labor blocks new expansion

Lavelle '8

[By Marianne Lavelle, "A Worker Shortage in the Nuclear Industry," Posted March 13, 2008, *U.S. News and World Report*, http://www.usnews.com/articles/business/careers/2008/03/13/a-worker-shortage-in-the-nuclear-industry.html download date: 11-7-08]

The hunt for workers is on in south Texas, two years before construction begins on the first new nuclear power plant in the United States in 30 years.
The huge engineering firm Fluor already is canvassing high schools within a 100-mile radius of Bay City, with an extraordinary offer: After graduation, enter Fluor's training program—free of charge—to learn carpentry, welding, electrical work, or another skilled trade. You'll eventually be sent for work and on-the-job training at one of Fluor's other construction projects in Texas: an oil refinery in Port Arthur or coal plant in Oak Grove. When NRG Energy, the company planning the two south Texas nuclear reactors, receives the government go-ahead to start building, around 2010, Fluor aims to bring those workers back to Bay City for specialized nuclear plant training and to start in on the job. The annual pay: $60,000 to $75,000.
"We need to start to attracting people and training today for the new crowd we'll need in the future," says Ron Pitts, senior vice president for nuclear power at Fluor. "We can't wait until we get a [construction and operating license]."
The reason for the hurry: Big energy construction will be booming in the next decade, concentrated in the South—not only nuclear generators but coal plants, liquefied natural gas terminals, oil refineries, and electricity transmission lines. All projects need skilled craft workers, and they are in drastically short supply.
The utility Southern Co. estimates that existing energy facilities already are short 20,000 workers in the Southeast. That shortfall will balloon to 40,000 by 2011 because of the new construction. Pay is inching up and hours are increasing for workers who are certified craftsmen. Fluor says skilled workers at the Oak Grove coal project are putting in 60-hour weeks instead of the well-into-overtime 50-hour weeks that had been planned.
Looking ahead, the nuclear industry views itself as especially vulnerable to the skilled-labor shortage. It hasn't had to recruit for decades. Not only were no nuke plants getting built, but workers in the 104 atomic facilities already in operation tended to stay in their well-paid jobs for years. But in the next five years, just as the industry hopes to launch a renaissance, up to 19,600 nuclear workers—35 percent of the workforce—will reach retirement age.
"The shortage of skilled labor and the rising average age of workers in the electric industry are a growing concern," likely to push up the cost of nuclear power plant construction, said Standard & Poor's Rating Services in a recent report.
The nuclear industry faces a different world compared with when it last was hiring three decades ago. "Parents, guidance counselors, and society in general push high school students to complete their secondary education with the intention of then attending a four-year college program," concludes a recent white paper on the Southeast workforce issues prepared by the Nuclear Energy Institute. "High-paying skilled labor jobs, once considered excellent career options, are now perceived as second class."
Carol Berrigan, senior director for industry infrastructure at NEI, says that the industry needs to do more to get the word out that the jobs actually require substantial training and offer a good quality of life. The median salary for an electrical technician is $67,500; for a senior reactor operator, $85,400. "And the other thing that's nice about these jobs," Berrigan says, "is they are not going to go offshore."

Neg Solvency – Labor Shortage

Worker crunch will cause delays in constructing new plants

USA Today '7

[By Paul Davidson, "Utilities brace for worker shortage," article updated: 5-16-07, USA Today http://www.usatoday.com/money/economy/employment/2007-05-16-power-shortage-cover_N.htm download date: 11-8-08]

A bigger worker crunch looms. With power demand expected to soar 50% by 2030, utilities are planning hundreds of plants and thousands of miles of transmission lines. The surge is due to population and business growth and bigger homes brimming with computers and plasma TVs. Yet there may not be enough welders, plant operators and other skilled workers to build and run all the new facilities.

Especially affected is the nuclear power industry, which is girding for a revival after a decades-long construction hiatus following the 1979 Three Mile Island partial meltdown.

The 33 nuclear reactors on the drawing board "will not get built as quickly as we want," says Dale Klein, chairman of the Nuclear Regulatory Commission. "You'll see regions where there are shortages of electricity" that trigger blackouts or brownouts.

Andrew White, head of General Electric's nuclear group, acknowledges the company has missed deadlines to provide documents for NRC approval of its new nuclear reactor design because of an engineer shortage. But he insists the project will meet its 2009 target date for final NRC certification.

Lave says that, because of labor shortages, many older coal plants will not meet a 2010 deadline to install pollution-control devices.

Neg Solvency – Uranium Shortage

Fuel shortage will result - Uranium supplies are limited

Hunt and Krieger '06

[Tam Hunt is Director of Energy Programs, Community Environmental Council, and David Krieger is Founder and President of the Nuclear Age Peace Foundation, Ph.D. in political science from the University of Hawaii & J.D. from Santa Barbara College of Law. "Does Nuclear Power Really Make Sense?" Article date: 4-28-06, Energy Pulse, http://www.energypulse.net/centers/article/article_display.cfm?a_id=1254 download date: 11-08-08]

Nuclear energy is not a renewable energy source, despite what President Bush has said recently. In fact, the U.S. Army Corps of Engineers stated in a recent report that uranium supplies are projected to last only another 20 years at present consumption rates. If the renewed interest in nuclear power leads to many new nuclear power plants, these supplies will be exhausted even sooner, leading to steep cost increases for uranium.

Neg Solvency – Uranium Shortage

Uranium supplies are limited – blocks any huge expansion of U.S. nuclear generation

Gelinas, Fellow, Manhattan Institute, '7

[Nicole Gelinas, the Searle Freedom Trust Fellow at the Manhattan Institute and a contributing editor of City Journal. She is a Chartered Financial Analyst (CFA) and a member of the New York Society of Securities Analysts. "Nuclear Power: The Investment Outlook," Energy Policy & the Environment Report, No. 1, June 2007, http://www.manhattan-institute.org/html/eper_01.htm download date: 11-8-08]

"We don't [currently] have the infrastructure to support a renaissance of nuclear power" in terms of securing an adequate long-term fuel supply, said another attendee, speaking of current levels of uranium production and enrichment. In fact, he noted, the nation barely has enough current sources of fuel to continue to supply the 104 plants already in operation.
It's unlikely that banks will offer twenty- or thirty-year debt to a new nuke project without a corresponding secure supply of fuel. But one $1.7 billion new fuel-source project, jointly owned by the British, Dutch, and German governments, is likely already "sold out," with 80 percent spoken for via take-or-pay agreements to utilities. Moreover, in the absence of significant new investment in uranium mining and enrichment at sources in the U.S., Canada, and Australia, much of the near-term supply will come from Russian weapons, meaning that through heavy investments in nuclear power, the United States likely wouldn't be decreasing its international "energy dependence"—an oft-stated political goal behind heavy nuclear subsidies—but merely diversifying it.
While fuel-supply risk alone likely won't preclude construction of a few new nukes, it does mean that it is not feasible for nuclear generation ever to dominate the U.S. fleet without significant new investment on the mining side.

Neg Solvency – Uranium Shortage

Lack of Uranium blocks mass expansion of nuclear energy

Van Leeuwen and Smith '2

[Jan Willem Storm van Leeuwen is Senior Scientist at Ceedata Consultancy, Chaam, Netherlands, and Philip B. Smith. "Can nuclear power provide energy for the future; would it solve the CO2-emission problem?" June 16, 2002 http://www.greatchange.org/bb-thermochemical-nuclear_sustainability_rev.html download date: 11-30-08]

The industry claims that nuclear power is a sustainable energy source. This claim is highly debatable. Obviously, no source of energy that is derived from mining a resource in the earth's crust can be sustainable. Yet the sustainability of nuclear power is nonetheless accepted by many. The main object of this document and the accompanying technical documents is, therefore, to show that nuclear power, as now used, is not only not a sustainable energy source, but cannot provide even 1% of the energy predicted to be needed on the coming decennia. Another way of putting it is to say that if all of the electrical energy used today were to be obtained from nuclear power, all known useful reserves of uranium would be exhausted in less than three years.

Neg Solvency – Climate

Nuclear Plants consume fossil fuels and generate emissions from beginning to end

Van Leeuwen and Smith '2

[Jan Willem Storm van Leeuwen is Senior Scientist at Ceedata Consultancy, Chaam, Netherlands, and Philip B. Smith. "Can nuclear power provide energy for the future; would it solve the CO2-emission problem?" June 16, 2002 http://www.greatchange.org/bb-thermochemical-nuclear_sustainability_rev.html download date: 11-30-08]

The false claim is made that nuclear power is free from CO2-emission, and therefore environmentally sustainable. If this were true it would then be eligible for classification as a CDM (Clean Development Mechanism), i.e. the transfer of low-CO2-emission technology from North to South . This claim is based upon a distortion of the facts. It is true that the operation of a nuclear power plant does not in itself lead to CO2-emission. However, large amounts of energy are needed in order to build the plant, in order to mine, refine, and enrich the uranium fuel, in order to condition and sequestrate the radioactive waste, and finally in order to dismantle the plant. Most of this energy must presently be obtained by burning fossil fuels. It should be noted that a great deal of this fossil-fuel energy will needed after the power plant has reached the end of its useful life.
But needed it will be if one is to classify nuclear energy as environmentally sustainable, and therefore it must be, from the beginning, chalked up to an energy debt inherent in the building and operation of a nuclear power plant. It is a distortion of the facts to pretend that this energy debt, that can at present only be paid by burning fossil fuels, does not exist. This will be shown in detail below. It must be understood that an energy debt is quite a different thing than a money debt. Money is only worth what people think it is worth. No amount of money placed in the bank can be used to "buy" energy when the sources are used up. The laws of physics are inexorable. Money can be made, but energy cannot be made. On the basis of calculations, using information from the nuclear industry, we can conclude that nuclear power, besides obviously not being a sustainable energy source, is not a solution to the problem of global warming.
Reducing the use of fossil fuels must be seen today as having the highest priority, and it is important to expose false solutions toward reaching this goal. We proceed below to show that nuclear power is not a viable way to substantially reduce CO2-emission. It is no exaggeration to say that nuclear power can only exist because it is fueled by fossil fuels.

Neg Solvency – Climate

Nuke energy still generate significant amount of greenhouse gas because of plant construction and ore refining

Hunt and Krieger '06

[Tam Hunt is Director of Energy Programs, Community Environmental Council, and David Krieger is Founder and President of the Nuclear Age Peace Foundation, Ph.D. in political science from the University of Hawaii & J.D. from Santa Barbara College of Law. "Does Nuclear Power Really Make Sense?" Article date: 4-28-06, Energy Pulse, http://www.energypulse.net/centers/article/article_display.cfm?a_id=1254 download date: 11-08-08]

Proponents argue that nuclear power offers a quick way to substantially reduce our greenhouse gas emissions. While it does produce fewer emissions than coal or natural gas-fired power plants, the emissions are not negligible. One report by Dutch researchers found that nuclear power plants that use high-grade ore (for which supplies are diminishing) emit about 40 percent of the greenhouse gas emissions of a natural gas power plant, from ore refining and plant construction. As uranium ore quality decreases, the greenhouse gas emissions rise because it takes more fossil energy to refine the ore.

Neg Solvency – Foreign Oil Dependence

Nuclear Energy cannot solve foreign oil dependency for decades

Ferguson, Council on Foreign Relations, '7

[Charles D., a fellow for science and technology at the Council on Foreign Relations, He is also an adjunct assistant professor in the School of Foreign Service at Georgetown University and an adjunct lecturer at the Johns Hopkins University, He holds a PhD in physics from Boston University. "Fight Fire With Fire?" *Washington Post*, Special to washingtonpost.com's Think Tank Town, April 30, 2007, http://www.washingtonpost.com/wp-dyn/content/article/2007/04/27/AR2007042701463.html download date: 11-30-08]

First, what can nuclear energy really do to free the United States from the clutches of corrupt oil-producing countries? The United States generates about twenty percent of its electricity from nuclear energy and only three percent from oil. Oil mainly fuels cars and trucks. Presently, the United States imports about two-thirds of its oil. While nuclear energy is now used for electric power generation and not for transportation, perhaps over many decades, it could power vehicles through production of hydrogen for fuel cells or electricity for plug-in hybrid cars and trucks. But until transportation is overhauled away from gasoline powered internal combustion engines, nuclear energy cannot wean the United States off oil from unstable parts of the world.

SAFETY – NO

Aff claims are theoretical. Safety in practice is actually low due to worker error, cost cutting, and low standards

Garwin, Fellow, Council on Foreign Relations, 2000

[Richard L., Philip D. Reed Senior Fellow for Science and Technology and Director, Science and Technology Studies, Council on Foreign Relations, "Letter to the Editor: Nuclear Reaction," *Foreign Affairs*, March/April 2000, lexis-nexis]

Modern nuclear plants can be operated safely. But the industry continues to suffer from an unacceptable level of worker errors. The lack of quality control compromises safety. The pressure to cut costs has also led management at some plants to cut safety corners. And the Nuclear Regulatory Commission has imprudently allowed the industry to relax safety standards. Regulation must ensure that major accidents that release radioactivity to the environment -- like Chernobyl in 1986 -- do not happen again.

SAFETY – NO - Accidents

Huge accident inevitable with nuclear energy – impact is massive death and destruction, Chernobyl proves risks are higher than reported

Lawyers' Committee on Nuclear Policy '98

[Founded in 1981, the Lawyers' Committee on Nuclear Policy (LCNP) is a national nonprofit educational association that uses national and international law to promote peace and disarmament. LCNP has been a vital link between policy makers, legal scholars and activists. Publication: Nuclear Energy and the Non Proliferation Treaty, Comments on Article IV of the Treaty on the Non-Proliferation of Nuclear Weapons, April 1998, http://www.lcnp.org/energy/NPT%20article%204.htm download date: 11-12-08]

While there have been numerous nuclear accidents, those of Windscale (UK), Three Mile Island (US) and Chernobyl (Ukraine) have most forcibly demonstrated the serious risks associated with nuclear energy.
Chernobyl, for example, released over 300 times the radiation released by the Hiroshima bomb, and contaminated at least 20 countries.(David Naples, "Chernobyl's Lengthening Shadow", Bulletin of Atomic Scientists, September 1993.) In Finland many reindeer had to be killed due to radioactive contamination. 99% of the land in Belarus is contaminated to some degree and will remain so for up to 250,000 years.
Over 800,000 children in Ukraine, Belarus, Moldova and surrounding states are at high risk of contracting leukemia or other cancers as a result of the accident. There is a 300% increase in congenital birth defects, blood and nervous system disorders and cancer in the area. Thyroid cancer increased 1000%. These health problems will continue to appear, particularly in children, for 1000-10,000 generations.(Chernobyl Nuclear Disaster Fact Sheet No. 1. Chernobyl Children's Project, January 1994.)
Independent scientists have estimated that between 280,000 and 500,000 deaths will result worldwide from the accident. (Greenpeace Environmental Trust-Nuclear Power Public Document.)
It has been claimed that the RBMK reactor is fundamentally more dangerous than other reactors and that this is the reason for the Chernobyl accident occurring. This is not true. The Chernobyl accident occurred primarily through human error. (Ulrike Fink et al, The International Control of Atomic Energy Agency- 35 Years Promotion of Nuclear Energy, Anti-Atom International, Austria.)
In fact, in 1983 Mr. Semenov, Head of the IAEA Department of Nuclear Energy and Safety praised the RBMK reactors for their safety features.(IAEA Bulletin 25 (1983) No. 2.) IAEA reassurances that such an accident cannot happen in other reactors are misleading and fallacious.
If nuclear energy is not phased out, another accident of the magnitude of that at Chernobyl will likely occur sometime.

SAFETY – NO

(answer to: Our specific reactor type is safe)

Commercial reactors are inherently unsafe. Major Accidents are possible in any design

Makhijani, President, I.E.E.R., '98

[Arjun, President, Institute for Energy and Environmental Research Ph.D. in Engineering (specialization: nuclear fusion) from the University of California at Berkeley; Author of three scholarly books on energy. "Nuclear Power: No Solution to Global Climate Change," Science for Democratic Action, Volume 6, Number 3, March 1998, http://www.ieer.org/ensec/no-5/index.html download date: 11-4-08]

There is no practical or reasonable way to eliminate the safety and proliferation threats arising from commercial nuclear power. All reactor types that have been developed or designed pose some level of risk of catastrophic accidents on scales similar to Chernobyl, though the specific accident mechanisms and probabilities depend on reactor design. This is in part because commercial nuclear power was developed as an adjunct to the nuclear arms race and as a tool of Cold War propaganda.2 In its rush to build new reactors, the industry, from its inception, put public safety, health, environmental protection and even economics behind weapons development and propaganda.

From the early days of reactor development, the Atomic Energy Commission (AEC) was aware of the possibility for catastrophic accidents. In 1957, Brookhaven National Laboratory published an assessment, known by its report number, WASH-740, which outlined the potential health and property damages that could result from a severe reactor accident. Several months after the release of the report, Congress passed the Price-Anderson Act, limiting liability of utilities to $500 million -- just ten percent of the property damage costs estimated in WASH-740.3 This amount was increased to $7 billion in 1988, still far below the likely damages of such an accident.

The nuclear industry continues to downplay the potential for catastrophic reactor accidents, despite the evidence presented by the Chernobyl disaster in April, 1986. The explosion and fire at Chernobyl deposited fallout on every country in the northern hemisphere and forced the evacuation of over 100,000 people in a 30 kilometer zone around the plant, and the abandonment of 250,000 to 375,000 acres of agricultural land. But the nuclear industry as well as the International Atomic Energy Agency (IAEA), citing erroneous official Soviet data and ignoring the lack of accurate data on health effects, have tended to minimize the significance of the accident. Official estimates of the radioactivity released in the first ten days were 80 million curies. But in an independent assessment, Soviet scientist Zhores Medvedev estimated that the releases of radioiodine and radiocesium were about three times higher than officially stated.4 The overall costs of Chernobyl are difficult to calculate, but even the official estimates of about ten to fiften billion dollars surpass the $7 billion liability limit of the Price-Anderson Act.

The most important and tragic lesson of Chernobyl is that the most severe kind of nuclear power accident can actually happen. Moreover, the problems created by such severe accidents will persist for many generations. While claims have been made for a new generation of "inherently safe reactors," they are exaggerated and highly misleading. It would take many decades to test various designs to determine whether creating a practical reactor that is economical and invulnerable to catastrophic accidents is achievable at all. Consequently, nuclear power cannot safely help the world reduce carbon dioxide emissions-a pressing need that must be addressed with policies in place in the next few years.

IAEA Fails

IAEA Fails – Understaffed and underfunded – Cannot ensure safety or security of nuclear facilities

Ferguson, Council on Foreign Relations, '7

[Charles D., a fellow for science and technology at the Council on Foreign Relations, He is also an adjunct assistant professor in the School of Foreign Service at Georgetown University and an adjunct lecturer at the Johns Hopkins University, He holds a PhD in physics from Boston University. "Nuclear lessons for today: The legacy of Chernobyl stresses the importance of security and nonproliferation," April 26, 2006, *Christian Science Monitor,* http://www.csmonitor.com/2006/0426/p09s01-coop.html download date: 11-30-08]

In working to improve security of nuclear facilities and safeguards against proliferation, industry should leverage the assets of the International Atomic Energy Agency (IAEA). In addition to being the world's nuclear proliferation watchdog, the IAEA has programs to evaluate the physical security of nuclear facilities and to provide training to security personnel.

However, the IAEA is understaffed and underfunded. Presently, 650 IAEA inspectors guard against illicit activities in 900 nuclear facilities around the world. In comparison, Walt Disney World employs more than 1,000 security personnel to protect its amusement park. The IAEA's total annual budget is only about $120 million, and for the next few years, the IAEA has annually budgeted a much smaller amount, $15.5 million, to pay for nuclear security assistance work in dozens of countries. The US and other countries should increase this budget to ensure that the IAEA has adequate funds to prevent nuclear proliferation and improve security.

The legacy of Chernobyl should teach industry and government that they should seize the opportunity now to take proactive steps to enhance security and prevent proliferation to pave the way for the next generation of nuclear power.

Yucca Mountain – Not Solve Terror Risk

Yucca storage does not solve risk of terrorist acquisition of nuclear material – spent fuel will remain vulnerable

Makhijani, President, Institute for Energy and Environmental Research. '2

[Arjun, Ph.D. in Engineering (specialization: nuclear fusion) from the University of California at Berkeley; Author of three scholarly books on energy. "A Bad Approach to Nuclear Waste," Washington Post, February 12, 2001, page A27, http://www.ieer.org/op-eds/yuccpost.html download date: 11-2-08]

President Bush is due to make a decision soon of a kind that has never been made by any head of state. He will decide whether he agrees with the finding of Energy Secretary Spencer Abraham that Yucca Mountain in Nevada is a suitable site for a repository for highly radioactive nuclear waste.

Most of this waste is spent fuel from nuclear power plants, now stored at dozens of power plant sites around the country, generally in huge, swimming-pool-like concrete tanks. More than 40,000 tons of it, containing hundreds of tons of plutonium -- the stuff from which nuclear weapons are made -- have accumulated so far. It will remain dangerous for hundreds of thousands of years.

A great deal is at stake, including the integrity of today's decision-making for generations far into the future. There are immediate issues too. Spent fuel storage is the most vulnerable part of the nuclear power system today. Will declaring Yucca Mountain a suitable site advance the goal of securing spent fuel against terrorist attacks by consolidating it all at one site, as Secretary Abraham claimed?

To eliminate security risks arising from on-site spent-fuel storage, it is essential to remove all the spent fuel from the pools and put it into some form of sub-surface storage, either on site or in a deep repository. In the long term (several decades) no reasonable substitute for a deep geologic repository exists.

But the spent-fuel pools cannot be closed while their existing nuclear power plants are operating. Underwater storage for several years is essential, else the spent fuel will melt and release large amounts of radioactivity. In other words, to end the security vulnerability of spent-fuel pools, existing nuclear power plants must be phased out.

That is just a difficult technical reality. It will take decades to do that, since these plants generate about 20 percent of the country's electricity. But it can be done in an orderly fashion. Whether or not new nuclear plants that don't have the vulnerabilities of existing plants can be built is an open question. But that doesn't solve the security problem at hand.

Moreover, the Bush administration, like its predecessor, is encouraging re-licensing of existing power plants far beyond their current licenses. In this context, Abraham's claim is simply wrong. Yucca Mountain will not consolidate spent fuel at a single site. The administration's nuclear power policy ensures that dozens of sites will continue to operate with spent-fuel pools. Given re-licensing, Yucca Mountain, which is crisscrossed with geologic faults, may well run out of room before it can take the spent fuel from existing power plants, to say nothing of new ones.

Then there's the hundred million gallons of high-level radioactive waste in the nuclear weapons complex, mostly stored in dangerous liquid form, some of it in tanks that have leaked. These tanks are near some of the most important water resources of the United States: the Columbia River and the Snake River Plain aquifer in the Northwest and the Savannah River in the Southeast.

Although Abraham has stated that military high-level wastes would also be sent to Yucca Mountain, the Energy Department has already floated a trial balloon to the contrary. It is exploring the possibility of simply declaring much high-level waste to be low-level waste by fiat, mixing it with cement, and disposing of it on-site.

Finally, Yucca Mountain is a poor site. Federal regulations have already been changed or set aside several times to accommodate it. The computer models that the Energy Department used to assess site suitability are riddled with uncertainties. The site's history carries the whiff of politics rather than sound science. By early 1986, the selection process, mandated by the 1982 Nuclear Waste Policy Act, included sites in New England, but it was abruptly abandoned in mid-1986. That happened just a couple of weeks after concerned New England residents went to see a top aide to then-Vice President George Bush, just as he was preparing to launch his presidential campaign. The next year Congress named Yucca Mountain as the only site to be investigated.

It is possible to do a far better job, but the Energy Department seems incapable of it. It has essentially ignored an excellent 1983 study that it commissioned from the National Academy of Sciences. President Bush should declare both Yucca Mountain and the Energy Department unsuitable for the job and create a blue-ribbon commission to recommend a new program to him. That approach stands a far better chance of actually restoring some confidence in public science and leading to a sound geologic repository program, which is needed for both security and environmental reasons.

Yucca Mountain – Not Solve (General)

Yucca site would be full in 3 years once opened – not an effective solution to waste issue

Spencer, Heritage Foundation, '8

[by Jack Spencer, Research Fellow in Nuclear Energy, "A Free-Market Approach to Managing Used Nuclear Fuel," June 23, 2008, Backgrounder #2149, http://www.heritage.org/Research/EnergyandEnvironment/bg2149.cfm download date: 12-1-08]

The United States has 58,000 tons of high-level nuclear waste stored at more than 100 sites in 39 states,[3] and its 104 commercial nuclear reactors produce approximately 2,000 tons of used fuel every year. The Yucca Mountain repository's capacity is statutorily limited to 70,000 tons of waste (not to mention the problems associated with even opening the repository). Of this, 63,000 tons will be allocated to commercial waste, and 7,000 tons will be allocated to the Department of Energy (DOE).

These are arbitrary limitations that Congress set without regard to Yucca's actual capacity. As currently defined by the Nuclear Waste Policy Act, Yucca would reach capacity in about three years unless the law is changed. Thus, even if Yucca becomes operational, it will not be a permanent solution, and the nation would soon be back at the drawing board.

Yet even with an expanded capacity of 120,000 tons, Yucca Mountain could hold only a few more years of America's nuclear waste if the U.S. significantly increases its nuclear power production. According to one analysis, America's current operating reactors would generate enough used fuel to fill a 70,000-ton Yucca right away and a 120,000-ton Yucca over their lifetime. If nuclear power production increased by 1.8 percent annually after 2010, a 120,000-ton Yucca would be full by 2030. At that growth rate, without recycling any used fuel, the U.S. would need nine Yucca Mountains by the turn of the century.[5]

NEG – Biased Sources

Aff evidence from bias pro-nuclear institutes and should be dismissed

Van Leeuwen '7

[Jan Willem Storm van Leeuwen is Senior Scientist at Ceedata Consultancy, Chaam, Netherlands.Secure Energy? Civil Nuclear Power, Security and Global Warming, March 2007, published by Oxford Research Group, Edited by Frank Barnaby and James Kemp, http://www.oxfordresearchgroup.org.uk/publications/briefing_papers/pdf/secureenergy.pdf download date: 12-2-08]

It should be noted that the IAEA (International Atomic Energy Agency), NEA (Nuclear Energy Agency), WNA (World Nuclear Association) and NEI (Nuclear Energy Institute) are organisations with a vested interest in nuclear power. These institutes are explicitly aimed at promoting nuclear power, and therefore are not necessarily independent scientific institutes.

Nuclear Terrorism

New Round of Nuclear Reactors increase risk of Nuclear Terrorism

Barnaby, Nuclear Physicist, Oxford Research Group, '7

[Frank, Nuclear Issues Consultant to Oxford Research Group (ORG). He is a nuclear physicist by training and worked at the Atomic Weapons Research Establishment, Aldermaston between 1951-57. He was Director of the Stockholm International Peace Research Institute (SIPRI) from 1971-81. *Secure Energy? Civil Nuclear Power, Security and Global Warming*, March 2007, published by Oxford Research Group, Edited by Frank Barnaby and James Kemp, download date: 12-2-08 http://www.oxfordresearchgroup.org.uk/publications/briefing_papers/pdf/secureenergy.pdf]

A major reason for opposing a nuclear expansion is that it would increase the risk of nuclear terrorism.
There are number of nuclear terrorist activities that a group may execute:
• stealing or otherwise acquiring fissile material and fabricating and detonating
a primitive nuclear explosive;
• attacking a nuclear-power reactor to spread radioactivity far and wide;
• attacking high-level radioactive liquid waste tanks;
• attacking plutonium stores
• attacking nuclear materials in transit; and
• making and detonating a radiological weapon, commonly called a dirty bomb,
to spread radioactive material.
Apart from exploding a dirty bomb, all of these types of nuclear terrorism have the potential to cause large, or quite large, numbers of deaths and disruption. At its most extreme, a crude nuclear explosive detonated in Parliament Square or Capitol Hill would cause catastrophic damage to those Governments. That the risk of all these types of nuclear terrorism will increase if more nuclear-power stations are built is, assuming the business-as-usual scenario, a matter of fact.
A new build would increase the risk because it would:
• create potential targets for terrorists, from waste tanks and generators at nuclear sites to moving targets such as 'waste trains' and MOX transporters;
• it would increase the availability of MOX and reactor-grade plutonium for use in a dirty bomb or crude nuclear weapon; and
• spread of the knowledge, materials and technology needed to develop nuclear weapons.

Weapons Proliferation

Unique Link: New rounds of U.S. nuclear plants will force a shift to large scale reprocessing of spent fuel, spurring

Van Leeuwen '7

[Jan Willem Storm van Leeuwen is Senior Scientist at Ceedata Consultancy, Chaam, Netherlands. *Secure Energy? Civil Nuclear Power, Security and Global Warming*. March 2007. Published by Oxford Research Group, Edited by Frank Barnaby and James Kemp. http://www.oxfordresearchgroup.org.uk/publications/briefing_papers/pdf/secureenergy.pdf download date: 12-2-08]

The shortage of high-grade uranium points towards three scenarios:
• nuclear power is phased out;
• the nuclear industry turns to MOX fuels and reactor-grade plutonium; or
• Generation IV reactors begin generating significant amounts of electricity.
What does this have to do with nuclear weapons proliferation? If fuel for reactors cannot be produced from uranium ore, then industry will have to rely on large scale reprocessing of spent fuel to manufacture MOX (a mixture of uranium and plutonium oxides) and reactor-grade plutonium to fuel nuclear reactors. Both materials can be used to produce a nuclear weapon.
At the moment nuclear reprocessing takes place in a handful of plants like Thorp in England, Rokkasho Mura in Japan and La Hague in France. Until recently the USA avoided reprocessing because of fears over the security risks associated with them, e.g. the impossibility of accounting for all of the plutonium which goes through a reprocessing plant, meaning that some could be stolen or diverted without detection by IAEA inspectors or plant operator (see section 1.2).
If plans for new nuclear plants are fulfilled, there will inevitably be a major increase in demand for reprocessing facilities to produce and sell MOX and plutonium fuels. If there is an increase in reprocessing it will lead to an international trade in weapons-useable nuclear materials. MOX and reactor-grade plutonium would require more secure deposits and secure transit around the world. Such a scenario would constitute a major security risk.
So far as Generation IV reactors are concerned, even if the enormous technological and commercial hurdles could be overcome, the very serious security problems remain unresolved. This technology would lead to the production and distribution of super-weapons grade plutonium.

Weapons Proliferation

Link: Nuclear energy facilitates nuclear weapons proliferation

Lawyers' Committee on Nuclear Policy '98

[Founded in 1981, the Lawyers' Committee on Nuclear Policy (LCNP) is a national nonprofit educational association that uses national and international law to promote peace and disarmament. LCNP has been a vital link between policy makers, legal scholars and activists. Publication: Nuclear Energy and the Non Proliferation Treaty, Comments on Article IV of the Treaty on the Non-Proliferation of Nuclear Weapons, April 1998, http://www.lcnp.org/energy/NPT%20article%204.htm download date: 11-12-08]

Nuclear energy poses serious threats to nuclear weapons proliferation.
In 1946 a report to the US Secretary of State's Committee on Atomic Energy concluded that
"The development of atomic energy for peaceful purposes and the development of atomic energy for bombs are much of their course interchangeable and interdependent." The committee further concluded that "...there is no prospect of security against atomic warfare" in an international system where nations are "free to develop atomic energy but only pledged not to use it for bombs." (A Report on the International Control of Atomic Energy, Secretary of State's Committee on Atomic Energy Board of Consultants, Washington DC March 16, 1946, cited in Plutonium and the NPT, Levanthal, NCI, November 18, 1993).
Subsequent events have given proof of this statement. The development of nuclear weapons by France emerged from a nuclear program which many scientists believed was only for civilian purposes. (L. Scheinman Atomic Energy Policy in France under the Fourth Republic, Princeton University Press, 1965.) A number of states including parties to the NPT such as Iraq and North Korea, have received technical assistance in the development of nuclear energy, only to redirect this technology into a nuclear weapons program.
Frank von Hippel, adviser to the US government, has noted that "Civilian nuclear energy programs provide a convenient cover, as well as the training, technology and nuclear material necessary for the construction of nuclear weapons."(F. von Hippel, Citizen Scientist, Touchstone, NY 1991. p202)
India's explosion of a nuclear device on May 18, 1974, developed from a civilian nuclear program, demonstrates dramatically that fissile material and technology diverted from civilian programs will indeed work in nuclear weapons.
The increase in production and reprocessing of plutonium from civilian nuclear reactors means that diversion into nuclear weapons becomes even harder to prevent. The manufacture of nuclear weapons is technically not difficult once fissile material is obtained.
Civilian stocks of separated plutonium, currently at 122 tonnes, are projected to surpass military stocks by the year 2000 and will reach 550 tonnes by 2010. (World Inventory of Plutonium and Highly Enriched Uranium, Albright, Berkhout and Walker, 1992, Stockholm International Peace Research Institute.) The recent diversion of Russian plutonium into private hands demonstrates the increasing likelihood that such diversion could enable nuclear weapons production by a growing number of states, including those without nuclear power, and also by non-state entities.

Weapons Proliferation

Internal Link: A shift to Reprocessing & Plutonium Fuels will cause worldwide nuclear weapons proliferation & nuclear terrorism

Barnaby, Nuclear Physicist, Oxford Research Group, '7

[Frank, Nuclear Issues Consultant to Oxford Research Group (ORG). He is a nuclear physicist by training and worked at the Atomic Weapons Research Establishment, Aldermaston between 1951-57. He was Director of the Stockholm International Peace Research Institute (SIPRI) from 1971-81. *Secure Energy? Civil Nuclear Power, Security and Global Warming,* March 2007, published by Oxford Research Group, Edited by Frank Barnaby and James Kemp, download date: 12-2-08 http://www.oxfordresearchgroup.org.uk/publications/briefing_papers/pdf/secureenergy.pdf]

A new generation of plutonium powered nuclear reactors and reprocessing plants to feed them will create an international plutonium and MOX economy: a global trade in a substance that can quite easily be fashioned into nuclear weapons made in facilities that cannot be effectively safeguarded. The risk of plutonium being diverted for a clandestine state programme is extremely serious in itself, but as the plutonium-MOX economy grows, the risk of plutoium finding its way to a terrorist group dramatically increases with it. In addition, an international trade in these materials increases the number of targets for a nuclear terrorist attack because reprocessing produces high-level radioactive waste and excess plutonium that has to be stored, and some stores can be targeted.

Weapons Proliferation

Internal Link: Reprocessing is inherently dangerous. Plutonium can go missing. This directly allows for proliferation

Barnaby, Nuclear Physicist, Oxford Research Group, '7

[Frank, Nuclear Issues Consultant to Oxford Research Group (ORG). He is a nuclear physicist by training and worked at the Atomic Weapons Research Establishment, Aldermaston between 1951-57. He was Director of the Stockholm International Peace Research Institute (SIPRI) from 1971-81. *Secure Energy? Civil Nuclear Power, Security and Global Warming,* March 2007, published by Oxford Research Group, Edited by Frank Barnaby and James Kemp, download date: 12-2-08 http://www.oxfordresearchgroup.org.uk/publications/briefing_papers/pdf/secureenergy.pdf]

Reprocessed nuclear fuels (MOX and reactor-grade plutonium) are produced by reprocessing spent nuclear fuel in facilities such as the THORP reprocessing plant at Sellafield. MOX and reactor-grade plutonium can be used to produce nuclear weapons. There is a major security problem with reprocessing: it is impossible to guarantee that weapons-usable materials are neither stolen nor diverted.

Safeguarding the plutonium in spent nuclear reactor fuel elements before reprocessing is relatively simple. It is just a matter of counting the number of the elements in their store – in a cooling pond, for example. For many years, the elements are so radioactive that they must be handled with remote equipment, so they are self-protecting. Safeguarding them is a matter of unit accountancy plus surveillance with video cameras.

Once the plutonium is removed from spent reactor fuel elements in a commercial reprocessing plant, however, safeguarding it is quite a different matter. The first measurement of plutonium in the reprocessing plant is made on samples taken from an accountancy tank at the beginning of the process. Using mass spectrometry, the ratio of the amount of plutonium to the amount of uranium is determined. From the calculated amount of uranium and the measured uranium/plutonium ratio, the amount of plutonium is calculated. There may be errors in each stage of this operation. For example, some plutonium will remain in the parts of the fuel elements not dissolved in the nitric acid (called "the hulls"). The amount is very difficult to estimate.

The operators of the reprocessing plant will, therefore, be uncertain about the precise amount of plutonium produced by the plant. The uncertainty is called the "material unaccounted for" or MUF. Because of the nature of the errors involved, the value of the MUF will usually not be zero even if no illegal diversion of plutonium has occurred. The fact that there is a MUF means that the operators of a commercial reprocessing plant do not know whether or not an amount of plutonium has gone missing.

Commercial reprocessing plants deal with a large amount of plutonium - typically, up to about ten tonnes per year. The separated plutonium can be used to fabricate effective nuclear weapons. There is no clear distinction between the commercial use of plutonium and its military use.

To date, about 250,000 kg of civil plutonium has been separated worldwide, theoretically enough to fabricate about 60,000 nuclear weapons. It must be emphasised that this is not a matter of the efficiency and competence of the inspectors or of the operators of safeguards instruments. Even with the best available and foreseeable safeguards technology it is not possible to get the precision necessary.

The safeguards agencies claim that a commercial plutonium-reprocessing plant can be safeguarded with effectiveness of about 99%. This means that, even on the most optimistic assessments, at least one per cent of the plutonium throughput will be unaccounted for. Some independent experts estimate that, in practice, a more realistic figure for the effectiveness of safeguards on a commercial plutonium-reprocessing plant is 95% and that at least five per cent of the plutonium throughput will be unaccounted for.

What do these figures imply? According to recent estimates, the potential MUF at the Japanese reprocessing plant now under construction at Rokkasho-Mura will be around 50 kg per year. This plant is designed to allow the application of the most effective safeguards possible today. The plant will have the capacity to reprocess about 800 tonnes of spent fuel a year, producing about eight tonnes of plutonium. The effectiveness of safeguards on the plant, according to these estimates, is more than 99%. Even on these very optimistic estimates, the potential MUF still amounts to about a nuclear weapon's worth a month.

Weapons Proliferation

Impact: Prolif increases the risk of inadvertent nuclear war

Wiberg, Sociology Professor, University of Lund, '93

[Håkan Wiberg, Ib Damgaard Petersen, and Paul Smoker, *Inadvertent Nuclear War*, Wiberg is also a senior researcher at the Danish Institute for International Studies (DIIS), Oxford: Pregamon Press, pages 24-25]

This is not the place to review the differences between Haves and Have-Nots, many of which will depend heavily on political sympathies. However, Bracken & Leavitt contribute one essential non-political argument to that debate. They point out that a number of the institutional and relational factors that have contributed to reducing the risks within and between the two superpowers are weak or absent in several non-nuclear states, and would be extremely costly and time-consuming to create. In addition, the warning times between new nuclear neighbors would be very short. The emergence of new nuclear states would therefore have at least a short- to medium-term effect of strongly increasing the risk of inadvertent nuclear war, and would have a long-term effect of increase it. There is also a paradox involved: if one of these states went nuclear, it would be in the interest of Nuclear Powers to assist it with C3I technology, at least for negative control, to reduce the risk for an accidental nuclear war; but at the same time, it is decidedly not in their interest to tempt any state to go nuclear by making such promises.

Weapons Proliferation

Impact: Proliferation Turns the Climate Advantage - even a small nuclear war would release massive amount of carbon into the atmosphere and spur climate change

Barnaby and Kemp, Oxford Research Group, '7

[Frank Barnaby, Nuclear Issues Consultant to Oxford Research Group (ORG). He is a nuclear physicist by training and worked at the Atomic Weapons Research Establishment, Aldermaston between 1951-57.He was Director of the Stockholm International Peace Research Institute (SIPRI) from 1971-81 James Kemp is ORG's Research & Fundraising Officer responsible for the Nuclear Issues Programme.. *Secure Energy? Civil Nuclear Power, Security and Global Warming,* March 2007, published by Oxford Research Group, Edited by Frank Barnaby and James Kemp, download date: 12-2-08 http://www.oxfordresearchgroup.org.uk/publications/briefing_papers/pdf/secureenergy.pdf]

The final nail in the nuclear coffin comes from recent research using state-of-the-art computer climate modeling. This work looked at the affect a small-scale nuclear war in the sub-tropics would have on the climate - primarily due to the release of carbon into the stratosphere. This research found that such a war would reverse any progress we might make in reducing atmospheric CO_2 emissions. The technology ostensibly promoted to tackle global warming could become our undoing.