Nuclear Loan Guarantees

Another Taxpayer Bailout Ahead?

Union of Concerned Scientists
Citizens and Scientists for Environmental Solutions

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Executive Summary

Advocates of nuclear power are promoting a "nuclear renaissance," based on claims that a new generation of reactors will produce relatively cheap electricity while solving the threat posed by global climate change. As of October 2008, U.S. utilities and power producers had already proposed building about 30 new nuclear reactors. And some analysts have called for building 300 new plants by mid-century.

However, ensuring that these new plants will be economical is a huge challenge for the industry. Congress has responded by authorizing massive loan guarantees for builders of the plants, and is on the verge of expanding this program before it begins. That means taxpayers and ratepayers may end up bailing out the U.S. nuclear power industry for a third time.

Promoters originally conceived the peaceful use of atomic energy as ushering in a new era in which electricity would be "too cheap to meter." However, the realities of the commercial marketplace quickly overtook this utopian vision, as companies built just a handful of plants. The federal government responded by creating financial incentives to jump-start the industry, and by limiting companies' liability in case of a nuclear accident. Meanwhile reactor manufacturers and developers used "turnkey" contracts to cap the costs of the first few plants.

That strategy seemed to have worked, as a large-scale market for commercial nuclear power plants developed in the late 1960s and early 1970s. However, as construction costs skyrocketed and growth in demand for electricity slowed, electric utilities abandoned some 100 plants—half of all those ordered—during construction. Those that utilities did complete led to large increases in electricity rates.

The result was what a *Forbes* cover story in 1985 called "the largest managerial disaster in business history, a disaster on a monumental scale." Because of this managerial disaster, ratepayers bore well over $200 billion (in today's dollars) in cost overruns for completed nuclear plants, while taxpayers and ratepayers shared in bearing most of the more than $40 billion in costs of abandoned plants.

During the 1990s—driven largely by the high costs of completed nuclear plants—states restructured the electricity industry. Legislators and regulators allowed utilities to recover most "stranded costs"—the difference between their remaining investments in nuclear plants and the market value of those plants. Some states did so by issuing some $40 billion in bonds, backed by ratepayer charges that paid for utilities' above-market investments.

THE POTENTIAL RISK EXPOSURE TO THE FEDERAL GOVERNMENT AND TAXPAYERS FROM GUARANTEEING NUCLEAR LOANS COULD RANGE FROM $360 BILLION TO $1.6 TRILLION.

Because of that record, Wall Street and the financial community have been unwilling to invest in new nuclear plants for three decades. Yet just as the industry is calling for massive new investments in nuclear facilities, estimated construction costs for the new generation of nuclear power plants have again skyrocketed. As recently as 2002, the industry and the Department of Energy (DOE) were projecting "overnight" costs of new nuclear units—

an industry measure of how much a plant would cost if built "overnight," rather than requiring an actual multiyear construction schedule—as $1,200 to $1,500 per kilowatt. This range suggests total costs of $2 billion to $3 billion per nuclear unit.

However, the DOE recently announced that it had received 19 applications for federal loan guarantees for 21 proposed reactors with an estimated cost of $188 billion: an average cost of $9 billion per unit. And industry analysts and rating agencies have warned that these projected costs are highly uncertain and could rise significantly.

While construction costs for all types of power plants have increased as a result of global competition for resources, commodities, and manufacturing capacity, the costs of nuclear construction have risen much more than those of other options for producing electricity.

Historically, the nuclear industry has had a very poor track record of predicting construction costs and avoiding cost overruns. Indeed, the actual costs of 75 of the first generation of U.S. nuclear power plants built from 1966 to 1977 exceeded initial estimates by more than 200 percent—meaning that the actual costs were more than triple their projected costs.

The rapidly escalating and still highly uncertain costs of new nuclear plants—along with the stated unwillingness of Wall Street to finance them—has sent the industry back to the federal government for loan guarantees and other forms of financial assistance. In 2005, Congress enacted the Energy Policy Act (EPACT 2005), authorizing the DOE to provide federal guarantees for nuclear plants employing new reactor designs, as well as other energy projects. The loan guarantees were part of a package of subsidies. Those included a 1.8 cent per kilowatt-hour tax credit for 6,000 megawatts of new nuclear capacity, and federal funding to offset the costs of construction delays from regulatory lag and litigation.

Congress initially authorized the DOE to guarantee up to 80 percent of the loans, which could constitute up to 80 percent of total plant financing. However, the agency recently issued a rule that allows it to guarantee 100 percent of any debt obligation. These plants will thus rely on a much higher proportion of debt than most plants competing in the marketplace, which typically use debt for no more than about half of total financing.

Of the $42.5 billion in energy loan guarantees Congress has already authorized, the DOE has allocated $18.5 billion for new nuclear plants over the next several years. The industry is now asking Congress to substantially expand that amount. Yet the DOE does not have the mechanisms and expertise in place to effectively manage a loan guarantee program of that magnitude, according to the Government Accountability Office (GAO).

What's more, federal loan guarantees will not reduce the risks associated with new nuclear power plants. Such a program merely transfers those risks from the companies building the plants to U.S. taxpayers. The magnitude of the risks taxpayers will bear depends on how many plants and the percentage of their costs the government guarantees, and how many companies default on their loans.

The GAO estimates that the average risk of default for DOE loan guarantees is about 50 percent. Based on various proposed scenarios for new nuclear plant construction, the potential risk exposure to the federal government and taxpayers from guaranteeing nuclear loans could range from $360 billion (based on 100 plants at today's projected costs) to $1.6 trillion (based on 300 plants with costs 50 percent higher than today's estimates).

The nuclear industry's history of skyrocketing costs and construction overruns has already resulted in two rounds of expensive bailouts by taxpayers and captive ratepayers. By shifting the risks of building new nuclear power plants from companies to taxpayers, new loan guarantees could lead to a third round of bailouts that could dwarf the first two. Congress should be very cautious about pushing the industry to invest in plants that it and Wall Street consider too risky to finance on their own.

This record suggests that Congress and the DOE should take several critical steps before moving ahead with any program for guaranteeing nuclear loans:

- Congress and the DOE should limit loan guarantees for new nuclear power plants to a small number of "first-mover" units, to demonstrate the feasibility of new plant designs and the new NRC licensing process.

- Congress should not expand funding for nuclear loan guarantees beyond the current $18.5 billion limit, or attempt to cover all pending loan applications for new nuclear plants. To win loan guarantees, developers of nuclear plants should also have to demonstrate that they can be competitive with other low-carbon options.

- The DOE must show that it can adequately oversee the loan guarantee program before issuing any guarantees. To do so, the agency should create a mechanism for monitoring the program, and ensure that it has the resources to assess and monitor the financial condition of applicants and recipients of loan guarantees.

- Companies that receive federal loan guarantees should agree not to sue the U.S. government over nuclear waste storage costs. (The Nuclear Waste Storage Act required the federal government to open the Yucca Mountain storage site by 1998, and numerous energy companies have sued for breach of contract.)

- Finally, the nuclear industry must be subject to the same requirements for reducing taxpayer costs and risks applied to other industries that benefit from government rescue plans, such as the finance and auto industries.

CHAPTER 1: Introduction

Advocates of nuclear power are promoting a "nuclear renaissance," based on claims that a new generation of reactors will produce relatively cheap electricity while solving the threat posed by global climate change. As of the time of publication, U.S. utilities and power producers had proposed building 26 new nuclear power plants. And some analysts have called for building as many as 300 new plants by mid-century. However, ensuring that these new plants will be economical is a huge challenge for the industry.

The Nuclear Energy Institute (NEI) regularly reminds the public that nuclear power plants have the lowest production costs among major options for generating electricity:

> *NEI observed that 2007 marked the ninth straight year that the industry's average electricity production cost has been below two cents per kwh, and the seventh straight year that nuclear plants have had the lowest production costs of any major source of electricity, including coal and natural gas-fired power plants.*[1]

However, production costs include only the cost of fuel, operation, and maintenance. Unfortunately, the industry sometimes neglects to mention the largest component of nuclear costs: capital costs—those associated with paying back the cost of construction, including financing. When *Newsweek* columnist Fareed Zakaria recently asked industry spokesperson Patrick Moore whether nuclear plants were too expensive to compete, he replied:

> *The cost of production of electricity among the 104 nuclear plants operating in the United States is 1.68 cents per kilowatt-hour. That's not including the capital costs, but the cost of production of electricity from nuclear is very low, and competitive with dirty coal. Gas costs three times as much as nuclear, at least. Wind costs five times as much, and solar costs 10 times as much.*[2]

THE INDUSTRY SOMETIMES NEGLECTS TO MENTION THE LARGEST COMPONENT OF NUCLEAR COSTS: THOSE NEEDED TO PAY BACK THE COST OF CONSTRUCTION.

By comparing nuclear's production costs to the full capital and production costs of wind and solar, Patrick creates a highly misleading impression of the competitiveness of nuclear power plants.

In real life, capital costs do not disappear—at least not without government assistance. Fortunately for the nuclear industry, federal and state governments have historically provided substantial assistance with such costs, shifting the risks and burdens of excessive capital costs onto taxpayers and captive ratepayers.

With estimates of the capital costs of the next generation of nuclear plants now quickly rising, the industry is again seeking massive assistance, aiming to shift the financial risks away from the companies building these plants onto taxpayers and ratepayers. A principle mechanism for such risk shifting is a new federal program of loan guarantees for nuclear power plant construction.[3] The nuclear industry and its advocates in Congress have now proposed a huge expansion of this program before it has even begun.

This report briefly reviews the industry's history of rapidly escalating construction costs, and shows how overoptimistic cost projections led to two rounds of expensive taxpayer and ratepayer bailouts of the industry. The report then examines the existing nuclear loan guarantee program and its proposed expansion, and recommends steps to help the nation avoid repeating past mistakes.

CHAPTER 2: Lessons Not Learned

From the beginning, the use of nuclear energy to produce electricity was the product of overly optimistic claims that it would provide extremely low-cost power, and action by the government to insulate companies from the risks inherent in nuclear technology. In September 1954, Lewis Strauss, the first chair of the Atomic Energy Commission (AEC), famously predicted that nuclear energy would transform America within 5 to 15 years: "It is not too much to expect that our children will enjoy in their homes electrical energy too cheap to meter."[4]

Despite this claim, two early attempts at stimulating construction of nuclear power plants were not very successful. The Atomic Energy Act of 1946 tried to limit nuclear technology to a government monopoly. When other governments began to acquire nuclear technology, the Atomic Energy Act of 1954 established a framework for federal licensing of nuclear plants built by private companies. The AEC offered various incentives and subsidies to encourage private investment in nuclear power plants.[5] However, they were insufficient to stimulate the development of a large-scale commercial industry. In particular, they did not overcome the risk of the indeterminate but potentially huge liability in the event of a nuclear accident of any magnitude.[6]

While insisting that the risk of a major nuclear accident was extremely remote, private-sector representatives informed Congress that they would be forced to stop developing nuclear power plants if legislation did not limit their liability for such an event.[7] Of particular note, General Electric officials stated that the company would not proceed with nuclear reactor development "with a cloud of bankruptcy hanging over its head."[8] Similarly, a Westinghouse executive made it "perfectly clear" that his company would not continue its activities unless the federal government limited private-sector liability for a nuclear accident.[9]

The Government Plays Underwriter

Congress responded to these concerns by passing the Price-Anderson Act in 1957.[10] The act had the dual purpose of "protect[ing] the public and . . . encourag[ing] the development of the atomic energy industry."[11] In its original form, the act limited the industry's total liability for a single nuclear incident to $500 million, plus the maximum amount of liability insurance available on the private market, which was $60 million in 1957.[12] Yet government estimates of the damages resulting from a reactor core meltdown totaled $14 billion at the time.[13]

Despite these measures, by 1961 only two small reactors were operating in the United States, with five other small plants under construction. Nuclear power plants were proving to be more expensive than anticipated. The Indian Point reactor, completed in 1962, cost twice as much as its original $55 million estimate, for example. The AEC itself estimated that nuclear-based electricity was 30 percent more costly than coal-based power. Utilities did not appear to be interested in ordering more reactors, and the Bureau of the Budget (the predecessor of today's Office of Management and Budget) was considering cutting nuclear subsidies.[14]

Congress extended the Price-Anderson Act in 1977, and again in 1988 and 2005. Each time the industry argued that it needed the extension to survive. Each time Congress also raised the combined insurance and liability limit, but to levels well below the potential costs of a serious accident, given growing populations around the plants.

Bad Assumptions

In 1962, the head of the AEC, Glen T. Seaborg, reported to the president that:

> *Nuclear power is on the threshold of economic competitiveness and can soon be made competitive in areas consuming a significant fraction of the nation's energy. . . . [E]conomic nuclear power is so near at hand that only a modest additional incentive is required to initiate its appreciable early use by the utilities.*[15]

Seaborg's report combined an argument for continuing nuclear subsidies with a claim that building larger plants would make nuclear electricity less expensive. Reactor vendors complied by offering larger plants for fixed prices. The vendors guaranteed the prices of completed plants through so-called "turnkey" contracts, in which they assumed all the risks of rising costs associated with design, manufacture, and construction.

Electric utilities ordered the first of these turnkey plants in 1963, and eight more over the next two years. With total cost overruns of $800 million to $1 billion, these initial projects meant large losses for the vendors. However, the companies considered them "loss leaders" that would "jump-start" a large-scale market for commercial nuclear power.[16]

In the so-called "great bandwagon market" from 1965 to 1968, utilities ordered 49 nuclear plants totaling almost 40,000 megawatts of capacity. After a short lull in 1969, utilities ordered another 145 reactors between 1970 and 1974.[17]

However, as the vendors had planned, this rapid creation of a large-scale market was premised not on turnkey but on "cost-plus" contracts, under which the utilities rather than the vendors assumed responsibility for cost overruns. Unfortunately, this large-scale market was also premised on "wishful thinking that electricity would stay cheap, blind faith that the technology would be carefully watched, and unquestioned reliance on the hope that growth in demand for electricity would continue."[18] The result was what a *Forbes* cover story would later call "the largest managerial disaster in business history, a disaster on a monumental scale."[19]

Starting in the 1970s, the costs of building new nuclear power plants began to spiral out of control. The actual costs of new plants were two to three times higher, on average, than estimates during the licensing process or when construction began. According to a 1986 study by the Department of Energy (DOE), the actual costs of 75 of the first generation of U.S. nuclear power plants exceeded initial estimates by more than 200 percent. In other words, the actual average cost of the plants was about triple the estimated cost (Table 1).[20]

These findings actually understate the cost overruns because the study used "overnight costs"—an industry measure of how much a plant would cost if built overnight, rather than if it required an average multiyear construction period. Overnight costs do not reflect escalating costs during construction or financing costs.

What's more, the study did not include some of the most costly U.S. nuclear power plants completed after the study, such as Comanche Peak, South Texas, Seabrook, and Vogtle. For example, the cost of Plant Vogtle Units 1 and 2, built in the 1970s and 1980s, skyrocketed from $660 million to $8.7 billion—a 1,200 percent overrun.

THE ACTUAL COSTS OF 75 OF THE FIRST GENERATION OF U.S. NUCLEAR POWER PLANTS EXCEEDED INITIAL ESTIMATES BY MORE THAN 200 PERCENT.

While construction costs were soaring, increases in electricity rates—caused partly by those soaring costs, and by inflation from rising oil prices after the oil embargo of 1973–74—slowed growth in customer demand for power.[21] Indeed, sales of electricity dropped from 1973 to 1974—the first time since the end of World War II that such a decline had occurred.[22]

As the new nuclear power plants approached completion, it became apparent that many would be overly expensive or unneeded. Consumers were upset at the rate increases that utilities received to recover their investments in the plants.[23] The 1979 accident at Three Mile Island also seriously undermined public confidence in the

safety of nuclear power, and resulted in costly additional regulation.[24]

Throughout this period, many utilities reevaluated the need for and economics of their proposed nuclear plants and decided to cancel them, or state regulators ordered them to do so. Although the Nuclear Regulatory Commission (NRC) licensed more than 200 proposed nuclear units (while rejecting none), utilities ultimately built only about half of them, canceling the remaining 100-plus units at various stages of planning or construction.[25]

Table 1: Cost Overruns for U.S. Nuclear Plants

The cost of a typical U.S. nuclear plant completed in this time frame—given an average overrun of 207 percent—was more than three times its original estimate. That figure does not include some of the most expensive plants, built after 1986.

CONSTRUCTION STARTS		AVERAGE OVERNIGHT COSTS[a]		
YEAR INITIATED	NUMBER OF PLANTS[b]	UTILITIES' PROJECTIONS (THOUSANDS OF DOLLARS PER MW)	ACTUAL (THOUSANDS OF DOLLARS PER MW)	OVERRUN (PERCENT)
1966-1967	11	612	1,279	109
1968-1969	26	741	2,180	194
1970-1971	12	829	2,889	248
1972-1973	7	1,220	3,882	218
1974-1975	14	1,263	4,817	281
1976-1977	5	1,630	4,377	169
OVERALL AVERAGE	13	938	2,959	207

Source: Congressional Budget Office, based on data from Energy Information Administration, U.S. Department of Energy. 1986. *An analysis of nuclear power plant construction costs.*
Notes: This analysis includes plants for which construction began after 1965 and was completed by 1986. Data are expressed in 1982 dollars, adjusted to 2006 dollars.
a. Overnight construction costs do not include escalating costs during construction or financing charges.
b. This study defines a nuclear power plant as having one reactor. If a utility built two reactors at the same site, those reactors would be considered two power plants.

CHAPTER 3: The Two Nuclear Industry Bailouts

Although they had provided significant subsidies to the commercial nuclear industry through their role as taxpayers, ratepayers of the utilities that undertook new nuclear power plants had to bear most the sunk costs of canceled projects, and most of the cost overruns for completed units. Regulators disallowed limited portions of those costs as imprudent, but ratepayers bore substantially more than $200 billion in overruns (2006 dollars).[26]

This estimate is conservative because it is based on Table 1, and therefore does not include cost escalation during the construction period, financing costs, or the higher cost overruns of the most expensive U.S. plants. Including those costs would push overruns incurred in building the existing generation of nuclear power plants above $300 billion (in 2006 dollars).

Nuclear power plants abandoned by their sponsors cost the nation almost $50 billion in today's dollars, according to a 1992 study by economists Charles Komanoff and Cora Roelofs.[27] Specifically, the 100 nuclear plants canceled from 1972 to 1982 cost about $10 billion.[28] Fifteen more plants canceled in 1983 and 1984 added $11 billion to that figure. And more cancellations after 1984 (such as of Washington Public Power Supply System's Units 1 and 3 in 1985) may have added another $4 billion. Together those costs total $25 billion, or $40 billion to $50 billion in 2006 dollars.

Ratepayers and taxpayers bore a significant portion of those costs. Allocating them among shareholders, ratepayers, and taxpayers is difficult because of complicated rate and tax treatments accorded to individual plants and utilities. However, it does appear from the 1986 DOE study that ratepayers bore as much as one-half to three-quarters of the costs of these abandoned plants—through higher utility rates or federal taxes.

Overall, therefore, taxpayers and captive utility customers paid well over $200 billion (in today's dollars) for cost overruns and abandoned plants. Joseph P. Tomain, a scholar of nuclear power, summed up the situation in these terms:

> *In the rush to meet the future, both government and industry created a regulatory structure promoting nuclear power without either party assuming concomitant responsibilities for having made the choice. Safety, environmental, and financial risks were passed from government to consumers and taxpayers.*[29]

The Second Bailout

The nuclear plants that utilities did complete not only cost more than initial estimates but also cost more than competing alternatives. For example, the 1992 study by Komanoff and Roelofs found that nuclear generating costs—including construction financing, operating, and maintenance costs—averaged three cents per kilowatt-hour higher for nuclear plants than for fossil fuel plants from 1968 to 1990. The 5.4 billion kilowatt-hours of nuclear electricity produced during that period therefore represented about $160 billion in overcharges to utility customers—or more than $225 billion in today's dollars.

Moreover, under traditional regulation of electricity, costs were highest in the initial years of plant operation, when regulators added costs not yet depreciated—including financing costs for construction—to the "rate base" on which utilities could earn a return. The term "rate shock" was coined to refer to the large increases in electricity rates that resulted when plants came online and did not pay for themselves in lower fuel costs.

Largely as a result, pressure began building in the 1980s to restructure the utility industry to reduce regulation and increase competition. This pressure led to the Energy Policy Act of 1992, and later rulemakings by the Federal Energy Regulatory Commission and state public utility commissions. These changes gave power producers other than utilities nondiscriminatory access to the

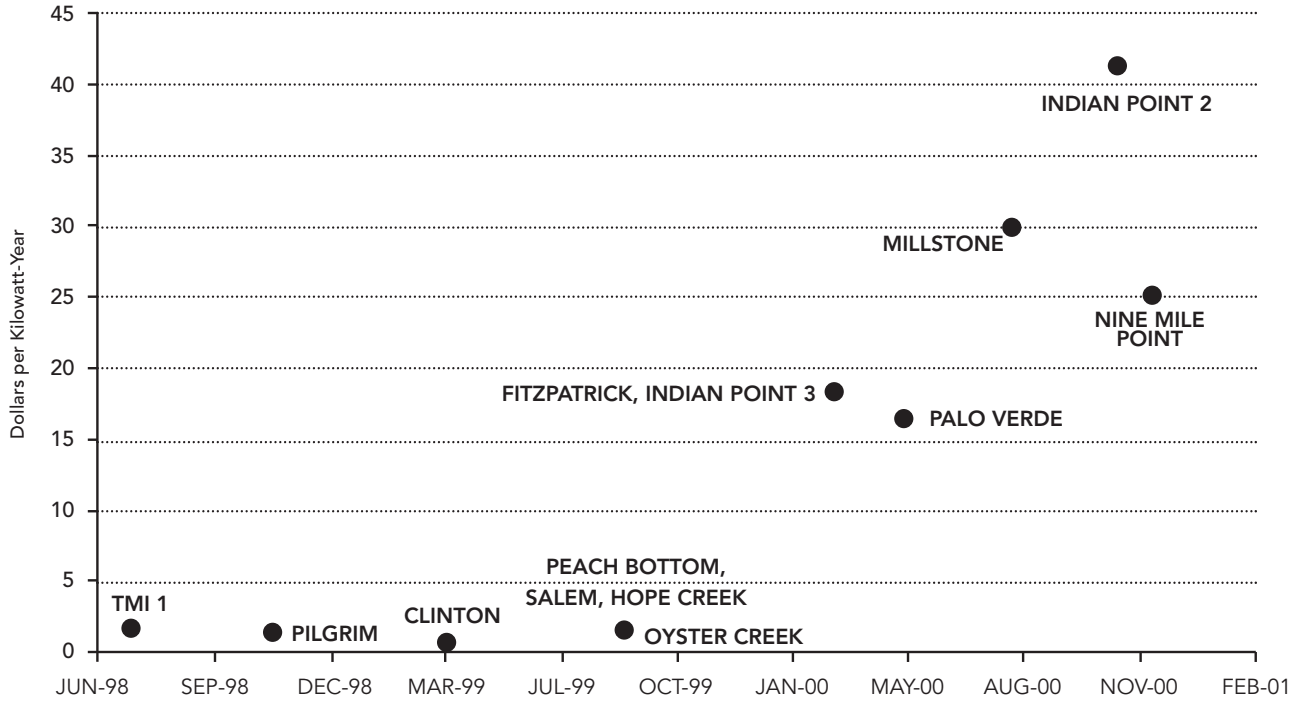
interstate system for transmitting electricity, and deregulated wholesale markets for electricity. These changes effectively broke each utility's monopoly on the sale and transmission of electricity across its service territory. Beginning in the mid- to late 1990s, a number of states also allowed competition in retail markets, though in most cases competition emerged only for large business customers, at best.

Who Should Pay?

One critical issue that regulators had to address while deregulating electricity markets was who—shareholders or ratepayers—would cover utilities' uneconomical investments in nuclear power plants. These "stranded" investments represented the difference between the remaining costs that utilities had incurred in building

Figure 1: **Purchase Prices for Nuclear Power Plants**

U.S. nuclear power plants sold for far less than their original cost. For example, the Clinton plant in Illinois, which cost more than $4 billion to build, sold for just $20 million.



Source: NAC Worldwide Consulting. 2001. Online at *http://www.nacworldwide.com/pdf/SR_PO2000.pdf*.
Note: The purchase price is based on the number of years between the purchase announcement and the end of the plant's current operating license.

these plants and their market value under the new competitive system. Regulators set the market value of each plant by holding an auction, or by using a discounted cash-flow analysis intended to mimic potential buyers' expectations.

Initial sales prices for nuclear power plants were extremely low. The Pilgrim Plant in Massachusetts sold in 1998 for $14 million—less than the value of its nuclear fuel, which sold for $67 million. State ratepayers had to "top off" the $471 million fund for decommissioning the plant that was transferred to the buyer. Similarly, the Clinton Plant in Illinois, which cost more than $4 billion to build, sold for only $20 million in 1999. The first three plants sold—including Three Mile Island 1 as well as Pilgrim and Clinton—reaped an average of only $25 per kilowatt, excluding fuel.[30]

The sales prices of nuclear plants later rose substantially but remained far below their initial construction costs (Figure 1). For example, the Millstone Unit 3 plant, which had cost more than $3,000 per kilowatt to build, sold for only $790 per kilowatt.

How Much Did the Public Pay?

Calculating the stranded nuclear costs that ratepayers assumed during restructuring is complicated, given that most transactions included long-term agreements by utilities to buy power from the plants they sold. However, estimates at the time of the potential stranded costs of nuclear plants stemming from industry restructuring ranged from about $70 billion to $86 billion.[31]

In a number of cases, state legislators or regulators "securitized" the difference between the sales price of a nuclear plant and its book value. That is, the state sold bonds equal to the plant's stranded costs—secured by charges to the utility's customers. According to an analysis citing a Fitch Ratings Report, states had securitized some $40 billion in stranded costs from nuclear plants as of 2006.[32]

Utility customers saved money through securitization compared with the status quo, because such bonds were highly rated, so utilities' interest rates fell. However, with securitization, "taxpayers bear part of the burden of stranded costs since the bonds are exempt from state income tax," according to an analysis by the Congressional Budget Office.[33] Unfortunately, no one has published a comprehensive post hoc analysis of nuclear stranded costs, or any estimates of the taxpayer burden from securitization.

NUCLEAR PLANTS THAT UTILITIES DID COMPLETE NOT ONLY COST MORE THAN INITIAL ESTIMATES, BUT ALSO COST MORE THAN COMPETING ALTERNATIVES.

The nuclear industry often boasts about the low costs of today's nuclear power plants. To some extent, these lower costs are due to significant improvements in industry operating performance over the past two decades. As nuclear units run more efficiently, the cost of each kilowatt-hour they produce drops. However, the lower costs of today's nuclear plants are due largely to the second bailout of the industry, which shifted many of its high sunk costs from owners to ratepayers and taxpayers.

CHAPTER 4: Soaring Costs and Limited Resources

As of the end of 2008, the domestic nuclear industry is planning to build a new generation of power plants. The industry has submitted applications to the NRC for 26 new reactors, based on five different designs:

- The Advanced Boiling Water Reactor (ABWR)
- The Evolutionary Pressurized Reactor (EPR)
- The Westinghouse AP 1000
- The Economic Simplified Boiling Water Reactor (ESWBR)
- The Advanced Pressurized-Water Reactor (APWR)

The NRC has certified the ABWR and AP 1000 designs, although it is now reviewing two revisions to the AP 1000 design. However, the industry has construction and operating experience only with the ABWR, and only in Asia. It is also building two EPRs, one in Finland and one in France.

Estimated construction costs for the new generation of nuclear power plants have skyrocketed in the past decade. As recently as 2004, the industry and the DOE were talking about overnight costs of about $1,500 per kilowatt for the first unit of simpler new reactor designs (declining to $1,200 per kilowatt for the fifth plant as companies recovered their engineering costs), and $1,800 for the first unit of more advanced designs.[34]

THE MOST RECENT COST ESCALATION HAS OCCURRED IN A STREAMLINED REGULATORY ENVIRONMENT DESIGNED LARGELY BY THE INDUSTRY.

These ranges suggested total costs of $2 billion to $4 billion per new nuclear plant. *The Future of Nuclear Power,* a 2003 study by MIT, produced somewhat higher estimates of $2,000 per kilowatt for overnight costs of initial plants, with a "plausible" reduction to $1,500 per kilowatt after companies built several plants.[35]

However, published cost estimates for new nuclear power plants quickly began to rise significantly. For example:

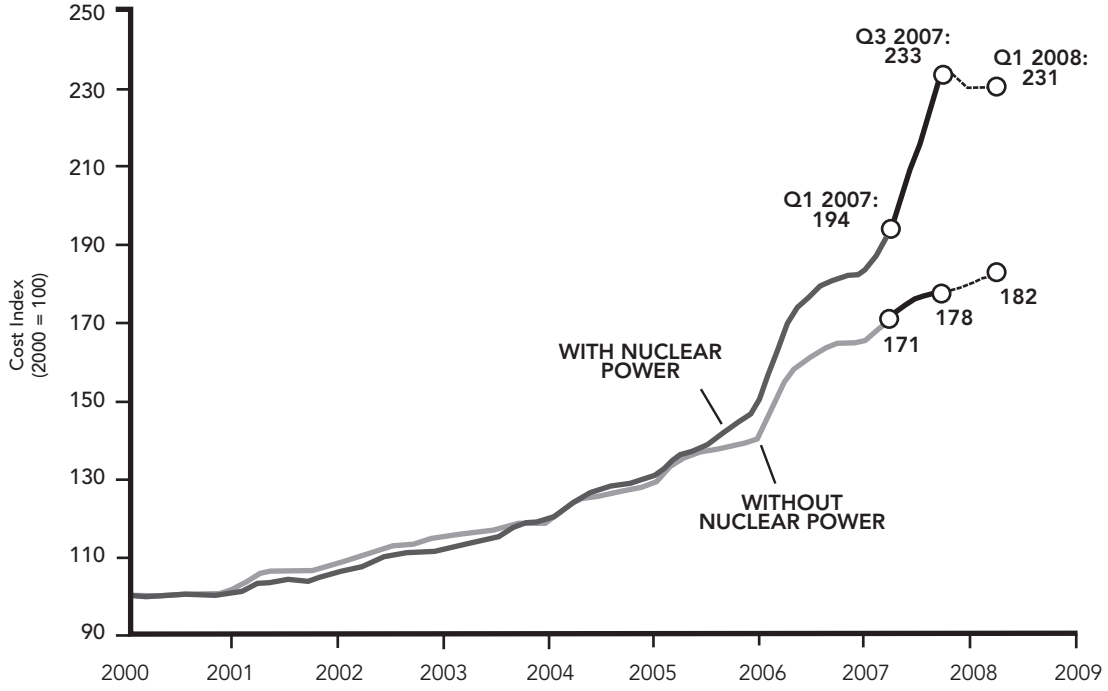
- A June 2007 report by the nonprofit Keystone Center estimated an overnight cost of $2,950 per kilowatt for a new nuclear plant, based on escalating construction costs since the MIT report. With interest on construction loans, this figure translated to $3,600–$4,000 per kilowatt.[36]
- In October 2007, Moody's Investor Services estimated $5,000–$6,000 per kilowatt for the total cost of new nuclear units, including escalating construction costs and financing costs, although the authors acknowledged that their estimate was "only marginally better than a guess."[37]
- Detailed tracking by Cambridge Energy Research Associates found that construction costs were rising much faster for nuclear power than for other options (Figure 2, page 16).

The industry was in for an even bigger shock in October 2007, when Florida Power & Light (FPL) announced overnight costs of $3,108–$4,540 per kilowatt for two proposed nuclear power plants. FPL also put the total cost of the project, including escalation and financing costs, at $5,492–$8,081 per kilowatt. These estimates translate into a projected cost of $12 billion to $18 billion for just two 1,100-megawatt units.[38]

A number of other companies have recently announced cost estimates for new nuclear plants in the same range. For example:

Figure 2: Capital Costs for Electric Power Plants, with and without Nuclear Power

Construction costs have risen much faster for nuclear power plants than for other options for producing electricity.



Source: Cambridge Energy Research Associates.

- Progress Energy estimated a total cost of $14 billion for the two-unit Levy Nuclear Plant in Florida, not including $3 billion for required transmission interconnections.
- Duke Energy announced an estimated cost of $11 billion, without escalation or financing costs, for its proposed Lee Nuclear Plant in South Carolina.
- The Tennessee Valley Authority announced that the total cost of its two proposed units at the Bellefonte site could be as high as $17.5 billion.

In October 2008, the DOE announced that it had received 19 applications for federal loan guarantees for 21 proposed reactors with an estimated total cost of $188 billion.[39] That reflects an average cost of $9 billion per unit, or $18 billion for a two-unit facility.

Given that companies have not yet built any new plant designs in the United States, these estimates must be seen as highly uncertain, and substantially likely to climb further. Indeed, in fall 2007 Moody's Investor Services warned that it had

> *. . . not been able to make a finite determination of the range for the all-in cost associated with new nuclear. As a result, we believe the ultimate costs associated with building new nuclear generation do not exist today—and that the current cost estimates represent best estimates, which are subject to change.*[40]

A recent assessment by Standard & Poor's similarly found that the risks associated with building new nuclear power plants remain "uncertain but significant," and concluded that "construction risk is the overriding risk for new nuclear units."[41]

An article in *Nuclear Engineering International* on escalating nuclear building costs explained that:

> *What is clear is that it is completely impossible to produce definitive estimates for new nuclear costs at this time. The fact that the USA and other leading nuclear nations have not been building plants for some time,*

and also that most current reactor designs have not yet been built to completion, suggests that there is considerable uncertainty with respect to the capital cost of new nuclear and other generating technologies.[42]

Rising Demand for Shrinking Resources

Cost estimates for the new generation of nuclear plants are rising largely because of the complexity of building them, combined with global competition for the needed resources, commodities, and manufacturing capacity. For example, rising demand has led to double-digit annual increases in the costs of key commodities such as steel, copper, and concrete. At the same time, as the *Wall Street Journal* explained, new nuclear plants are being proposed "amid a growing shortage of skilled labor; and against the backdrop of a shrunken supplier network for the industry."[43]

For example, only two companies have the heavy forging capacity to create the largest equipment and components for new nuclear plants: Japan Steel Works and Creusot Forge in France (although AREVA, a French company, has proposed building another such facility in Virginia).[44] The demand for heavy forgings will be significant, because the nuclear industry will be waiting in line alongside the petrochemical industry, which also needs heavy forgings for new refineries it aims to build.[45]

Many suppliers that provided nuclear-quality equipment and materials for the existing generation of nuclear plants no longer do so. For example, two decades ago about 400 U.S. companies supplied components for nuclear plants, and the American Society of Mechanical Engineers provided 900 so-called nuclear stamp, or N-stamp, certifications to suppliers of nuclear materials and components. Today the country has fewer than 80 suppliers and 200 N-stamp certifications.[46] The limited number of manufacturers and suppliers could cause construction bottlenecks. Given orders for new power plants in the United States and abroad, key plant components may have lead times of six years.

NRC Chairman Dale Klein attested in early 2007 that the nuclear industry will probably rely heavily on overseas companies to manufacture systems and components, and that the agency would have to inspect foreign manufacturing facilities to ensure that U.S. nuclear plants do not end up with substandard materials and equipment.[47] He also cautioned that inspecting foreign-made components would take extra time.

Strong global demand for skilled construction labor, and the retirement of many experienced workers, is also leading to labor shortages, especially in the energy sector, which will threaten the schedule and in-service dates of most projects. To make matters worse, more than 45 percent of the engineering labor pool is eligible to retire in the next five years, according to Standard & Poor's.[48] In fact, the rating agency has identified a shortage of managers and workers with the specialized skills needed to build new nuclear plants as one of the most "significant challenges" for a nuclear power renaissance.[49]

Global competition for power plant design and construction resources, equipment, and commodities means fewer bidders for work, higher costs, earlier payment schedules, and longer delivery times. Heavy reliance on overseas suppliers will also mean cost increases because of the continuing weakness of the U.S. dollar relative to other currencies.

The global economic slowdown may lead to some near-term price declines in commodities used to build nuclear plants, such as steel and concrete. Indeed, prices have come down as construction activity has slowed. However, demand for power plant design and construction resources, equipment, and commodities remains substantial. The United States, China, and the European Union have announced that stimulus spending packages in 2009 will include infrastructure repairs and improvements. The Obama administration has signed a stimulus program that will provide significant funds for renewable resources and energy efficiency. Such spending will increase the demand for some of the same resources and commodities used to build nuclear power plants.

Short Industry and Regulator Track Record

Further complicating these supply chain constraints is the fact that the industry has a limited track record in building the next generation of nuclear plants. As noted, of five new designs proposed for the United States, developers have actually built and operated only the ABWR, and the

great majority of proposed U.S. plants would be very different. What's more, it is unclear how relevant construction costs and experiences with the ABWR in Asia are to the United States, given its very different construction, accounting, and regulatory environment.

Finland's Olkiluoto 3 EBR power plant is the first truly new-generation nuclear unit to break ground anywhere in the world. Construction began in 2005, and was scheduled for completion in 2009. However, Olkiluoto has experienced many problems, and the completion date has already slipped to June 2012 (as of January 2009)—almost three years of slippage after a little more than three years of construction. The estimated cost of the plant has risen 33–50 percent, or about $2 billion.[50] AREVA and the utility that is buying the plant are in arbitration over responsibility for the overruns. AREVA has also experienced quality problems while beginning to build a second EBR in France.[51]

The industry and conservative economists have blamed overregulation, rather than mismanagement, for the cost overruns that led to a complete halt in construction of the first generation of nuclear power plants. However, the most recent escalation in estimated construction costs has occurred in a streamlined regulatory environment designed largely by the industry. This NRC oversight process is yet another wild card that could affect the schedules and costs of new plants:

- The new NRC licensing process for the combined construction and operating license (COL) is untested.
- NRC personnel have no recent experience with reviewing construction and operating licenses for new nuclear plants.
- NRC inspectors have limited experience in monitoring nuclear construction projects.
- The NRC is still certifying some new reactor designs, while others that it has already certified may require changes.
- The design certification and COL application processes are proceeding simultaneously in many cases.[52]

Because of this limited experience, problems that emerge during the construction and early operation of nuclear power plants in Finland, China, and France could affect the cost of building and operating new plants in the United States. Indeed, one clear lesson from the existing generation of nuclear power is that significant problems discovered while building and operating new plants will require modifications and create higher costs at other plants with similar designs. Thus the actual costs of new U.S. nuclear power plants may be substantially higher than even the $12 billion to $18 billion announced by utilities such as Florida Power & Light and the Tennessee Valley Authority.

CHAPTER 5: The Next Bailout?

U.S. electric power companies do not have the size, financing capability or financial strength to finance new nuclear power projects on balance sheet, on their own. To do so could place the entire company at risk – if the project could receive Board approval in the first place. These first projects require credit support – either loan guarantees from the federal government or assurance of investment recovery from state governments, or both.
Frank L. Bowman, president, Nuclear Energy Institute, May 6, 2008

Without loan guarantees, we will not build nuclear power plants.
Michael Wallace, CEO, Constellation Energy, July 2007

In 2005 Congress passed the Energy Policy Act (EPACT 2005), which authorized the DOE to provide loan guarantees for energy projects that would "avoid, reduce, or sequester air pollutants or anthropogenic emissions of greenhouse gases," and "employ new or significantly improved technologies as compared to technologies in service in the United States at the time the guarantee is issued."

EPACT 2005 authorized the DOE to issue loan guarantees of up to $4 billion for new nuclear projects through fiscal year 2007. These guarantees were expected to allow a few "first-mover" nuclear plants to demonstrate the new industry designs and NRC licensing process. This approach, in turn, reflected the MIT and DOE projections that nuclear plants could become competitive through industry learning, and after companies paid off their first-of-a-kind engineering costs. Other nuclear subsidies in this package included a 1.8 cent per kilowatt-hour tax credit for 6,000 megawatts of new nuclear capacity, as well as federal funding to offset the costs of construction delays stemming from regulatory lag or litigation.

Wall Street Balks

Congress limited each guarantee to 80 percent of the funds loaned to a company to build a nuclear power plant. However, it soon became clear that the level of loan guarantees in EPACT 2005 would not ensure the desired nuclear renaissance even when combined with the law's other nuclear subsidies. In fact, in the summer of 2007, six of Wall Street's largest investment banks (Citigroup, Credit Suisse, Goldman Sachs, Lehman Brothers, Merrill Lynch, and Morgan Stanley) informed the DOE that they were unwilling to extend loans for new nuclear power plants unless taxpayers shouldered 100 percent of the risks. In justifying this demand, the banks stated:

> *We believe these risks, combined with the higher capital costs and longer construction schedules of nuclear plants as compared to other generation facilities, will make lenders unwilling at present to extend long-term credit. . . . [L]enders and investors in the fixed income markets will be acutely concerned about a number of political, regulatory and litigation-related risks that are unique to nuclear power, including the possibility of delays.*[53]

Uncle Sam Writes a Blank Check

After Wall Street's rejection of the 80 percent cap on federal guarantees, the DOE issued its final rule in October 2008. Under this rule, the federal government would guarantee up to 100 percent of any loan or debt obligation for an energy project, as long as the loan is no more than 80 percent of the total cost. The DOE stated that "the borrower must have a significant equity stake in a project." However, it also said:

> *The Department believes, based on the record before it, that it should not set at this time a numerical minimum for the equity contribution to an eligible project.*

> *The determination of the significance of the equity contribution cannot practicably be made at the time that the loan application is filed.*[54]

Such an open-ended interpretation could allow nuclear utilities to rely on consumer rate increases, designed to cover the costs of initial financing and NRC licensing, as their equity stake.

Once it became clear that the $4 billion in loan guarantees was inadequate to ensure a nuclear renaissance, Congress passed the Energy and Water Appropriations Act in December 2007, which included $38 billion in federal loan guarantees for energy projects. The DOE has interpreted this provision as giving it the authority to issue loan guarantees for the following projects:

- $18.5 billion for nuclear power plants
- $6.5 billion for coal-based power generation and industrial gasification and carbon capture retrofitting
- $2 billion for advanced coal gasification
- $10 billion for renewable energy generation, transmission, and distribution
- $2 billion for uranium enrichment

THE DOE ESTIMATES THAT CONSTRUCTION COSTS FOR 21 NEW REACTORS WILL TOTAL $188 BILLION—FAR ABOVE THE $18.5 BILLION CAP.

The new act authorized the DOE to issue these guarantees through the end of fiscal year 2009. Thus Congress increased both the total dollar amount that the DOE could guarantee for the nuclear industry and the time period in which it could do so.

However, it is now clear that even these changes to the loan guarantee program will not be sufficient to restart the nuclear industry. By October 2008, utilities and vendors had submitted requests for 21 new reactors with an installed capacity of 28,000 megawatts—about 2 percent of total U.S. electrical capacity.[55] As noted, the DOE estimates that construction costs for these new nuclear plants will total $188 billion—far above the $18.5 billion cap.

The DOE is now seeking congressional approval to extend its authority to issue loan guarantees through fiscal year 2011. The agency needs such an extension because the NRC says it will not issue construction and operating licenses for new nuclear plants until then, at the earliest.

The nuclear industry is actively seeking to expand its access to loan guarantees. The industry was unable to persuade Congress to add an additional $50 billion in loan guarantee authority for nuclear power plants and other technologies to the 2009 economic stimulus bill. However, it is continuing to advocate for an expansion of the loan program and has recently called for the creation of a "Clean Energy Development Bank"—a restructured program within the DOE with its own legal and financial advisers that would make billions of dollars available to support deployment of clean energy infrastructure in the United States, including nuclear power, similar to the Export-Import Bank, which has $100 billion in loan guarantee authority at its disposal.

Under existing legislation, if the federal government guarantees 100 percent of a loan for an energy project, it must come from the Federal Financing Bank (FFB). Congress created the FFB in 1973 as part of the U.S. Treasury Department, and it borrows directly from the treasury. The $38.5 billion in loan guarantees that the DOE now has the authority to grant could double the FFB's current liabilities. Extending guarantees for all the nuclear plants whose owners have applied for DOE licenses could quintuple the bank's liabilities.[56]

Who Will Benefit?

The major beneficiaries of U.S. taxpayer–backed loans for new nuclear power plants would likely be large foreign corporations, based in Asia and Europe, and the shareholders of U.S. nuclear utilities and power producers. For example, according to the DOE, Japanese, Korean, and European manufacturers would provide the major components—reactor pressure vessels, steam generators, and moisture separator reheaters—for new nuclear plants.[57] That situation is unlikely to change, at least unless the United States builds several new reactors.

Foreign corporations that stand to significantly benefit from U.S. loan guarantees include:

- **AREVA**, about 80 percent owned by the French government.
- **Mitsubishi Heavy Industries**, a Tokyo-based manufacturer of heavy machinery that has built 23 nuclear reactors in Japan.
- **Toshiba**, which purchased a 77 percent share of Westinghouse Corp. from its previous owner, British Nuclear Fuels, in February 2005. Other shareholders include The Shaw Group (20 percent) and Ishikawajima-Harima Heavy Industries (3 percent). U.S. power companies plan to buy 11 new reactors based on Toshiba/Westinghouse designs.
- **General Electric/Hitachi**—the only remaining U.S.-based reactor vendor. GE combined its nuclear power division with Hitachi. According to the DOE, Hitachi supplies "reactor pressure vessels, fine motion control rod drive mechanisms, fuel assemblies, steam turbine generators, pumps, control systems, and simulators."[58] The GE/Hitachi consortium is marketing the ABWR and the ESBR, and U.S. power producers plan to buy several new reactors based on those designs.

CHAPTER 6: Rolling the Dice

In July 2008 the U.S. Government Accountability Office (GAO) reported to Congress that the average risk of default on DOE loan guarantees was about 50 percent, and that the federal government would likely recover about 24 percent of these losses.[59] The GAO also expressed concern that:

> *. . . if defaults occur, they will be for large dollar amounts and will likely not take place during easily predicted time frames. Recoveries may be equally difficult to predict and may be affected by the condition of the underlying collateral. In addition, project risks and loan performance could depend heavily on regulatory and legislative actions, as well as future economic conditions, including energy prices and economic growth, which generally cannot be predicted accurately.*[60]

These concerns are similar to those expressed by the Congressional Budget Office (CBO) in 2003:

> *[The CBO] considers the risk of default on a [nuclear] loan guarantee to be very high—well above 50 percent. The key factor accounting for this risk is that we expect that the plant would be uneconomic because of its high construction costs, relative to other generation sources. In addition, this project would have significant technical risk because it would be the first of a new generation of nuclear plants, as well as project delay and interruption risk due to licensing and regulatory proceedings.*[61]

The CBO voiced these concerns in assessing provisions in a proposed 2003 energy bill that would have authorized the DOE to provide loan guarantees for up to 50 percent of construction costs for seven new nuclear plants.[62] The risks to the federal government and taxpayers under the current loan guarantee program are much greater.

A number of factors suggest that these concerns are valid:

- The risks that the costs of building new nuclear power plants will soar far above today's estimates are substantial.
- There is no evidence that power producers can obtain licenses and build new nuclear plants in the eight-year time frame that the industry is now predicting. Longer construction periods raise financing costs.
- Cost overruns and related financing difficulties facing the first generation of nuclear plants bankrupted one investor-owned builder, Public Service of New Hampshire, and several government-owned power companies. Several other investor-owned companies, including Long Island Lighting Co. and Consumers Power, nearly went bankrupt.

Other Flaws of Government Loan Guarantees

A 1978 critique by Murray Weidenbaum (who soon became the first chair of President Reagan's Council of Economic Advisors) and Reno Harnish identified a number of flaws in government loan guarantees for energy facilities.[63] Peter A. Bradford, former chair of the Maine Public Utility Commission and the New York Public Service Commission, and a former member of the NRC, summarized these points in a March 2008 paper:[64]

- *Federal loan guarantees merely shift funds from one borrower to another. They do not increase the amount of loans available to the U.S. economy.*
- *These programs squeeze out weaker borrowers outside the federal umbrella, including new and small businesses, school districts, local governments, and private mortgage borrowers. Because*

loan guarantees do not increase the total amount of capital available, these unsubsidized borrowers wind up paying higher interest rates.

- *Federal loan guarantees put the government in the position of holding assets of questionable quality or limited use, making it difficult to recover the original value of the loans if a company defaults, and complicating the process of liquidating the company.*
- *Loan guarantees undermine a basic function of credit markets: to distinguish credit risks and assign appropriate risk premiums. They therefore encourage investments that are fundamentally more risky than other investments.*

Weidenbaum and Harnish's 1978 review quoted MIT Professor Henry Jacoby, who supported limited loan guarantees:

The problem with loan guarantees is that they tend to hide the true cost of the technology that is being demonstrated. . . . If I thought this bill was a prelude to a massive program of loan guarantees for new energy facilities, for multiple plants with known technology and not just for a limited set of demonstrations, then I would oppose it. I think it would be a terrible mistake to embark on a large scale program of hidden subsidies for energy supply from new capital intensive technologies. . . . The disadvantage of the widespread use of loan guarantees is that they will obscure the true cost to the economy. . . . More important, they hide the true cost from consumers and encourage wasteful consumption practices.[65]

A LARGE-SCALE PROGRAM OF LOAN GUARANTEES FOR NUCLEAR PLANTS COULD DIVERT FUNDS FROM ENERGY EFFICIENCY AND RENEWABLE ENERGY.

A particular risk of a large-scale program of loan guarantees for new nuclear plants is that they could divert public and private funds from energy efficiency and renewable energy measures. These measures would address both growing demand for electricity and concerns about global climate change more quickly than nuclear power, and with less financial risk.

Emerging renewable energy and other low-carbon technologies are eligible for $10 billion in federal loan guarantees—an amount that could rise in economic stimulus legislation. However, the DOE has dedicated these loan guarantees to demonstrating innovative technologies, as opposed to the large-scale deployment of power plants proposed by the nuclear industry. And even if the DOE made loan guarantees equally available for all technologies, they tilt the market in favor of the option with the largest inherent financial risks—nuclear technology—because of the very large capital investments and long construction periods nuclear power plants require.

Taxpayers Bear the Risks

The federal loan guarantees and additional subsidies for the nuclear industry in EPACT 2005 will not reduce the risks associated with new nuclear power plants. Those loan guarantees and subsidies merely transfer risks from the companies that want to build the plants to the federal government and its taxpayers. The plants remain "very expensive, very high-risk projects," as noted by John Rowe, CEO of Exelon, the largest U.S. operator of nuclear power plants.[66]

The total financial risks that the federal government and taxpayers will bear depend on how many plants and the percentage of their costs the government guarantees, and how many companies default on their loans. To estimate those risks, consider that to replace all existing units at the end of their 60-year operating lives, the United States would need to build 100 new nuclear plants by about 2040. To both replace existing plants and triple the U.S. nuclear capacity, the nation would need 300 new nuclear plants.

Under those scenarios, the total risks to taxpayers for units completed in the 2016–2020 time frame fall within this range:

- 100 new nuclear plants to replace all existing units x *$9 billion* per plant x 80% = $720 billion

- 100 new nuclear plants x *$13.5 billion* per plant (assuming a 50 percent increase in average costs) x 80% = $1.08 trillion
- 300 new nuclear plants (to triple existing capacity as existing units retire) x *$9 billion* per plant x 80% = $2.16 trillion
- 300 new nuclear plants x *$13.5 billion* per plant (assuming a 50 percent increase in average costs) x 80% = $3.24 trillion

The risks to the federal government and taxpayers could be even higher if plants built after 2016 see further increases in the cost of labor, materials, and equipment.

Given the 50 percent average risk of default on DOE loan guarantees cited by the GAO, and its estimate that the federal government would likely recover about 24 percent of any losses, taxpayer risk might range from $360 billion (given 100 new plants with no cost overruns) to $1.6 trillion (given 300 new plants with 50 percent cost overruns).

CHAPTER 7: Recommendations

Our investigation of the proposed federal loan guarantee program for new nuclear plants leads to the following recommendations:

- **As initially conceived, loan guarantees for new nuclear power plants should be limited to a small number of "first-mover" units, to demonstrate the feasibility of new designs and the new NRC licensing process.**

The loan guarantee program was never intended to promote all possible new reactor designs, and should not do so. Rather, it should promote the development of a small number of new designs with the greatest potential for safety, reliability, and replicability. Indeed, the best hope for reducing costs through standardization and industry learning is to focus on no more than one or two designs.

- **Congress should not expand the loan guarantee program for nuclear power beyond the current $18.5 billion limit, or attempt to cover all pending applications for new nuclear plants. Even up to that level, nuclear plants should first have to demonstrate that they can compete economically with other low-carbon technologies.**

The loan guarantee program was never intended to support every potential nuclear reactor developer, or shield the industry indefinitely from the commercial risks of creating the next generation of plants at the expense of U.S. taxpayers. Such a policy would severely distort competition between nuclear plants and other low-carbon options that do not pose the same financial risks. This would be the unintended result of approving all applications for loan guarantees.

- **The DOE must show that it can adequately oversee the loan guarantee program. To do so, the agency should create a mechanism for monitoring the program, and ensure that it has the resources to assess and monitor the financial condition of applicants and recipients of loan guarantees.**

The GAO has already identified a number of flaws in the agency's development of the loan guarantee program. For example, in July 2008, the GAO found that "DOE is not well positioned to manage the [program] effectively and maintain accountability because it has not completed a number of management and internal control activities key to carrying out the program."[67] Specifically, the GAO found:

> *DOE has not sufficiently determined the resources it will need or completed detailed policies, criteria, and procedures for evaluating applications, identifying eligible lenders, monitoring loans and lenders, estimating program costs, or accounting for the program —key steps that GAO recommended DOE take over a year ago. DOE also has not established key measures to use in evaluating program progress.*

The DOE must remedy these weaknesses before processing any loan applications and issuing any guarantees.

The agency should also have a reasonable chance of repayment before issuing a loan guarantee. Credit ratings are an essential element of this process. According to the GAO in 2008:

SHIFTING THE RISKS OF SKYROCKETING CONSTRUCTION COSTS FROM COMPANIES TO TAXPAYERS COULD LEAD TO A THIRD ROUND OF EXPENSIVE BAILOUTS.

> *Of particular concern are corporations whose credit ratings are likely to be downgraded because of the magnitude of nuclear costs and the uncertain timescale before construction is completed. In October 2007, Moody's Investment Service indicated that entities that finance nuclear projects face the prospect of credit downgrading.*[68]

Moreover, at least one applicant for a $2 billion nuclear loan guarantee, the U.S. Uranium Enrichment Corp. (USEC), has received a CCC credit rating from Standard & Poor's.[69] Anything lower than a BBB rating is considered a speculative or junk bond. USEC argues that the DOE should "form its own opinion" on credit worthiness, because a credit rating from a nationally recognized rating agency adds substantial costs and is "of questionable value to the project."[70]

- **Companies that secure federal loan guarantees should agree not to sue the U.S. government over nuclear waste storage costs.**

The Nuclear Waste Storage Act required the federal government to open the Yucca Mountain storage site by 1998, and numerous energy companies have sued for breach of contract.

- **Finally, the nuclear industry must be subject to provisions for reducing taxpayer costs and risks applied to other industries that benefit from government rescue plans, such as the finance and auto industries.**

For example, loan guarantees should convert to equity interests in parent companies if they default on the loans. Recipients of loan guarantees should also cap executive compensation and adhere to environmental and worker safety laws, and the DOE should terminate or convert their guarantees if they do not comply.

Conclusion

The history of the nuclear industry has been one of rising costs and construction overruns, leading to two rounds of expensive bailouts by taxpayers and captive ratepayers. By shifting the risk from investors to taxpayers that construction costs will skyrocket, an expanded loan guarantee program could lead to a third round of bailouts that could dwarf the first two. Congress should be wary of encouraging the industry to build new plants that it and Wall Street consider too risky to finance themselves.

ENDNOTES

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Union of Concerned Scientists

Citizens and Scientists for Environmental Solutions

Nuclear Loan Guarantees

Another Taxpayer Bailout Ahead?

Originally conceived as providing power that would be "too cheap to meter," nuclear energy was seen as the future of the electric industry. Reality quickly overtook this utopian vision in what has been called "the largest managerial disaster in business history," leading to two bailouts of the industry in the 1980s and 1990s.

Advocates of nuclear power are now promoting a "nuclear renaissance" based on claims that a new generation of reactors will produce relatively cheap electricity while solving threats posed by global climate change. The industry has proposed building almost 30 new nuclear reactors, with some calling for 300 new plants by mid-century. The rapidly escalating and still highly uncertain costs of new nuclear plants—along with the stated unwillingness of Wall Street to finance them—has sent the industry back to the federal government for financial assistance. In response, Congress authorized a package of subsidies in 2005 that included federal loan guarantees and production tax credits. The industry is now asking for more.

In this report, the Union of Concerned Scientists urges Congress to be cautious about committing taxpayer dollars to promote plants that both industry and Wall Street consider too risky to finance on their own. We also identify several critical steps the federal government needs to take before moving ahead with any program that would shift the risks of building new nuclear plants from industry to taxpayers, leading to a third bailout that could dwarf the first two.

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