# NUCLEAR POWER'S FEDERAL LOAN GUARANTEES: THE NEXT MULTIBILLION-DOLLAR BAILOUT?

## HEARING

BEFORE THE

SUBCOMMITTEE ON DOMESTIC POLICY

OF THE

COMMITTEE ON OVERSIGHT AND GOVERNMENT REFORM

HOUSE OF REPRESENTATIVES

ONE HUNDRED ELEVENTH CONGRESS

SECOND SESSION

APRIL 20, 2010

**Serial No. 111–138**

Printed for the use of the Committee on Oversight and Government Reform

Available via the World Wide Web: http://www.fdsys.gov
http://www.oversight.house.gov

U.S. GOVERNMENT PRINTING OFFICE

65–123 PDF WASHINGTON : 2011

For sale by the Superintendent of Documents, U.S. Government Printing Office
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# NUCLEAR POWER'S FEDERAL LOAN GUARANTEES: THE NEXT MULTIBILLION-DOLLAR BAILOUT?

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**TUESDAY, APRIL 20, 2010**

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON DOMESTIC POLICY,
COMMITTEE ON OVERSIGHT AND GOVERNMENT REFORM,
*Washington, DC.*

The subcommittee met, pursuant to notice, at 2:07 p.m., in room 2154, Rayburn House Office Building, Hon. Dennis J. Kucinich (chairman of the subcommittee) presiding.

Present: Representatives Kucinich, Cummings, Welch, Foster, Jordan, Issa, and Towns (ex officio).

Staff present: Jaron R. Bourke, staff director; Jean Gosa, clerk; Charisma Williams, staff assistant; Ron Stroman, chief of staff, full committee; Leneal Scott, IT specialist, full committee; Lawrence Brady, minority staff director; Adam Fromm, minority chief clerk and Member liaison; Stephanie Genco, minority press secretary and communication liaison; Christopher Hixon, minority senior counsel; and Brien Beattie and John Ohly, minority professional staff members.

Mr. KUCINICH. Thank you very much for being here. The Domestic Policy Subcommittee of the Oversight and Government Reform Committee will now come to order. Today's hearing is the first of several Domestic Policy Subcommittee hearings on the topic of the $54 billion loan guarantee program for a new wave of nuclear power plants. Today the subcommittee will hear from nongovernmental proponents and critics of the Federal loan guarantee program. Without objection, the chair and ranking member will have 5 minutes to make opening statements, followed by opening statements not to exceed 3 minutes by any of the Members that seeks recognition.

Without objection, Members and witnesses may have 5 legislative days to submit a written statement or extraneous materials for the record.

American taxpayers have very recent experience with the cost of bailing out businesses. Today's hearing evaluates the likelihood that taxpayers will be saddled with a new bailout. This time the bailout would be for the nuclear power industry.

During the 1970's and the 1980's, economics halted the spread of the nuclear power industry. Cost overruns in building nuclear power plants averaged more than 200 percent. Utilities abandoned 100 plants during construction, around half the plants they had

planned. Taxpayers and ratepayers reimbursed utilities for most of the more than $40 billion cost of these abandoned plants. Ratepayers bore well over $200 billion in cost overruns for completed nuclear plants. In 1985, Forbes Magazine called this, "the largest managerial disaster in business history, a disaster on a monumental scale."

Now, the nuclear industry wants to have a renaissance. They assert that new technologies and standardized plant designs will produce results that are totally different from their prior history of mismanagement, cost overruns and taxpayer or ratepayer bailouts. They say that the cost of planned construction will be lower, that there will be no cost escalations or construction delays, and that the problem of disposal of nuclear waste will be resolved.

Well, Wall Street isn't buying it. The nuclear industry can't get private capital to fund its rebirth. So to have any comeback, they need tens of billions of dollars in Federal loans and Federal loan guarantees backed by American taxpayers. The government appears ready to provide it. On June 30, 2008, the Department of Energy asked for applications for $18½ billion in loan guarantees for nuclear plant construction. The current administration is seeking to triple that amount to $54½ billion. The Department of Energy announced its first nuclear loan guarantee on February 16, 2010, an $8.3 billion loan guarantee to the Southern Co. for construction for two reactors in Georgia.

Not to worry. The nuclear industry and the U.S. Department of Energy say the risks to taxpayers are low. However, the Congressional Budget Office estimated in 2003 that a nuclear power plant project would have a, "well above 50 percent," chance of defaulting on its loan guarantee. And that was for a plant that was estimated then to cost only $2½ billion, with only 50 percent of that cost covered by a loan guarantee. Cost estimates increased substantially after the CBO report in 2003, and Standard & Poor's predicted on October 15, 2008, that the construction costs of nuclear power plants would soar even further. Moody's has referred to the construction of a new nuclear power plant as a "bet-the-farm" investment for most companies.

The purpose of this hearing is to determine whether taxpayer-financed loan guarantees for a nuclear power plant are necessary to jump-start the nuclear renaissance, whether they are being priced correctly, and whether they are likely to create a multibillion-dollar liability for the taxpayer and a multibillion-dollar bailout for the nuclear industry.

As my Republican colleagues have pointed out in their February 3, 2010, policy brief, "While loan guarantees can help utilities with near-term financing, they also create taxpayer liabilities, dole out preferential treatment and distort capital markets." We will hear today from witnesses from all parts of the political spectrum, Democrats and Republicans, conservatives, moderates, liberals.

Finally, a source for a March 5, 2010, article in the Los Angeles Times described the situation the subcommittee is examining in the following way: "Consider buying a car. The salesman has a long history of telling lies, covering up mistakes and breaking promises. He is trying to sell you a car that doesn't exist yet, so he is not sure what it will look like. It is likely to cost at least two, maybe

three times what it says on the sticker. It almost certainly will take much longer to deliver it than he says it will. So the question before us: Why would anybody buy that car?"

[The prepared statement of Hon. Dennis J. Kucinich follows:]

**Opening Statement**
**Of**
**Dennis J. Kucinich**
**Chairman**
**Domestic Policy Subcommittee**
**Of the**
**Oversight and Government Reform Hearing**

**"Nuclear Power's Federal Loan Guarantees: the Next Multi-Billion Dollar Bailout?"**

**2154 of the Rayburn House Office Building**
**Tuesday, April 20, 2010**
**2:00 p.m.**

American taxpayers have very recent experience with the costs of bailing out business. Today's hearing evaluates the likelihood that taxpayers will be saddled with a new bailout. This time, the bailout would be for the nuclear power industry.

During the 1970s and 1980s, economics halted the spread of the nuclear power industry. Cost overruns in building nuclear power plants averaged more than 200 percent…Utilities abandoned 100 plants during construction—around half of the plants they had planned. Taxpayers and ratepayers reimbursed utilities for most of the more than 40-billion-dollar cost of these abandoned plants. Ratepayers bore well over 200 billion dollars in

cost overruns for completed nuclear plants. In 1985, Forbes Magazine called this "the largest managerial disaster in business history, a disaster on a monumental scale."

Now, the nuclear industry wants to have a "renaissance," They assert that new technologies and standardized plant designs will produce results that are totally different from their prior history of mismanagement, cost overruns and taxpayer or ratepayer bailouts. They say that the cost of plant construction will be lower, that there will be no cost escalations or construction delays and that the problem of disposal of nuclear waste will be resolved.

But Wall Street isn't buying it. The nuclear industry can't get private capital to fund its rebirth. So to have any come back, they need tens of billions of dollars in federal loans and federal loan guarantees, backed by American taxpayers. The government appears to be ready to provide it. On June 30, 2008, the Department of Energy asked for applications for $18.5 billion in loan guarantees for nuclear plant construction. The current

administration is seeking to triple that amount to $54.5 billion. DOE announced its first nuclear power loan guarantee on February 16, 2010--an 8.3 billion dollar loan guarantee to the Southern Company for construction of two reactors in Georgia.

Not to worry, the nuclear industry and the U.S. Department of Energy say, the risks to taxpayers are low.

However, the Congressional Budget Office estimated in 2003 that a nuclear power plant project would have a "well-above-fifty per cent" chance of defaulting on its loan guarantee, and that was for a plant that was estimated then to cost only 2.5 billion dollars, with only 50 percent of that cost covered by a loan guarantee. Cost estimates increased substantially after that CBO report in 2003, and Standard & Poor's predicted on October 15, 2008 that the construction costs of nuclear power plants would "soar" even further. Moody's has referred to the construction of a new nuclear power plant as a "bet-the-farm" investment for most companies.

The purpose of this hearing is to determine whether taxpayer financed loan guarantees for nuclear power plants are necessary to

jump-start the nuclear "renaissance," whether they are being priced correctly, and whether they are likely to create a multi-billion dollar liability for the American taxpayer and a multi-billion dollar bailout for the nuclear industry.

As my Republican colleagues have pointed out in their February 3, 2010 Policy Brief, "while loan guarantees can help utilities with near-term financing, they also create taxpayer liabilities, dole out preferential treatment and distort capital markets." We will hear today from witnesses from all parts of the political spectrum, Republicans and Democrats; conservatives, moderates and liberals.

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> "Say you're buying a car. The salesman has a long history of telling lies, covering up mistakes and breaking promises. He is trying to sell you a car that doesn't exist yet, so he's not sure what it will look like. It is likely to cost at least two and

maybe three times what it says on the sticker. It almost certainly will take him much longer to deliver it than he says it will..."

So the question before us, Why would anybody buy that car?

Mr. KUCINICH. The chair recognizes Mr. Jordan.

Mr. JORDAN. Thank you, Mr. Chairman. Thank you for holding this hearing.

When I travel around our district and our State talking about the future of our country, the issue of energy always comes up, and I like to frame it like this. Americans instinctively know that the world is a better place when America leads. We can lead economically, militarily only if we have access to reliable and affordable sources of energy. That is why I'm an advocate for a commonsense, "all of the above" American energy solution.

Everyone here agrees that Americans need cost-effective energy, especially in these tough economic times. Unfortunately, some of my friends on the other side of the aisle take a position on energy policy that is unrealistic at best and disingenuous at worst. On the one hand, they tell us we have to reduce carbon emissions or the sky will fall because of man-made global warming. On the other hand, they impose such draconian regulatory burdens on building new nuclear power plants, the only zero carbon source we have, that no nuclear power plant has been approved in over 30 years. At the same time, they continue to pour billions of dollars we don't have into windmills and solar panels that alone cannot deliver the energy we need.

We cannot power our lives and our economy relying solely on sources of power like windmills and solar panels. Even this Congress can't pass a law that makes the wind blow or the sun shine. Does this mean that wind and solar should not be part of the energy mix in the country? Not at all. We need an affordable energy that is available around the clock. We need an "all of the above" energy policy where consumers, businesses and the free market, not bureaucrats and politicians in Washington, make energy choices.

I am skeptical of all government subsidies because I don't think Washington has the wisdom or, frankly, the ability to pick the right solutions for our Nation's energy needs. That's what the free market does so well. I do not want the arrogance and the abuse of power we saw with the government takeover of health care turn into the blueprint for restructuring the energy sector of our economy.

The real reason we are here today is because some people are ideologically opposed to nuclear power, and the only reason these loan guarantees exist is to offset the cost of burdensome regulation that has been imposed by those who seek to impose their agenda on America's energy future. The best thing we can do as legislators is to clear away the thicket of regulations and subsidies that frustrate the market's ability to find the right mix of affordable energy solutions that our country needs. The solution, quite simply, is less hubris, less government and more humility from Washington politicians.

Thank you, Mr. Chairman. I yield back our time.

Mr. KUCINICH. I thank the gentleman.

For those that just joined us, the topic of the hearing is the $54 billion loan guarantee program for a new wave of nuclear power plants.

The chair recognizes Mr. Foster.

Mr. Issa.

Do you want to check in the cloakroom? OK. Fine. OK.

If there are no more opening statements, I'm pleased to announce that the subcommittee will now receive testimony from the witnesses who are before us. I want to start by introducing our first panel. Mr. Peter Bradford is a former member of the U.S. Nuclear Regulatory Commission, former chairman of both the New York State Public Service Commission and the Maine Public Utilities Commission. He currently chairs Vermont's public oversight panel on the reliability of the Vermont Yankee nuclear power plant. He was a member of the 2007 Keystone Center Collaborative on Nuclear Power and Climate Change and the 2006 National Academy of Sciences panel evaluating alternatives to continued operation of New York's Indian Point nuclear plants. And he has also advised several international bodies on nuclear issues. He is a graduate of Yale University and Yale Law School.

Welcome, Mr. Bradford.

Next is Dr. Arjun Makhijani. He is the president of the Institute for Energy and Environmental Research. He earned his Ph.D. in nuclear fusion at the University of California in Berkeley. He is the author of numerous books and studies, including, "Carbon Free and Nuclear Free: A Roadmap for U.S. Energy Policy." That was in 2007. He is a fellow of the American Physical Society and has served as a consultant to the Tennessee Valley Authority, Lawrence Berkeley Laboratory and several agencies of the United Nations.

Welcome, Dr. Makhijani.

Mr. Jack Spencer is a research fellow in nuclear energy at the Heritage Foundation's Roe Institute for Economic Policy Studies, where he concentrates on subsidy policies, technology issues and nuclear waste management. Previously Mr. Spencer worked at the Babcock & Wilcox Companies on commercial, civilian and nuclear energy issues, and that would be military nuclear energy issues.

Thank you for being here.

Finally for this panel, Ms. Leslie Kass. Ms. Kass is senior director of business policy and programs of the Nuclear Energy Institute, where she is responsible for developing and managing programs related to the business and financial aspects of the nuclear industry. Ms. Kass has 17 years in the industry, having worked for utilities and a uranium enrichment company. She holds a bachelor's degree in materials science and engineering from MIT and an MBA from Duke University's Fuqua School of Business.

I want to thank all of the witnesses for appearing before the subcommittee. It is the policy of the Committee on Oversight and Government Reform to swear in our witnesses before they testify. I would ask that you please rise and raise your right hands.

[Witnesses sworn.]

Mr. KUCINICH. Thank you very much.

Let the record reflect that each of the witnesses answered in the affirmative.

I would ask each witness to give a brief summary of your testimony, and to please keep this summary under 5 minutes in duration. Your entire written statement will be included in the record. And I am grateful for your presence here.

Mr. Bradford, you will be our first witness on the panel. You may proceed.

**STATEMENTS OF PETER BRADFORD, FORMER MEMBER, U.S. NUCLEAR REGULATORY COMMISSION, FORMER CHAIRMAN, NEW YORK STATE PUBLIC SERVICE COMMISSION, FORMER CHAIRMAN, MAINE PUBLIC UTILITIES COMMISSION, ADJUNCT PROFESSOR, VERMONT LAW SCHOOL; ARJUN MAKHIJANI, PRESIDENT, INSTITUTE FOR ENERGY AND ENVIRONMENTAL RESEARCH; JACK SPENCER, RESEARCH FELLOW IN NUCLEAR ENERGY, THOMAS A. ROE INSTITUTE FOR ECONOMIC POLICY STUDIES, THE HERITAGE FOUNDATION; AND LESLIE KASS, SENIOR DIRECTOR OF BUSINESS POLICY AND PROGRAMS, NUCLEAR ENERGY INSTITUTE**

**STATEMENT OF PETER BRADFORD**

Mr. BRADFORD. Thank you, Mr. Chairman, members of the committee.

Without concern over climate change, the 30-year verdict of U.S. power markets that new nuclear reactors were too expensive and too economically risky would remain undisturbed. Instead, some now assert that a massive effort to build new reactors by having taxpayers and customers——

Mr. KUCINICH. Do you want to bring that mic a little bit closer? A little bit more. People can't hear you in the back.

Mr. BRADFORD [continuing]. Take the risks that investors and lenders are refusing to assume will reduce climate change. The opposite is true. Such an undertaking will undermine the fight against climate change by diverting money and attention from the resources that offer much larger atmospheric pollution reductions much sooner and less expensively.

One must begin by understanding the reason that new nuclear plants have not been built in the United States for decades. It has nothing to do with the U.S. reactor licensing or regulatory processes, which licensed more plants than the next several countries combined. It has everything to do with cost and with risk. Competitive power procurement as adopted in free-market economies over the last 25 years shifts the economic risk of all new power plant construction, risks such as plant cancellations, cost overruns and emergence of cheaper competitors, from the customers to investors and lenders. Aware that each of these risks had hit the nuclear industry hard in the recent past, investors and lenders would not put their own money at risk by committing to competitive prices and delivery schedules for new reactors.

Loan guarantees are the centerpiece of the present effort to reverse the successful 30-year evolution of competitive power markets by shifting the risks to taxpayers. But loan guarantees do not lower any actual costs in the way that cheaper steel or concrete would do. For example, the savings that the recently announced $8.3 billion loan guarantee appeared to produce for Georgia's proposed Vogtle reactors are offset by a new taxpayer risk exposure of almost $100 taken on by every family in America. And every additional $10 billion in taxpayer-backed loan guarantees will add another $100 to this exposure.

At its peak in 2008, the nuclear renaissance consisted of 23 existing and projected applications for 34 new reactors. Since 2008, reality has set in. Nuclear cost estimates have risen, demand has fallen, as have the cost estimates for most major alternatives. Several nuclear projects have been canceled outright. Most of the remaining 16 applications for 24 reactors have experienced combinations of major cost overruns and major delays. Most, indeed probably all, of these reactors will not be built without loan guarantees. The economic and political impact of trying to charge the full cost to the customers is just too great. Customer backlash in Florida and in Texas has already demonstrated this.

By way of response to the subcommittee questions directed to me, I will summarize as follows. First: Are the cost overruns in the construction of nuclear power plants a thing of the past or a present-day problem? While we have no current U.S. nuclear construction experience on which to base an answer; however, the trebling of U.S. nuclear cost estimates in less than a decade is not encouraging. Experience in Newfoundland and in France with the design that Areva proposes for Maryland's Calvert Cliffs, a loan guarantee finalist, is also not encouraging. In Finland the Areva reactor, originally scheduled to be on line last summer, has doubled Areva's cost estimate and fallen at least 3 years behind a 4-year schedule.

Some Asian nations claim more success in building to schedule and budgets. Energy Secretary Steven Chu asserts that if the proposed loan guarantees result in plants that come on line on time and on budget, private capital for new nuclear will then become available. But this is wrong. Today's "on budget" is so high in relation to the price of alternatives to the prices projected in our power markets and to the price of energy efficiency that even if new U.S. reactors come on line on budget, the financial community will not invest.

Second: Do we currently have such a demand for electric power that we need to rush into construction of multiple nuclear plants? The United States has little or no demand for wholesale electric power, and new nuclear is forecast at a 12 to 20-cent-per-kilowatt-hour price range. If we make wise use of far less expensive energy efficiency, renewables and natural gas, we will not face electricity shortages, even if we adopt policies that put a meaningful price on greenhouse gas reductions.

Third: Do increased loan guarantees for nuclear power plants misdirect resources? Yes. Those who argue that we have to subsidize many new reactors along with all of the alternatives ignore the economic reality of limited resources and the fact that new nuclear reactors cannot produce near-term greenhouse gas reductions.

Furthermore, I can attest from my own experience regulating in Maine and New York that entities in States committed to building large nuclear projects will deemphasize and even resist alternative sources. One need only look at New Hampshire's 1980's resistance to Hydro-Quebec Power where the opposition of Maine utilities to renewable cogeneration and energy efficiency while the region's utilities struggled to finish Seabrook and Millstone 3 to see this effect clearly. The same was true in New York while Shoreham and

Nine Mile Point 2 preoccupied the State's utilities, and the same is true in Florida today.

However, the problem of misdirected resources is much broader than this. Loan guarantees do not create new capital; they merely create a favored class of borrowers who will have easier access to the available capital than will all other would-be borrowers. Murray Weidenbaum, who was later chairman of President Reagan's Council of Economic Advisors critiquing the failed program to manufacture synthetic fuel from coal many years ago, noted a basic function that credit markets are supposed to perform is that of distinguishing credit risks and assigning appropriate risk premiums. This function is the essence of resource allocation by credit markets. As an increasing proportion of issues coming to credit markets bears the guarantee of the Federal Government, the ability of the market to differentiate credit risks inevitably diminishes.

Fourth: Will the proposed Clean Energy Deployment Administration adequately deal with the risk of defaults? The answer is not as presently written. The Senate version of CEDA, because it has the potential to underwrite unlimited nuclear loan guarantees, is particularly problematic. Secretary Chu recently estimated that the price to be charged for a loan guarantee would range between half of 1 percent and 1½ percent of the face value of the guarantee. For the conditional loan guarantee recently approved for the Vogtle units, this would mean that the average family would receive between 50 cents and a $1.50 for its $100 exposure.

Other estimates of a reasonable credit subsidy fee are considerably higher. For example, the Congressional Budget Office estimated 30 percent in 2003, Standard & Poor's estimated 4 to 6 percent. The Center for American Progress recently did an analysis concluding that the payment should be 10 percent. Underpricing of risk is, of course, a root cause of the current financial crisis.

To make matters worse, the Department of Energy apparently intends to keep secret the credit subsidy fee charged to each guaranteed recipient. The people disadvantaged by this secrecy will be first the public, who will not be able to quantify the extent to which DOE has exposed American families to uncompensated risk; second, builders of other forms of power generation and energy efficiency, who will not be able to prove what now seems very likely, that DOE intends to charge less for guarantees to highly risky nuclear ventures than it will charge for loan guarantees to more secure renewable and solar ventures; third, State utility regulators, who may be unable to set rates based on actual costs since loan recipients may allege that they cannot disclose these costs in a public forum.

In conclusion, whatever the appeal of offering a limited number of loan guarantees to a few first mover plants, meaning six or seven, as part of a bargain that succeeds in passing a meaningful cap-and-trade program, the discussion of loan guarantees in Congress seems to have spun far outside of that orbit. A larger commitment would proclaim new reactors to be a climate change winner when all meaningful economic evidence is to the contrary. It would put energy and climate policy at the service of nuclear power. Sound public policy works the other way around.

Thank you very much.
[The prepared statement of Mr. Bradford follows:]

**Testimony**
**Of**
**Peter A. Bradford**

**Domestic Policy Subcommittee**
**Of the**
**Oversight and Government Reform Committee**
**2154 Rayburn House Office Building**

**Tuesday, April 20, 2010**

**2:00 p.m.**

I'd like to put my responses to the Subcommittee's questions in the context of nuclear power's role in reducing the emissions that cause climate change. Without concern over climate change, the 30 year verdict of U.S. power markets that new nuclear reactors were too expensive and too economically risky would remain undisturbed.

Instead, some now assert that a massive effort to build new reactors by having taxpayers and customers take the risks that investors and lenders would normally assume will reduce climate change. The opposite is true. Such an undertaking will undermine the fight against climate change by diverting money and attention from the resources that offer much larger atmospheric pollution reductions much sooner and less expensively.

**Why new U.S. nuclear reactors must have loans guaranteed by taxpayers.**

One must begin by understanding the reason that new nuclear plants have not been built in the U.S. for decades. It has nothing to do with the U.S. licensing process, which licensed more plants than the next several countries combined. It has nothing to do with citizen intervenors, whose hearings went on while the plants were being built. It has everything to do with cost and risk.

The U.S. moved to competitive power procurement following passage of the Public Utility Regulatory Policies Act in 1978. This movement was expanded in much of the country by electric restructuring in the 1990s.

Competitive power procurement shifted the economic risk of all new power plant construction (plant cancellations, cost overruns, emergence of cheaper competitors) from customers to investors and lenders. Aware that each of these risks had hit the nuclear industry hard in the recent past, investors and lenders would not put their own money at risk by committing to competitive prices and delivery schedules for new reactors. No new nuclear plant has ever bid in a truly competitive power procurement process anywhere in the world.

Generally, this move to competitive power procurement has been a major public policy success. We have had adequate power supplies at declining wholesale prices. And we have stimulated more efficient production as well as technological advance in the process.

This history, coupled with the prohibitively high cost of new reactors, explains why we have had no new nuclear plants in the United States for so many years. New reactors can only be built if someone other than investors and lenders bear the risks. There are only two alternatives: customers and taxpayers. Loan guarantees are the centerpiece of the present effort to reverse the successful thirty year evolution of competitive power procurement by shifting the risks to taxpayers.

Because financing costs are a significant part of the cost of building nuclear plants and because financing costs are driven by the risks, loans guaranteed by the taxpayers not only make building new reactors more feasible, but they lower the price that such facilities must charge to earn a profit on their electricity. But they do this not by lowering any actual cost – in the way that cheaper steel or concrete would do. Instead, they shift risk to the government. The overall cost to U.S. citizens is not lowered at all. So, for example, the savings that the recently announced $8.3 billion dollar loan guarantee appears to produce for the Southern Company and its partners in Georgia's proposed Vogtle reactors are offset by a taxpayer risk exposure of almost $100 taken on by every family in America. And every additional $10 billion in taxpayer backed loan guarantees that the federal government issues will add another $100 per family to this exposure.

**The status of the "nuclear renaissance"**

Loan guarantees no more express financial health than transfusions express physical health. The nuclear industry's need for loan guarantees is a confession of the bankruptcy of the much touted nuclear renaissance. At its peak in 2008, the renaissance – driven by not by real need but by the deadlines in laws offering subsidies - consisted of 23 existing and projected applications for 34 new reactors between 2007 and 2011. Since then reality has set in. Nuclear cost estimates have risen. Demand has fallen, as have the cost estimates for most major alternatives. Several projects have been cancelled outright. Most of the remaining 16 applications for 24 reactors have experienced combinations of major cost overruns and major delays, including several outright suspensions.

In fact, most – probably all - of these reactors will not be built without loan guarantees. The economic and political impact of trying to charge the full costs to the customers is just too great. Customer backlash in Florida and in Texas has demonstrated this while calling the viability of at least six of the proposed new reactors into serious question.

The battle for loan guarantees is the nuclear renaissance's last stand. Whether it is extinguished altogether, whether it takes the form of a carefully crafted opportunity to ascertain the potential of the new designs and the new licensing process to produce competitive low carbon energy or whether the "renaissance" becomes an unlimited socialist bonanza – converting the nuclear industry into a corporate version of President's Reagan's high-living welfare queen, cruising the nation's power grid in a taxpayer funded Cadillac is for the Congress now to decide.

**Responses to subcommittee questions**

1. **Are the costs overruns in the construction of nuclear power plants a thing of the past or a present day problem?**

We have no current U.S. nuclear construction experience on which to base an answer. However, the trebling of U.S. nuclear cost estimates in less than a decade is not encouraging. Experience in Finland and France with the design that Areva proposes for Maryland's Calvert Cliffs (a loan guarantee finalist) is also not encouraging. In Finland, the Areva reactor – originally scheduled to be online last summer - has doubled Areva's cost estimate and fallen three years behind a four year schedule.

Some Asian nations claim more success in building to schedule and budgets. However, it is important to understand that cost estimates for new reactors have risen so high that overruns are not necessary to price nuclear power far out of the market. Energy Secretary Stephen Chu asserts that, if the proposed loan guarantees result in plants that come on line "on time and on budget", private capital for new nuclear will then become available.

But this is wrong.

Today's "on budget" is so high in relation to the price of alternatives, to the prices projected in our power markets and to the price of energy efficiency that – even if the new reactors come on line "on budget" - the financial community will still not invest.

2. **Do we currently have such a demand for electric power that we need to rush into construction of multiple nuclear plants, or do we have time to experiment and to see what works and what does not?**

Demand for electric power depends on price. The U.S. has little or no demand for wholesale electric power in new nuclear's forecasted 12-20 cent per kwh price range. If we make wise use of far less expensive energy efficiency, renewables and natural gas, we will not face electricity shortages for many years. This will be true even if we adopt policies that put a meaningful price on greenhouse gas reductions.

New reactors simply will not be built without massive federal support, especially in the majority of U.S. markets that rely on competitive power procurement. Where regulators decide what gets built and have the power to shift risk to customers, the future of new reactors will depend on the quality of their resource planning processes and their willingness to have customers join taxpayers in taking the risks that investors and lenders refuse to bear.

Those who argue in the context of climate change that "we need silver birdshot, not a silver bullet" to fight climate change and that therefore we have to subsidize new reactors along with all of the alternatives ignore the economic reality of limited resources and the fact that new nuclear reactors cannot produce near term green house gas reductions. The excessively costly emission savings that they do produce are very small until two or more decades from now. The money that has gone into them will have detracted from other options that produce greater savings in less time.

Furthermore, I can attest from my own experience regulating in Maine and New York that entities and states committed to building one or more large nuclear projects will deemphasize and even resist alternative sources. One need only look at New England's

1980s experience with Hydro-Quebec power, with renewables in Maine and with energy efficiency while the region's utilities struggled to finish Seabrook and Millstone 3 to see this effect clearly. The same was true in New York as to natural gas and independent power production while Shoreham and Nine Mile Point 2 preoccupied the state's utilities. And the same is true in Florida today.

3. **Do increased loan guarantees for nuclear power plants misdirect resources that could be better used for energy efficiency and renewable power projects?**

Yes, but the problem of misdirected resources is much broader than that. Federal loan guarantees do not create new capital. They merely create a favored class of borrowers who will have easier access to the available capital than will all other would-be borrowers – not just efficiency and renewables but worthwhile projects in many sectors. Because it is now clear that demand for borrowing is likely to strain available capital for all purposes just when nuclear construction would be ramping up[1], favoring new reactors at the expense of all other societal needs(while simultaneously burdening the U.S. government's stressed credit rating) is especially problematic. Loan guarantees will reduce the funds available for all unassisted borrowers, leading them to request aid of their own. The borrowers that remain unsubsidized will have to pay higher interest rates.

Furthermore, loan guarantees distort credit market in other ways. As Murray Weidenbaum, later Chairman of President Reagan's Council of Economic Advisors, pointed out in critiquing the failed program to manufacture synthetic fuels from coal many years ago[2], "A basic function that credit markets are supposed to perform is that of distinguishing credit risks and assigning appropriate risk premiums. This function is the essence of resource allocation by credit markets. As an increasing proportion of issues coming to the credit markets bears the guarantee of the federal government, the ability of the market to differentiate credit risks inevitably diminishes. Theoretically the federal agencies issuing or guaranteeing debt perform this role, charging as costs of the programs differing rates of insurance premiums. In practice, all of the pressures are against such differential pricing of risks (p 13).

Dr. Weidenbaum further quotes MIT Professor Henry Jacoby, a supporter of limited loan guarantees, as follows: "The problem with loan guarantees is that they tend to hide the true cost of the technology that is being demonstrated..... 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 (pp. 41-42).

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1. See "Tight Credit Seen as March 1 Debts Come Due", New York Times, March 16, 2010, P. 1 and "Moody's Says U.S. Debt Could Threaten Triple A Rating" New York Times, March 16, 2010, p. B 1.

[2] Murray Weidenbaum and Reno Harnish, with James McGowen, "Government Credit Subsidies for Energy Development", (American Enterprise Institute for Public Policy Research, 1978). For a more amusing and recent critique of nuclear loan guarantees, see Douglas Koplow, "Nusubsidies Nuclear Consortium: Where the Taxpayer is Our Favorite Investor" (Earthtrack Institute, 2005) (www.earthtrack.net/earthtrack/library/NNC_Overview.pdf)

In the same synfuels context, the General Accounting Office observed that "The bill would hamper conservation efforts rather than simply fail to promote them.....Its guarantees would make projects it assists financially more attractive to private capital than conservation projects not backed by federal guarantees. Thus both its loans and its guarantees will siphon private capital away those conservation projects which might have been able to obtain private financing (p. 12)

**4. Will the proposed Clean Energy Deployment Administration (CEDA) adequately deal with the risk of defaults?**

Not as presently written. The Senate version of CEDA, because it has the potential to underwrite unlimited nuclear loan guarantees, is particularly problematic. The risk of defaults and estimated loss to taxpayers should be offset by the price charged for the loan guarantees. Neither CEDA nor the existing loan guarantee program as presently structured offer any assurance that this will in fact be the case. Secretary of Energy Chu recently estimated that the price to be charged for a loan guarantee would range between .5 percent and 1.5 percent of the face value of the guarantee. For the conditional loan guarantee recently approved for the Vogtle units, this would mean a range of $41.5 million to $124.5 million. The average family, would receive between 50 cents and $1.50 for its $100 exposure.

Other estimates of a reasonable credit subsidy fee are considerably higher. For example, the Congressional Budget office estimated 30% in 2003. Standard and Poor's estimated 4-6%. The Center for American Progress recently did an analysis concluding that the payment should be 10%.

Most analysts – including the Government Accounting Office and the Congressional Budget Office - agree that the Department of Energy has a poor record in managing loan guarantees and that it is highly likely to underestimate potential losses to taxpayers.

To make matters worse, the Department of Energy apparently intends to keep secret the credit subsidy fee charged to each guarantee recipient on the preposterous ground that company's shouldn't be able to compare fees and complain about unequal treatment. But the industry recipients will be free to discuss this information among themselves. The people disadvantaged by this secrecy will be

First, the public, who will not be able to quantify the extent to which DoE has exposed American families to uncompensated risk;

Second, builders of other forms of power generation and energy efficiency, who will not be able to prove what now seems very likely – that DoE intends to charge less for guarantees to highly risky nuclear ventures than it will charge for loan guarantees to more secure renewable and solar ventures;

Third, state utility regulators, who may be unable to set rates based on actual costs since loan recipients may allege that they cannot disclose these costs in a public forum.

In conclusion, I can see the appeal of offering a limited number of loan guarantees to a "few first mover plants" (meaning six or seven), at least if such a step is part of a bargain that succeeds in passing a meaningful cap-and-trade program. But the discussion of loan guarantees in the Congress seems to have spun far outside of that manageable orbit. A larger commitment would proclaim new reactors to be a climate change winner when all meaningful economic evidence is to the contrary. It would put energy and climate policy at the service of nuclear power. Sound public policy would work the other way around.

Mr. KUCINICH. Dr. Makhijani.

**STATEMENT OF ARJUN MAKHIJANI**

Mr. MAKHIJANI. Thank you, Mr. Chairman. I really appreciate the opportunity to testify before you. And I just want to take this personal opportunity to thank you for reading my book, "Carbon Free, Nuclear Free," and for making it part of your Presidential campaign. Thank you very much.

You asked me six questions, and I will just go question by question and summarize my testimony along those lines. The first question was, why won't Wall Street invest in nuclear power plants, and why does Moody's call them "bet-the-farm" investments?

Now, I will just give you some examples. Starting with a quote from the CEO of General Electric, Mr. Immelt, he was quoted in the Financial Times as saying, if you were a utility CEO and looked at your world today, you would just do gas and wind. You would say they are easier to site, digestible today, I don't have to bet my company on any of this stuff. You would never do nuclear. The economics are overwhelming.

Now, he was promoting loan guarantees because you couldn't do nuclear without betting the company. What does "betting the company" mean? Let us take some examples. Progress Energy wants to build two reactors in Florida with estimated costs of $17 billion. Now, these are company estimates. Progress Energy's market capitalization when I wrote this testimony last month was $10.85 billion. That is, the cost of the project is a lot more than the market capital of the company. Florida Power, a little bit better. Its price tag is $14 billion for two reactors, and its market capitalization last month was $19.41 billion, but still quite close to the market capitalization of the company. If you look at CPS Energy, which is one of the country's largest publicly owned utilities, a municipal utility for the city of San Antonio, its entire assets, gas, electric, buildings, transmission, distribution, the net value of those assets at the end of its last fiscal year in January 2009 was $6.4 billion. And it had at one time 50 percent of two reactor projects in south Texas, and that 50 percent, one reactor, is now estimated costs of $9.1 billion, quite a bit more than the net worth of the whole company on the books, on its own books.

Now, Wall Street has flatly refused to finance these projects. There are three problems. It is not just the high cost; it is the long lead time compared to alternatives, which also compounds the risk. And it is the large unit size, which also compounds the risk.

And I just would like to add that Mr. Bradford mentioned that nuclear would squeeze out alternatives, and one reason it squeezes out alternatives is that when you put more than the value of your company on one project, and that project isn't going to return a dollar to you for 8 or 10 years, you can't afford to put another comparable investment in anything else.

Now, in Florida, ratepayers are paying in advance for these reactors without any assurance that they are going to get any electricity in return. The legislature there passed a construction work in progress law. And it is not just home-owning ratepayers that are protesting; businesses are also protesting. Here is what the Washington Post said: Utilities advance payments are consumer losses,

and businesses such as Georgia Industrial Group and Georgia Textile Manufacturing have joined consumer and environmental groups in combating State laws and higher rates.

Now, the four reactors in Florida are in some question as a result of this ratepayer protest, including ratepayers—business ratepayers who are not against nuclear power. They just say, "We don't want to pay in advance," and they have no guarantee they are going to get anything for this money. It is like giving a builder an advance to build you a house, but you have no contract that says they are actually going to build it and give you the keys. If they abandon the project halfway, you will have no recourse.

Now, the San Antonio case is actually very interesting because the city spent—the city's utility spent about $370 million on paperwork and initial engineering. They don't have a price, a final price. They won't have a final price until 2012. And the part—its partners, NRG Energy and Toshiba, were 50/50 initially in this project. There was an alleged cover-up of the cost overruns. Initially the company had said $5.4 billion and then $6 billion and then $7 billion when I arrived on the scene in San Antonio in March 2008. When I assessed the project, I felt the cost would be between $12 and $17 billion in round numbers, as you have said, Mr. Chairman, two to three times what the company said at the time. By last fall it seemed clear that their cost estimate was going to be something like $18 billion, a little bit more than my high end. Now the project is in something of a mess because CPS Energy wants to withdraw.

You asked me about new reactor designs.

Mr. KUCINICH. I would just ask the gentleman if you could wrap up your testimony and then maybe we could get to some of the other points in the questioning period.

Mr. MAKHIJANI. Sure. Should I wrap it up now, or do you want me to go over——

Mr. KUCINICH. If you would make the last point you wanted to make, and then we will have to move on.

Mr. MAKHIJANI. OK. The last couple of points are that there is no reactor that we have that is proposed to be built that is fully certified as of now because the certified reactors have design modifications they've asked for. And I would say that 3 or 4 years ago, I believed that it would be impossible—essentially it was an educated guess to make a renewable energy system in this country, and I changed my mind when I did the research. That is why I wrote my book, "Carbon Free, Nuclear Free." I believe it is possible to do an economical energy system, and I have debated nuclear energy and nuclear power performance on this numerous times since my book was published.

Mr. KUCINICH. Thank you, Dr. Makhijani.

And members of our committee will have an opportunity to get your questions, and some of the other points you wanted to make I'm sure you will be able to get in.

The chair recognizes Mr. Spencer. Thank you for being here. You may proceed.

**STATEMENT OF JACK SPENCER**

Mr. SPENCER. Chairman Kucinich, Ranking Member Jordan——

Mr. KUCINICH. Would you pull that mic a little bit closer so we can all hear you? Thanks.

Mr. SPENCER. My name is Jack Spencer, and I'm a research fellow for Nuclear Energy Policy at the Heritage Foundation. The views I express in this testimony are my own and should not be construed as representing any official position of the Heritage Foundation.

A limited loan guarantee program can help overcome some near-term financing obstacles, but President Obama's expansion could transform a limited program into a broader one that threatens to institutionalize both the existing systemic challenges as well as inefficiencies that subsidies ultimately create.

By subsidizing a portion of the actual cost of a project, nuclear or otherwise, through a loan guarantee, the government is actually distorting the allocation of resources by directing capital away from more competitive projects.

These subsidies have four market-distorting properties that I would like to discuss. First, the loan guarantee artificially discounts the cost to build a project, which allows the recipient's project to be market viable at a point where it otherwise would not be. This allows the recipient to focus on other measures, even securing the next subsidy, rather than addressing cost-inflating issues.

Second, this artificial price reduction removes the incentive to look for less expensive or more competitive options. It also hurts competition within the nuclear industry. A utility that cannot afford a large subsidized reactor might be able to afford multiple smaller ones. This would create competition, and the subsidized technologies would either have to reduce costs or lose market share.

Third, a major problem facing nuclear power in the United States is not that it lacks subsidies, but that the regulatory environment does not promote growth, innovation or competition. Regulatory reforms could substantially reduce the investor risk, which would be reflected in lower financing costs. Guaranteeing the loans reduces near-term pressure to fix this ongoing problem.

And finally, they suppress private-sector financing solutions. Companies routinely invest in projects with substantial risks without government loan guarantees. Finding a way to develop an investment is at the heart of free enterprise, but loan guarantees distort this process and remove the incentive to come up with better long-term solutions.

If loan guarantees are expanded, they must be coupled with reforms and conditions. Any expansion of the loan guarantee program should be accompanied by the following five conditions, which would help reduce their market-distorting effects, protect the taxpayer, and ensure a strong, market-viable nuclear industry in the long term.

First, end loan guarantees and capital subsidy programs. Stopping the program at $54½ billion in total loan guarantees, which is the President's total, would at least limit the damage and provide a deadline whereby industry and government must have resolved their outlying issues.

Second, ensure that the recipients pay the full cost of the subsidy. While the President's budget did not request funds to pay for the subsidy cost, legislation introduced over the past year has. This should be avoided. An accurate financial assessment should provide a market incentive to reform the policies that give rise to the risks to begin with. This will occur, however, only if the true cost of the subsidy is assessed, and if guarantee recipients are responsible for paying that cost.

Third, make recipients privately refinance within 5 years of project completion. Rather than a long-term financing option, the loan guarantee program should be viewed as a bridge program to protect investors against project failure during its most vulnerable stages. Upon completion, loan recipients should privatize liability by refinancing without support of additional taxpayer backing.

Fourth, limit loan guarantees to no more than two plants of any reactor design. Completing the permitting process for two plants that share a single reactor design should be sufficient to establish regulatory integrity. This condition would also ensure that no one reactor design monopolizes the program, and that Federal regulators diversify their regulatory experience.

And finally, limit to two-thirds of the loan guarantee program that can support a single technology. Because regulatory support is a necessary prerequisite to reactor use, and the regulatory environment favors large light water reactors, nuclear investors tend toward this technology as it poses the least regulatory risk. Ensuring that the subsidy is not consumed by a single reactor type should help break the regulatory monopoly currently held by light water reactors by lowering the relative risk of emerging commercial nuclear technologies.

If not subsidies, then what? Whether through the promise of subsidies, regulatory problems, unworkable waste management policies or DOE programs that stifle competition, the current policies are not working. The following reforms should be pursued instead of subsidies. Reform the permitting process for new nuclear power plants. Creating a more efficient and predictable permitting schedule should be a top priority, but that alone is not enough. The NRC must also be better prepared to regulate reactor technologies beyond large light water reactors.

Waste management policy reform. The current system is driven by government programs and politics. There is little connection between used fuel management programs, economics and the needs of industry. Any successful plan must grow out of the private sector and be driven by sound economics.

And finally, supporting the NRC's authority to determine the safety of Yucca Mountain. The NRC should be allowed to review the Department of Energy's permit application for the Yucca Mountain repository and determine if it can be constructed and operated safely.

In conclusion, a true nuclear renaissance cannot be micromanaged from Washington, but with the right free-market policies in place, nuclear energy has a chance to literally change the world. That concludes my testimony. I look forward to your questions.

Mr. KUCINICH. Thank you, Mr. Spencer.

[The prepared statement of Mr. Spencer follows:]

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*CONGRESSIONAL TESTIMONY*

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**Jack Spencer**
**Research Fellow, Nuclear Energy Policy**
**The Heritage Foundation**

# Domestic Policy Subcommittee
# Of the
# Oversight and Government Reform Committee

## Tuesday, April 20, 2010
## 2154 Rayburn HOB
## 10:00 a.m.

## "Nuclear Power Federal Loan Guarantees: The Next Multi-Billion Dollar Bailout?"

Chairman Kucinich, Ranking Member Jordan, and Members of the Subcommittee: My name is Jack Spencer. I am the Research Fellow for Nuclear Energy Policy at The Heritage Foundation. The views I express in this testimony are my own, and should not be construed as representing any official position of The Heritage Foundation.

Thank you for inviting me to testify before the Domestic Policy Subcommittee of the Oversight and Government Reform Committee.

As we sit here today there are approximately 440 commercial nuclear reactors operating around the world. One hundred and four of them are operating in this country alone. With the exception of a few highly publicized and, I might add, mostly misunderstood, accidents, these reactors have operated safely, cleanly, and to the benefit of society for most of their lifetimes.

This is not to suggest that no problems have ever arisen. It is merely to acknowledge the good track record of nuclear power.

And it is this track record that essentially brings us here today to discuss the economic advisability of increasing the availability of loan guarantees for the construction of new nuclear power plants.

President Obama's 2011 budget requests an additional $36 billion in loan guarantee authority to nuclear energy projects. When added to the $18.5 billion previously authorized under the Energy Policy Act of 2005, the American taxpayer will now be subsidizing $54.5 billion in loans to the nuclear industry (if the budget is approved).

Limited loan guarantees can help overcome some near-term financing obstacles, but they are subsidies. If not used prudently, they will only act to prop up non-competitive industries. Furthermore, if they are not accompanied by policy reforms, they would simply magnify the uncertainty, and thus the risk to

taxpayers, caused by the underlying policies that make private financing difficult to attain in the first place.

### Tolerable to a Degree

The clean energy loan guarantee program, under which the nuclear program resides, was created in 2005 to help move new clean energy sources toward market viability. A limited loan guarantee program that allowed industry and government to share risk while working through some remaining issues (such as waste disposal and unpredictable regulation) is appropriate.

Expansive loan guarantee programs, however, are fraught with problems. At a minimum, they create taxpayer liabilities, give recipients preferential treatment, and distort capital markets. Further, depending on how they are structured, they can remove incentives to decrease costs, stifle innovation, suppress private-sector financing solutions, perpetuate regulatory inefficiency, and encourage government dependence.

President Obama's expansion would transform the limited program into a much broader one that threatens to institutionalize the inefficiencies that subsidies create. Most basically, the program diminishes the incentive to reform problematic regulations and policies, such as the prolonged and unpredictable permitting process, because the loan guarantee protects investors against the risk posed by those policies. Instead of providing a near-term transition from an unstable past to a viable future during which policy reforms would take place, the expanded loan guarantee program would simply perpetuate the systemic inefficiencies and risk that gave rise to the need for the subsidy in the first place.

### Market Distortion

The program, under which the government guarantees bank loans for power projects, was originally sold as a way to help move new, clean energy sources

toward market viability. Regarding nuclear power, given the past role of organized political opposition and overzealous regulators in making the industry uncompetitive, some limited, near-term help to reduce government-imposed risk was appropriate. In support of including nuclear energy as part of the program, former Secretary of Energy Spencer Abraham argued, "I am not calling for massive ongoing subsidies to the nuclear industry, [but] I do believe some federal financial participation is in order to help defray a percentage of the high, first-time costs associated with new generation construction." The same was argued for other energy sources as well.

But as America edges toward a massive expansion of the loan guarantee program, not all of which will go to nuclear, this starts looking very much like an ongoing subsidy.

And it is a subsidy that does not need to be extended. Consider an exchange between Senator Richard Burr (R-NC) and Secretary of Energy Steven Chu during the Secretary's confirmation hearing. Senator Burr suggested that the existing loan guarantee program was so poorly run that utilities were being forced to build reactors without the loan guarantees.

Emblematic of the subsidy-first mentality of modern U.S. energy policy, the conclusion was not that this demonstrates the market viability of nuclear power but that the subsidy program should be more workable. They were inviting government dependence.

And that is the problem with loan guarantees: They distort normal market forces and encourage government dependence.

### How Loan Guarantees Distort the Market

One problem with the larger national economic debate is that we too often act as if money—or, more accurately in this example, savings or capital—grows on

trees. It comes from real people who have saved and invested and exists in finite amounts. By subsidizing a portion of the actual cost of a project through a loan guarantee, the government is actually distorting the allocation of resources by directing capital away from a more competitive project.

This signals to industry (be it nuclear, wind, clean coal, natural gas, or anything else) that it does not have to be competitive. It reduces incentives to manage risk and be independent, innovative, and efficient. Loan guarantees also distort the risk of failure businesses traditionally take into account when financing a project. The end result will be a new nuclear, wind, or solar industry that is built for the short run and not sustainable.

While a loan guarantee may be good for the near-term interests of the individual guarantee recipient, it is not good for consumers, taxpayers, or long-term competitiveness.

Loan Guarantees specifically distort the market because:

**They remove incentives to decrease costs.** The loan guarantee discounts the cost to build a project, and this artificial price reduction allows the recipient's project to be market viable at a point where it otherwise would not be. The consumer will eventually have to pay for this artificial reduction either through higher prices once the subsidy is removed or by being denied access to the less expensive technology that the guarantee recipient displaced. Eventually, these inefficiencies will result in higher electricity prices for consumers.

**They stifle competition and innovation both between sectors and within sectors.** The loan guarantee artificially reduces the cost of capital, which allows a recipient to offer its product at below actual cost. This removes the incentive to look for less expensive or more competitive options. If a product is not competitive in a free market, then it should be allowed to adjust or fail.

Part of the success of nuclear energy will depend on competition within the industry. While a utility might not be able to afford a single large reactor without subsidies, it might be able to afford multiple smaller rectors or a reactor based on some other technology. This would create competition, and the subsidized technologies would have to either reduce costs or lose market share. This competitive environment, with other energy sources and within the nuclear sector, would force the entire industry to become more efficient, innovative, and cost-effective.

**They perpetuate the regulatory status quo.** Nuclear energy could transform how the nation produces energy. But one of the big problems with the success of nuclear power in the United States is not that it lacks subsidies but that the regulatory environment for nuclear power does not promote growth, innovation, or competition.

Assuming the permitting process works perfectly, it takes the Nuclear Regulatory Commission four years to permit a new reactor. That is too long. Furthermore, the commission is prepared to permit only one type of reactor, essentially limiting competition to a handful of companies and one technology.

Another regulatory obstacle is the nation's dysfunctional nuclear waste management strategy. The federal government has taken responsibility of nuclear waste (or used fuel) management, allowing nuclear power producers to largely ignore waste production—a critical element of the nuclear fuel cycle—when developing their business models. Because each nuclear technology produces a unique waste stream that has its own characteristics, some reactor types would be more attractive than others depending on how the waste was being managed. But so long as nuclear operators do not have to consider waste management, reactors with attractive waste characteristics can be ignored.

Furthermore, developing a sound approach to waste management would substantially reduce investor risk, which would be reflected in lower financing

costs. Guaranteeing the loans reduces near-term pressure to fix this ongoing problem.

**They suppress private-sector financing solutions.** Companies invest in major projects with substantial risk all the time and do so without government loan guarantees. If they believe that the potential reward justifies the risk, they figure out a way to secure financing. This might include forming a consortium with other firms to share risk or developing an industry insurance scheme of some sort. Numerous companies exist in the private sector to insure large projects. Finding a way to develop an investment is at the heart of capitalism. But loan guarantees distort this process and remove the incentive to come up with better long-term solutions.

### If Loan Guarantees Are Expanded, They Must Be Coupled with Reform and Conditions

The United States energy consumer and taxpayer would be best served by the federal government simply resolving outstanding regulatory issues. This would increase investor confidence and reduce the need for expanded loan guarantees. However, if Congress moves forward with a loan guarantee expansion, accompanying the guarantees with the following conditions would help reduce their market distorting effects, protect the taxpayer, and ensure a strong, market viable nuclear industry.

**End Further Loan Guarantees.** Transforming a limited program into a permanent subsidy virtually guarantees that the negative potential impacts of loan guarantees will come to pass.

Expanding the program by $36 billion already diminishes near-term support for reform efforts. Stopping the program at $54.5 in total loan guarantees would at least limit the damage and provide a deadline whereby industry and government must have resolved their outlying issues.

**Ensure That Recipients Pay the Full Cost of the Subsidy.** As the program stands, loan recipients are responsible for paying the subsidy costs—a determination of the long-term liability to the federal government of the loan guarantee. The cost, which is calculated based on the risk of default and taxpayer losses as a result of default, is required to be paid either by an appropriation to the Department of Energy or by way of payment from the guarantee recipient.

The President's budget did not request funds to pay for the subsidy cost, however, legislation introduced over the past year has.[1] This legislation was the result of controversy over what the actual subsidy costs should be. Many nuclear advocates argued that it should cost 1-2 percent of the project, whereas nuclear critics argued that it should be closer to 50 percent. Accurately assessing the risk will ensure that the market integrity of nuclear power is sustained and reflect the true risk associated with nuclear power.

Given that problematic public policy has caused much of the risk associated with new nuclear plants, a true financial assessment should provide a market incentive to reform the policies that give rise to the risk to begin with. This will occur, however, only if the true cost of the subsidy is assessed and if guarantee recipients are responsible for paying that cost.

**Make Recipients Privately Refinance within Five Years of Project Completion.** The most compelling argument for loan guarantees is that political and regulatory unpredictability have made competitive private financing difficult to secure. Since government is a primary source of this unpredictability, it is only fair that government offset the costs associated with high risk.

[1] Although the President's budget did not request funding to cover the subsidy costs for nuclear loan guarantees, it did request $500 million to cover the subsidy costs for renewable projects. This funding should be eliminated. The Clean Energy Act of 2009, introduced by Senators Lamar Alexander (R-TN) and James Webb (D-VA), authorized $10 billion to fund the subsidy cost of the $100 billion nuclear loan guarantee program offered in that legislation.

But once the project is complete, that risk should be eliminated. Thus, rather than a long-term financing option, the loan guarantee program should be viewed as a bridge program that helps to protect investors against project failure during its most vulnerable stage: licensing and construction. Upon completion, loan recipients should privatize liability by privately refinancing without support of additional taxpayer backing.

**Limit Guarantees to No More Than Two Plants of Any Reactor Design.** Establishing regulatory integrity should substantially reduce the risk associated with bringing innovative technologies to market, thus removing the need for a loan guarantee. Completing the permitting process for two plants that share a single reactor design should be sufficient to establish that integrity.

Therefore, Congress should limit loan guarantees to no more than two plants of any reactor design. This will also ensure that no one reactor design monopolizes the program and that federal regulators diversify their regulatory experience.

**Limit to Two-Thirds ($36 Billion) of the Loan Guarantee Program That Can Support a Single Technology.** Because regulatory support is a necessary prerequisite to reactor use and the regulatory environment favors large, light water reactors (LWRs), nuclear investors tend toward this technology as it poses the least regulatory risk. Ensuring that the subsidy is not consumed by a single reactor type should help to break the regulatory monopoly currently held by LWRs by lowering the relative risk of emerging commercial nuclear technologies.

As the Nuclear Regulatory Commission (NRC) builds regulatory expertise to meet this demand, it will be breaking down one of the primary barriers that small and modular reactors currently face: a lack of regulatory support.

**If Not Subsidies, Then What?**

Instead of developing a subsidy package that merely perpetuates uneconomical and obsolete policies and practices, the time is ripe to engage in a major overhaul of how the U.S. government interacts with the nuclear industry. All of the major policies, regulations, and legislation that govern America's nuclear industry are from a different time and place. They were either put in place to achieve some national objective that is no longer relevant or to govern an industry whose future was very different from today's.

The fact is that the modern nuclear industry and the regulation that governs it grew out of a set of national security requirements. To achieve those critical national objectives, there was a legitimate need for close private/public partnerships, and the original Atomic Energy Act of 1954 reflected that by establishing a government entity, the Atomic Energy Commission, that oversaw the development of military and civilian uses of nuclear power and the regulation of those uses.

Over time, the industry evolved and so did the regulations that govern it. The Atomic Energy Act went through a major overhaul in 1974 with the Energy Reorganization Act, which established the Nuclear Regulatory Commission and the Department of Energy. This placed the promotion of nuclear energy in the Department of Energy and the regulation of those activities with the NRC.

The next major reorganization came under the 1982 Nuclear Waste Policy Act, which placed the responsibility for nuclear waste disposal with the federal government while the cost of those activities would be paid by industry.

And finally was the Energy Policy Act of 1992, which attempted to streamline the burdensome and inefficient two-step permitting process. The Act created a one step process by which the applicant could receive both a construction and operating license.

With each of these steps, we see a movement to disconnect commercial nuclear activities from government. The result of this evolution is the nuclear industry we have today. It is an industry that knows how to operate in the free market and has done so very successfully. America's 104 reactors exist largely without subsidy and have become some of the most efficient and safest energy-producing machines ever built and operated. America has a growing private fuel enrichment industry. The private sector is investing in nuclear infrastructure and education.

However, the work to fully commercialize and realize the full potential of nuclear power is not finished. Though one foot is firmly planted in the free market, one foot remains shackled by the federal government. Whether through the promise of subsidies, regulatory obsolescence, unworkable waste management policies, or anti-competitive behavior in the DOE, current policies are not working. That is because the industry has evolved and ready to take the final step towards full commercialization.

That is why the time has come to take a hard look at nuclear energy in the United States and develop a new governing set of regulations and policies that recognize the present state of nuclear energy in the U.S. and its potential.

Such reorganization should achieve the following:

**Reform the Arduous Permitting Process for New Nuclear Power Plants.** Congress should institute a fast-track program for granting construction/operation permits for certain new plants. To qualify, a new plant would have to have a NRC-certified design, be located on a site that already has a plant, and be operated by an experienced nuclear operator.

**Prepare the NRC to Regulate Multiple Technologies.** The NRC is built to regulate large light water reactors. It simply does not have the regulatory expertise to efficiently regulate other technologies, and building that expertise takes time.

Helping the NRC to develop that expertise now would help bring new technologies into the marketplace more smoothly.

**Modernize Nuclear Waste Management.** Congress should authorize nuclear waste producers to finance and manage their own spent nuclear fuel however they see fit so long as public health and safety is protected. This must include repealing the fee paid to the federal government for waste disposition activities. Fees already paid to the federal government should either go toward financing geologic storage or be returned to the ratepayers.

**Support the NRC's Authority to Determine the Safety of Yucca Mountain.** The NRC should be allowed to review the Department of Energy's permit application for the Yucca Mountain repository and determine if it can be constructed and operated safely. If it is deemed safe, Congress should allow the nuclear power industry to negotiate the eventual opening of the repository with the people of Nevada. If the Administration wants to oppose Yucca Mountain, it should not evade congressional authority, enacted statute, or the established regulatory process. To terminate the Yucca project legitimately, the Administration should seek to overturn current policy through legislative initiative.

## Conclusion

In conclusion, a true nuclear renaissance cannot be micromanaged from Washington. While subsidies and government support programs may have been part of the emergence of America's nuclear energy industry, it was also this dependence that helped to bring it down.

But the industry did not die. Indeed, just the opposite happened. As government support waned, America's private sector took its existing reactors and made them some of the safest and most efficient energy-producing machines in the world. America's nuclear operators know that nuclear energy is a safe, affordable, and clean source of power, and that is why they invest in it. And if Washington would

put the right free-market policies in place, the stage would be set for not just a handful of new reactors but a sustainable nuclear resurgence.

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Mr. KUCINICH. Ms. Kass, you may proceed.

**STATEMENT OF LESLIE KASS**

Ms. KASS. Thank you, Mr. Chairman.

Chairman Kucinich, Ranking Member Jordan and members of the subcommittee, thank you for your interest in loan guarantees for the construction of new nuclear power plants to meet our Nation's energy needs and reduce carbon emissions. I appreciate the opportunity to speak with you today.

As the President stated last month at the announcement of the conditional commitment for loan guarantees offered to the Vogtle nuclear project, "To meet our growing energy needs, and to prevent the worst consequences of climate change, we need to increase our supply of nuclear power." It is that simple. Investing in nuclear energy remains a necessary step. I hope that this announcement underscores both our seriousness in meeting the energy challenge and our willingness to look at this challenge not as a partisan issue, but as a far more—matter far more important than politics, because the choices we make will affect not just the next generation, but generations to come.

To make the necessary transformation to a low-carbon economy while we upgrade aging energy infrastructure, consensus estimates show that the electric sector must invest between $1½ and $2 trillion by 2030. This will fund new power plants, transmission and distribution systems, energy efficiency measures and environmental controls.

To meet the national policy objective of reducing carbon emissions, the public and private sectors must work together to ensure clean energy is affordable for consumers and businesses alike. By reducing the cost of capital, the DOE loan guarantee program authorized by the 2005 Energy Policy Act serves the public interest by accelerating deployment of clean generating technologies at a lower cost to consumers.

The Federal Government already manages a successful loan guarantee portfolio of approximately $1.2 trillion, which on balance returns more to the Treasury than it costs the taxpayer. The Federal Government uses these credit support programs to support shipbuilding, steelmaking, rural electrification, affordable housing and many other purposes.

To ensure the protection of the taxpayer's interest, all projects seeking DOE loan guarantees will be subject to detailed due diligence and underwriting by a rating agency and the DOE. This due diligence evaluates the technical, legal and financial attributes of each project.

The companies building new nuclear power plants will have significant shareholder equity, a billion dollars or more per project at risk. This equity is in a "first-loss" position, meaning that the company would forfeit that equity in the event of a default. As a result, the companies seeking loan guarantees for new nuclear power plants have a powerful incentive to ensure that the projects achieve commercial success.

The amount of misinformation about nuclear plant construction and loan guarantees is remarkable. One of the more egregious examples is the continued use of a 50 percent default rate from a

2003 CBO analysis of a different loan guarantee program that was never enacted. CBO Director Douglas Elmendorf was moved to explain on March 4th that the 2003 report, "reflected information about the technical, economic and regulatory environment as it existed in 2003, almost 7 years ago. Such generalized estimates of credit risk may not apply to a guarantee for any particular power plant because of variations in the technical, economic, regulatory, and contractual characteristics of each project. Without such information, much of which would be proprietary, CBO has no basis for estimating the cost to the government of any specific loan guarantee of this type."

Detailed analysis and historical data demonstrate that the new nuclear power projects being proposed for DOE loan guarantees provide a very high degree of lender protection. A realistic analysis of default probability and recovery rate, based on project specifics, will produce credit subsidy costs sufficient to protect the taxpayers' interest. Credit subsidy calculations must be approved by DOE's Credit Review Board, the Office of Management and Budget and by the Treasury Department.

Given the very low probability of losses associated with nuclear projects, the benefits far outweigh their risks. Electricity consumers will benefit from low-cost, clean energy. Southern Co. projects that its $3.4 billion portion of the loan guarantees for the two reactors at the Vogtle station would save consumers $15 to $20 million in interest costs annually. The program will create jobs for American workers. Each plant will generate 1,400 to 1,800 jobs during construction, with 2,400 at peak; 400 to 700 permanent jobs for plant operations; and 400 to 700 additional jobs in the community to support the plant work force. Construction of new nuclear plants will create demand for commodities like concrete and steel and hundreds of components, large and small, that benefit American manufacturers.

In addition to the existing U.S. manufacturing supply base, the industry is reaching out to manufacturing workshops to help businesses identify the opportunities in new plant construction. For example, over 300 companies from Ohio participated in workshops just last year.

In conclusion, the nuclear loan guarantee program is an opportunity to build the clean-energy facilities necessary to support our economy and to put Americans back to work. The analytics show that the risk of default are small, and, as the President explained, the benefits cannot be ignored.

Mr. Chairman, thank you again for the opportunity, and I look forward to your questions.

Mr. KUCINICH. Thank you very much for being here.

[The prepared statement of Ms. Kass follows:]

**STATEMENT FOR THE RECORD**

*by*

Leslie C. Kass
Senior Director of Business Policy and Programs
Nuclear Energy Institute

*to the*

Subcommittee on Domestic Policy
Committee on Oversight and Government Reform
U.S. House of Representatives

April 20, 2010

Chairman Kucinich, Ranking Member Jordan, members of the subcommittee, thank you for your interest in loan guarantees for construction of new nuclear power plants to meet our nation's energy needs and reduce carbon emissions. I appreciate the opportunity to speak with you today.

I am Leslie Kass, senior director of business policy and programs at the Nuclear Energy Institute. By way of introduction and background, I have a degree in Materials Science and Engineering from MIT, an MBA from Duke University's Fuqua School of Business and 17 years of service in the nuclear industry, including time as an engineering manager at an operating reactor and I helped prepare the financing package for the $1.5 billion National Enrichment Facility currently under construction near Eunice, New Mexico. I have spent the past year and a half focusing on business policies affecting the nuclear industry including the Title XVII loan guarantee program.

Before I address the issue of loan guarantees for clean energy technologies, let me provide some essential context.

First, all mainstream analyses of climate change show that reducing carbon emissions will require a portfolio of technologies, that nuclear energy must be part of the portfolio, and that expansion of nuclear generating capacity over the next 30-50 years will be essential.

The Energy Information Administration's analysis of the Waxman-Markey climate change legislation showed that the U.S. would need to build 96 gigawatts of new nuclear generation by 2030 (69 new nuclear plants). This would result in nuclear energy supplying 33 percent of U.S. electricity generation, more than any other source of electric power. To the extent the United States cannot deploy new nuclear power plants in these numbers, the cost of electricity, natural gas and carbon allowances will be higher.

As the President stated last month at the announcement of the conditional commitment offered to the Vogtle nuclear project: "To meet our growing energy needs and prevent the worst consequences of climate change, we'll need to increase our supply of nuclear power. It's that simple .... [I]nvesting in nuclear energy remains a necessary step .... I hope that this announcement underscores both our seriousness in meeting the energy challenge – and our willingness to look at this challenge not as a partisan issue, but as a matter far more important than politics. Because the choices we make will affect not just the next generation, but generations to come."

Second, we are confident that new nuclear generating capacity will be competitive – particularly in a carbon-constrained world – and we're not aware of any credible analysis that shows otherwise.

In last year's National Academies' report on *America's Energy Future*, new nuclear capacity competes well against all other baseload options in the carbon-constrained world in which we are likely to be living in the future.

We see similar results in analyses by the Energy Information Administration, the Brattle Group, the Congressional Budget Office, and the Massachusetts Institute of Technology.

Third, the U.S. electric industry faces a formidable investment challenge. Consensus estimates show that the electric sector must invest between $1.5 trillion and $2 trillion in new power plants, transmission and distribution systems, and environmental controls to meet expected increases in electricity demand by 2030.

To put these numbers in perspective: the book value of America's entire electric power supply and delivery system today is only $750 billion, and that reflects investments made over the last 60 years.

Addressing the financing challenge will require innovative approaches. Meeting these investment needs will require a partnership between the private sector and the public sector, combining all the financing capabilities and tools available to the private sector, the federal government and state governments.

Loan guarantees are one of the most effective tools available to the federal government, and are widely used by the federal government to support financing of projects that have substantial public value. The federal government manages a successful loan guarantee portfolio of approximately $1.2 trillion which, on balance, returns more to the Treasury than it costs the taxpayer. The United States government uses these credit support programs to support shipbuilding, steelmaking, rural electrification, affordable housing, construction of critical transportation infrastructure, and for many other purposes.

By reducing the cost of capital, loan guarantee programs – like the clean energy loan guarantee program authorized by the 2005 Energy Policy Act – serve the public interest by accelerating the deployment of clean generating technologies at a lower cost to consumers.

As this committee knows, a number of clean energy technologies are eligible under the Title XVII loan guarantee program. If the President's budget proposal for FY2011 is approved, energy efficiency and renewables will have $56.7 billion in loan volume available; nuclear power projects will have $54.5 billion in loan volume; front-end nuclear fuel cycle facilities will have $2 billion; fossil energy projects, $8 billion; and advanced vehicles, $25 billion.

To ensure protection of the taxpayer's interest, all projects seeking loan guarantees will be subjected to detailed due diligence and underwriting by a rating agency and by the Department

of Energy. This due diligence evaluates the legal, technical and financial attributes of each project, and will produce a credible estimate of default probability that has a factual, analytical basis. DOE's due diligence is conducted in concert with outside legal and financial advisers, independent engineering consultants and market experts. The analysis includes a rigorous assessment of the creditworthiness of the project, which can be accurately measured using well-established project finance ranking criteria such as the credit rating of the project sponsor, project capital structure, project cash flow, the strength of power purchase agreements, the terms and conditions of the engineering-procurement-construction contract, and other factors.

The nuclear energy industry is confident that the new nuclear power plants being developed can be built and commissioned to cost and schedule. Recent construction and operational experience demonstrates that experienced project management teams – with effective quality assurance and corrective action programs, with detailed design completed before the start of major construction, with integrated engineering and construction schedules – can complete projects on budget and on schedule. The global nuclear industry, including the U.S. nuclear industry, has performed projects ranging from new plant construction to major upgrades to plant restarts to refueling outages efficiently, on time and on budget.

In addition, the new nuclear power plant designs that will be built in the United States between 2015 and 2020 will have been built overseas first and, as a result, U.S. projects will benefit from lessons learned overseas. By the time the U.S. plants receive their combined licenses and close on loan guarantee financing, one design will be in the final year of construction and the others will be operational. The final costs will be informed by this additional data and will be reviewed as part of the financial closing for the loan guarantee.

Finally, the companies building new nuclear power plants will have significant shareholder equity ($1 billion or more per project) at risk. This equity is in a "first-loss" position: The company would forfeit that equity in the event of default. For most electric companies, such a loss would be unsustainable. The significant amount of money at risk imposes a high level of discipline on investment decisions. As a result, the companies seeking loan guarantees for nuclear power plants have a powerful incentive to ensure that projects are properly developed, constructed, operated and maintained to achieve commercial success. The federal government's interest and the company's interest are completely aligned. Like the federal government, the nuclear companies wish to avoid default at all costs.

The amount of misinformation about nuclear plant construction, loan guarantees for new nuclear projects, and the methodology used to calculate the cost of those loan guarantees is remarkable. One of the more egregious examples is the continued use of a 50 percent default rate from a 2003 Congressional Budget Office (CBO) analysis of a different loan guarantee program that was never enacted. CBO Director Douglas Elmendorf was moved to explain on March 4 that the 2003 report "reflected information about the technical, economic, and regulatory environment as it existed in 2003, almost seven years ago. Such generalized estimates of credit risk may not apply to a guarantee for any particular power plant because of variations in the technical, economic, regulatory, and contractual characteristics of each project. Without such information, much of which would be proprietary, CBO has no basis for estimating the cost to the government of any specific loan guarantee of this type."

The principal determinant in calculating credit subsidy cost – and the sole issue of concern to the federal government – is the degree of lender protection and the strength of that lender protection. Detailed analysis and historical data demonstrate that the new nuclear power projects being proposed for DOE loan guarantees provide a very high degree of lender protection.

That high degree of lender protection will drive the calculation of credit subsidy cost.

A realistic analysis of default probability and recovery rate based on project specifics will produce credit subsidy costs sufficient to protect the taxpayers' interest, and there are procedures and protocols in place to ensure this. Credit subsidy calculations must be approved by the Department of Energy's Credit Review Board, the Office of Management and Budget – which provides the government-wide credit subsidy cost calculator used for government loan guarantee programs – and by the Treasury Department.

It's worth noting that the average fee for all government loan guarantee programs in the 2010 fiscal year is 0.2 percent of the loan amount. The government-wide average subsidy fee is low because many loan guarantee programs generate more fee revenue for the federal Treasury than they cost, as the DOE loan guarantee program for nuclear energy is expected to do.

Given the very low probability of losses associated with nuclear projects, the benefits far outweigh the risks. Electricity consumers and American workers and manufacturers are the major beneficiaries of a loan guarantee program for new nuclear plants.

- Electricity consumers will benefit from low cost clean energy. Southern Company projects that its $3.4 billion loan guarantee for two reactors at its Vogtle plant in Georgia would, if ultimately approved when the project receives its license from the Nuclear Regulatory Commission, save consumers $15 million to $20 million in interest costs annually.

- American workers and manufacturers will benefit from the loan guarantee program. For each plant, that means:
  - Approximately 1,400-1,800 jobs during construction on average (with peak employment as high as 2,400 jobs at certain times).
  - 400-700 permanent jobs when the plant is operating: These jobs pay 36% more than average salaries in the local area.
  - 400-700 additional jobs in the local area to provide the goods and services necessary to support the nuclear plant workforce (e.g., car dealers, dry cleaners, food service).

- American manufacturers will benefit from the loan guarantee program, because construction of new nuclear plants will create demand for commodities like concrete and steel and hundreds of components, large and small. For example, a single new nuclear power plant requires approximately:
  - 400,000 cubic yards of concrete—five times as much concrete as in the foundation and floor slabs of the 100-story Sears Tower in Chicago
  - 66,000 tons of steel

— 44 miles of piping and 300 miles of electric wiring
— 130,000 electrical components.

In conclusion, the nuclear loan guarantee program is an opportunity to build the clean energy facilities necessary to support our economy and to put Americans back to work. The analytics show that the risks of default are very small and as the President explained, the benefits cannot be ignored.

Mr. Chairman, thank you again for the opportunity to testify.

Mr. KUCINICH. And I would like to start with a question of you, Ms. Kass. Department of Energy representatives have been quoted as saying that the credit subsidy fee that Southern Co. will pay for its $8.3 billion Federal loan guarantee is proprietary to Southern Co. and, "will remain confidential." Is that the industry's position, that the amount of credit subsidy fees for nuclear plant loan guarantees should be kept secret and should not be disclosed to the public or to the company shareholders and bondholders?

Ms. KASS. I believe that the process by which we derive the credit subsidy cost should be very transparent for all stakeholders and for all projects, those that are renewable for which the Government is covering the credit subsidy cost, and those for nuclear and other technologies where the borrower pays. Now, the very project specifics I do believe get into confidential information for contracts, so some of those pieces of information would need to remain proprietary. And where you draw the line, obviously, that is up to DOE and OMB.

Mr. KUCINICH. Mr. Bradford, would you like to comment on that question?

Mr. BRADFORD. I think the problem——

Mr. KUCINICH. Could you pull the mic closer?

The question relates to should the credit subsidy fees remain confidential. Is it proprietary? Do the people—taxpayers have no right to know what kind of skin they have in this game, or, you know, what do you think?

Mr. BRADFORD. I think the proposition is beyond sober analysis.

Mr. KUCINICH. What do you mean? I mean, we——

Mr. BRADFORD. There is no conceivable justification for withholding the credit subsidy fee being charged these projects.

Mr. KUCINICH. Wait. You're not answering the question. They are saying it is proprietary. You know something about the nuclear industry. So is there any justification in terms of business sense and its proprietary information?

Mr. BRADFORD. Not the credit subsidy fee itself. It can't possibly be proprietary. It is the amount that the taxpayers are receiving in return for extending the loan guarantee. And they are being told, the taxpayers, that they can't know what level of protection they are receiving. The justification that DOE advanced, that is that other applicants for loan guarantees might complain if they felt that they had gotten unfairly treated, is, in fact, the exact reason why they should be aware of what type of treatment has been extended to their competitors. If the solar industry is being charged 10 percent, and the nuclear industry is being charged 1 percent, damn right they should know it and be able to complain about it.

Mr. KUCINICH. Dr. Makhijani, what is your opinion of a credit subsidy fee that is secret and not disclosed to the taxpayers?

Mr. MAKHIJANI. Mr. Chairman, first of all, the subsidy fee will give us some idea how the government values the risk of default and whether it is realistic or not. In my opinion, the risk of default is quite high because nuclear power plants take so long to build, they may be economically obsolete before this first set goes on line.

Mr. KUCINICH. So why would this subsidy fee need to be made public then?

Mr. MAKHIJANI. We need to know whether the subsidy fee is adequately covering the risk and what the risk analysis is that leads to a specific sum of money.

Mr. KUCINICH. Mr. Spencer, what is your position on this credit subsidy fee? Do you think from a business standpoint it ought to be proprietary and should remain confidential?

Mr. SPENCER. I'm not in the business sector, so it is not really fair for me to answer.

Mr. KUCINICH. From an economic standpoint.

Mr. SPENCER. From a public policy standpoint, I think that we do need transparency over the subsidy cost. And I think that it is critical, because really that has a lot to do with, as we just heard, what the risk is associated with this. And I think it works on both sides. I tend to believe that the risk associated with nuclear power would be relatively low, so I think that it should be made public. But it is absolutely critical that the—that those important business aspects remain confidential. So we need to figure out a way to do that.

Mr. KUCINICH. OK. Thank you.

Ms. Kass, on the back cover of the current National Journal, that staff could put the copy up, there is an ad with the headline, "Southern Company Is Investing $6 Billion in Clean, Reliable, Affordable Energy." My question to you is this: Wouldn't it be more accurate if Southern Co. had stated that it was investing $6 billion of taxpayers' money, that this $6 billion is going to be coming from taxpayers' money from the Federal Financing Bank; isn't that right?

Ms. KASS. Actually, sir, I had in my testimony Southern Co.'s portion of the loan guarantee is $3.4 billion. So they are getting a guarantee for a $3.4 billion loan, and the rest of their portion of the project, they are about a 40—45, 46 percent owner, would come from owners' equity. So there is quite a bit of their own cash invested as well.

Mr. KUCINICH. Is that loan taxpayers' money that they are referring to? Is there any taxpayers' money in there at all?

Ms. KASS. It comes from the Federal Financing Bank because that is the way the loan guarantee program rule is written. They are required to access that from the Federal Financing Bank.

Mr. KUCINICH. And that's taxpayers' money, right?

Ms. KASS. The Federal Financing Bank. So, yes.

Mr. KUCINICH. The chair recognizes Mr. Jordan.

Mr. JORDAN. Thank you, Mr. Chairman. Let me do some housekeeping first. If I could ask unanimous consent to get Ranking Member Issa's statement entered into the record?

Mr. KUCINICH. So ordered.

[The prepared statement of Hon. Darrell E. Issa follows:]

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DARRELL E. ISSA, CALIFORNIA
RANKING MINORITY MEMBER

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**Statement of Rep. Darrell Issa, Ranking Member**

**"Nuclear Power Federal Loan Guarantees: The Next Billion Dollar Bailout?"**

**April 20, 2010**

Thank you, Mr. Chairman, and thank you Ranking Member Jordan. I believe this is an important hearing, but for very different reasons than my colleagues on the other side of the aisle.

The title you have given this hearing, Mr. Chairman, exposes why America is still thirty years behind on wide-scale deployment of clean, safe nuclear energy. In fact, it takes real audacity to call government loan guarantees for nuclear power a "bailout" and not mention the billions of dollars in loan guarantees that the Chairman's party has given to the darlings of the left: wind, solar, and other renewable sources that cannot alone meet our energy needs.

So let's put these nuclear loan guarantees into perspective, Mr. Chairman. First, these guarantees only go into effect in the instance of a default. Of course, if the federal government had not yielded to the carping of left-wing environmental activists who oppose nuclear energy on radical ideological grounds, we wouldn't have to worry about defaults. There are countless private investors ready to pour massive amounts of capital into the industry, but they have been discouraged by decades of bad government. For years, environmental activists and their allies on Capitol Hill have successfully blocked technological development, halted progress, and opposed the site at Yucca Mountain, which offers a secure location to store nuclear byproducts. This economic filibuster has seriously compromised our competitive edge in the world.

Moreover, the Nuclear Regulatory Commission has been subjected to hundreds of lawsuits with the sole objective to hamstring the industry and slow the development of safe, clean nuclear power or end it altogether. Meanwhile, many of our trade partners are reducing their reliance on carbon-based fossil fuels and leaving America behind in job creation, energy independence, and the development of promising energy technologies. It should be noted, as well, that a Gallup poll released yesterday showed that American support for nuclear power has reached 62%.

It is intellectually dishonest, Mr. Chairman, to label what our efforts to resume nuclear energy deployment as a "bailout" that is "too expensive," while conveniently ignoring the substantial federal support to renewable resources. In fact, the only reason nuclear development has been so costly is because government has systematically colluded with radical special interests to impose oppressive regulations and foment unreasonable fear among those who would benefit most from clean nuclear energy.

There are two facts, Mr. Chairman, that should frame our entire discussion today.

First, we will never reach our goal of energy independence or reduce carbon emissions without the development of nuclear energy and the backing of the federal government to undo the thirty years of damage to the industry through cumbersome regulation and irresponsible fear-mongering.

And second, there is no industry better prepared to break through our economic crisis and mitigate our rising unemployment than nuclear power. Every nuclear power plant generates up to 700 permanent jobs that pay 35% more than local salaries, produce $430 million in total economic output, and provide $20 million in state and local tax revenue. By some estimates, America could have more than 600,000 new jobs in the next decade if we get serious about next generation nuclear energy.

Thank you.

Mr. JORDAN. Thank you.

Let me go to Mr. Spencer and Ms. Kass, if I could. Mr. Bradford in his testimony stated—and I'm reading from it—the reason the new nuclear—that no new nuclear plants have been built in the United States for decades has nothing to do with the U.S. licensing process and has nothing to do with citizen interveners in the court hearings. And yet I think in Mr. Spencer's testimony he talked about a 4-year timeframe to get a permit for a new reactor. When I look at the memo that the staff put together, it is 3 to 5 years, both licensing and permitting.

I mean, do you agree with Mr. Bradford's statement that it is not—has nothing to do with the cost of these—building these has nothing to do with the requirements that the government has in place? Mr. Spencer and then Ms. Kass.

Mr. SPENCER. No. I think that clearly the permitting process has more than nothing to do with it, though that is not the only problem. And we have seen this historically, really starting in the early 1970's, the regulatory burden growing on nuclear energy throughout that time period. Certainly into the 1980's as the regulatory burden grew, there were other systemic problems, energy prices changing, the downturn of the economy all contributing to the reduction of the use of nuclear energy.

Mr. JORDAN. So is this—for Joe Layman here, is this—it is almost like the government chasing its tail. Because we have this high regulatory burden which adds cost to the project, well, then we need to put taxpayer money at risk so that someone will actually undertake the project. And then because of that, then we add more burdens because taxpayer money is at risk, and it is a bad spiral for energy needs for the country and taxpayer dollars that are being put at risk in the first place.

Mr. SPENCER. I agree with the way that you just described it. Let me be clear. It is not just a regulatory burden. There are policy issues with nuclear waste and some other things that add to unpredictability into the system that increase the risks that then leads to the need for taxpayer support.

Mr. JORDAN. But you would argue that the regulatory burden is a factor? Would you say a big factor?

Mr. SPENCER. I would say a significant factor.

Mr. JORDAN. A significant factor. Would you agree, Ms. Kass?

Ms. KASS. Yes. The time to market for nuclear in this country right now is about 10 years, and a lot of that is licensing. There are currently 54 reactors under construction worldwide with several more planned, and other countries are moving forward who don't have a similar regime.

Mr. JORDAN. OK. Now, with that being established, what specifically needs to change on the regulatory side? I mean, I think Mr. Spencer in his testimony, he talked about almost a bias the government has for certain types, because the regulators get accustomed to approving that type of reactor. And I don't know enough to make the distinction. So what needs to change on the regulatory side that would help the process?

Ms. KASS. The thing we need most right now is experience. We have a new Part 52 licensing process that allows for designs to be certified up front. You can also have a site certified environ-

mentally up front, and then you could put in your combined license. We believe in the second wave we will be down to about 2 years for a combined license, provided that we are efficient with the process.

The industry has some recommendations for making sure that we take out some of the redundant reviews between the early site permit and the COL, as well as ensuring that the hearing process again involves all the public stakeholders, which this new process involves everyone up front, which would feel very positive and very transparent, but involves them but in a way that doesn't lag on.

Mr. JORDAN. OK. Let me ask this. I simply just don't know. How long does the process take for a coal—coal-fired plant? How long does the process take to approve any type of wind project or solar panel project? Is it comparable, or is it much shorter, much longer? Give me the comparisons.

Mr. SPENCER. I don't know the answer to that question, but I can find it for you. But I do know this, that each of those projects that you just brought up are currently facing regulatory delays for a lot of the same environmental reasons that are facing nuclear, interestingly enough.

Really, across the board, we are facing a situation where our infrastructure construction is being hamstrung because of unreasonable regulation. This problem of regulation is not just one for the nuclear industry, though that's what we are talking about today. It is something that we need to face generally in this country.

Mr. JORDAN. I would agree with that. OK.

Thank you, Mr. Chairman.

Mr. KUCINICH. The chair recognizes Mr. Foster.

Mr. FOSTER. Thank you.

Let's see. I will start with Mr. Makhijani. I was wondering if you have an opinion on the suggested design point of multiple small nuclear—things that are basically plucked off an assembly line, thereby reducing the time between when you manufacture the modules and the time that you actually get a revenue stream, if you really are optimistic that will have a transformative effect on the economics of nuclear projects, particularly when they are sited on an existing preapproved site where there is already reactor approval?

Mr. MAKHIJANI. I'm actually not very optimistic, and the reason is as follows. There is obviously some advantage to saying we are going to manufacture small nuclear power plants on an assembly line basis rather than putting together a special project each time onsite. However, there is a reason we have large reactors. It is because of economies of scale, and the economies of scale work as follows. The cost of the materials and the construction goes approximately as the surface area of the reactor vessel, the containment building. And the amount of power you generate goes with the volume of the reactor vessel. And the volume increases much faster than the surface area when you increase the size of the reactor. That is why we have 1,000-megawatt reactors rather than 100-megawatt reactors. Imagine a ball. The volume of the ball increases much faster than the radius or the surface area of the ball. Something like that.

Mr. FOSTER. But if for a larger—if you're going to argue physics or engineering here, but the hoop stress—there is a famous result when you are designing a pressure vessel, that the total mass of the pressure vessel is sort of independent of whether it is a small- or large-radius pressure vessel. So there is sort of second-order effects here.

Anyway, this is—you have to do the whole engineering study of the big and small ones to get the answer there. I think it is a little more complicated than elementary.

Mr. MAKHIJANI. If I might add, yeah, it is quite complicated. I will just give you one reason why the cost might not come down as much as is being advertised.

And second, with nuclear reactors you have radioactive materials inside a high-pressure vessel. And that is why—that's part of the reason why the cost of reactors are high as compared to the cost of an ordinary boiler is because it involves very particular risks, and you have to investigate and check every weld and so on, and you're going to have to do that in the factory as you have to do it at the site.

Mr. FOSTER. I guess I had a question. I'm not sure who should cover this. But I don't understand exactly how the secret interest rate subsidies work. Aren't these regulated utilities where your books are pretty much open to the universe? How do you succeed in keeping these secret? Is there anyone who can help me with this?

Mr. BRADFORD. Well, I can try. The Department of Energy has announced that they will treat the fee to be charged for the loan guarantee as proprietary to the recipient of the loan guarantee. So they, who are the ones who decide the fee, have no intention of making it public. In the States in which generation is still regulated, the commission, of course, can ask for it, but they're likely to be told that it is proprietary information, and that the Department of Energy has so certified. That means they may be able to see it themselves, or they may not, but in all likelihood, they won't be making it public either. So it will remain secret in those State proceedings as well, if DOE persists in this misguided course, which I hope they won't.

Mr. FOSTER. One way that I view this and hold this debate here is what—you're all familiar with the McKenzie report that basically says, look at all the ways we know how to mitigate carbon in the atmosphere, and what is the net present value of all of these different systems. And I was wondering—one of the things I struggle with is the fact that there isn't a trusted third party to actually report the real-world cost of this. We have our proponents' cost estimates and different things with wildly different views of the real cost of capital project costs associated with project risk. Is there any trusted third entity? Or who would you on the panel prefer as the—to be established as the trusted third party to actually come up with a fair apples-to-apples comparison of the cost of producing electricity by all of these?

Mr. Spencer.

Mr. SPENCER. It might not be the answer you're looking for, but there is a trusted third party that assesses real-world cost, and it is the marketplace. That is the problem with Washington deciding

which of these things to do. You're taking, instead of the millions——

Mr. FOSTER. But that completely ignores all of the externalities and indirectly imposes costs on there.

Mr. SPENCER. The market alone will take all of those into consideration in a much better way than Washington. If Washington were the best place to do it, we should just have a command-and-control economy.

Mr. FOSTER. No. It is simply—the free market has no way of dealing with the external costs imposed by various solutions.

I yield back.

Mr. KUCINICH. The gentleman's time has expired.

What I would like to do is, does Mr. Towns have a question on this round? OK.

Well, we will pick up on that point which Mr. Foster raised. And I was intrigued with Mr. Spencer's answer. And actually you may find surprising occasionally in this committee about who may concur with your answer, because if—as someone who voted against the bailouts. Why is this industry having trouble getting financing from Wall Street? I mean, if the market is the arbiter, as you say—you know, they are asking for tens of billions of loans and guarantees from the Federal Government. Why can't they get that money from Wall Street? Help me out with that.

Mr. SPENCER. I agree that subsidies are not the way to go. My belief—because I believe in the potential of nuclear energy—is that we need to address the underlying problems, which I believe are an antiquated regulatory process. I believe we don't have a waste management system that brings any sort of predictability to the process. I believe that there is overdependence on government. These are the underlying issues that create the whole basket of unpredictability that leads to the need for subsidies, and it is not just nuclear. I think that wind and solar, these other things, fall victim to the same thing, sir. That is the whole problem with Washington dictating this process. We need to throw it out there, throw it to the marketplace. Maybe someone comes up with a new wind technology that is great and affordable, then it will be nuclear.

Mr. KUCINICH. Let me ask Ms. Kass. You know, the nuclear industry is asking for tens of billions of dollars in loans and loan guarantees from the Federal Government. It can't get financing from Wall Street. Why should the taxpayers take on risks that the private investment community is afraid of?

Ms. KASS. We have a structural imbalance in this country because of the size of our utilities. It is one of the few things that Dr. Makhijani and I will agree upon is that the size of our utilities is relatively small compared to that capital spending I mentioned of $1½ to $2 trillion that has to happen between now and 2030 to upgrade and clean up our electricity infrastructure. So given that, it is very difficult for the companies to raise enough capital. And Wall Street has supported small charges of capital for the projects. Like NEAG went for a bond offering that was specifically highlighted for the nuclear project. We have had some other smaller capital offerings.

But when you come to a guarantee of this size—and again, this is our first time coming back to construction in many years with

the new regulatory regime—there is some nervousness, but long term there is a structural problem. EDF in France and Tepco in Japan, they are very large, and they can fund these on balance sheet because they have hundreds of billions dollars on their balance sheet. We don't have that here in the United States. The largest electric utility is in the roughly $30 to $35 billion range.

Mr. KUCINICH. We have had some earlier discussions here about the issue of risk. And if Southern Co. defaults on its $8.3 billion loan, what would happen to the taxpayers? What would be the result to the taxpayers?

Ms. KASS. It all gets down to recovery, what you assume the recovery rate is, and the probability of default. Southern Co. has put their balance sheet behind this transaction, and they also have significant equity, again, and a first-loss position. They have other partners——

Mr. KUCINICH. Here is the thing that concerns me. What concerns me is that I'm asking—you're here representing the industry. I have that. I'm very clear on that. I'm wondering what sympathy you have for the U.S. taxpayers, and I don't hear that.

Ms. KASS. I am a U.S. taxpayer, sir.

Mr. KUCINICH. But you're not going to fork up billions of dollars yourself. I'm just looking for some kind of sentiment on your part of your concern for what the U.S. taxpayers here have at stake. That's why I'm just trying to figure out where you are coming from on this.

Ms. KASS. Well, I think when you look at the analytics and, as I mentioned, the risks versus the possibilities of what we have to do here, I as a taxpayer am concerned that we are going to come up with energy cost so high that it crushes our economy as we try to go to a clean-energy economy. That's my concern.

Mr. KUCINICH. Ms. Kass, I want to go to Mr. Bradford.

What happens if there is a default? What is the impact here?

Mr. BRADFORD. Well, if there is a default, at that point presumably the project is going to either change hands or stop, and the components will be sold off. There will be a net loss, and that net loss will be charged to the taxpayers.

But I wonder if I could comment on this issue of the size of the utilities, because it doesn't seem to me to be remotely the problem that the industry asserts it is in justifying loan guarantees. All that is needed is to match a consortium to build a plant with the size of the project being undertaken. If the buyers are there, and the plant can produce an output at a reasonable price, it is financeable. We finance bigger projects than nuclear plants in the country. But the difficulty is—lies in mismatches between what is being undertaken and the size of the individual companies.

The Florida companies are trying to find buyers for their shares of plants. Other utilities aren't interested in buying in because it is too expensive. And the way we have built nuclear plants in the past is by putting consortia companies together. There are consortia backing each reactor design that have assets and gross sales bigger than 100 countries combined. It is about risk, and it is about costs.

And that is true also incidentally with regard to this issue of the regulatory process. I mean, for God's sake, Ralph Nader has not

been appointing the Nuclear Regulatory Commissioners for the last 30 years. The regulatory process about which Ms. Kass is concerned has been designed—has been made up of Presidential appointees, not one of whom her organization opposed until Commissioner Jaczko a few years back.

So what are we to believe, this group of Presidential appointees has come up with a regulatory process that is hosting the industry? No. This is a regulatory process of the industry's design and choosing for three decades.

Mr. KUCINICH. Thank you, Mr. Bradford.

The chair recognizes Mr. Jordan.

Mr. JORDAN. Thank you.

It's about risk. It seems to me—and Mr. Spencer raised that—the risk of what you do with the waste has to be something that's factored in, and the current administration's decision concerning Yucca Mountain, that has to contribute to the cost and the uneasiness of investors to take that risk.

Ms. Kass, would you agree with that?

Ms. KASS. As far as the waste is concerned, it certainly has not helped the risk perceived from Wall Street. What I will say is that the waste is currently safely stored on our sites. The industry supports the Blue Ribbon Commission and looks forward to being able to move forward and have——

Mr. JORDAN. But obviously some certainty on that question would help with potential investors taking a stronger look at investing in one of your facilities.

Ms. KASS. Yes. Having certainty on the waste question will be very helpful to us.

Mr. JORDAN. I would argue that when you think about our entire economy, having some certainty about what's going to happen with our energy policy, I think the uncertainty of are we going to have a cap-and-trade, the uncertainty—are we going to have other policies, I would argue that's a big factor in why our economy's not growing and responding the way we would like as we come out of this recession.

Mr. Bradford, you and the doctor are not in favor of the loan guarantee program for nuclear plants. Are you in favor of loan guarantees or subsidies for other forms of energy, ethanol, wind, solar? Do you support those programs that taxpayer money is currently being put at risk with right now, Mr. Bradford?

Mr. BRADFORD. I think the process by which we choose and allocate Federal support for energy technologies is deeply flawed. And I'll join with Mr. Spencer in wishing that we paid a good deal more attention to market verdicts, tempered, however, by attention to externalities. And there are various ways one can incorporate them.

Mr. JORDAN. I appreciate that.

Mr. BRADFORD. That said, I'm much more comfortable with support at the research and development level for technologies that seemed to promise carbon reductions and other benefits quickly than I am with support for commercialization of large——

Mr. JORDAN. Which is it? Go back to my question. Yes or no? Do you support help for alternative energy?

Mr. BRADFORD. In the R&D sector, based on the potential to alleviate the various problems in terms of energy security and environmental protection, yes, I would be supportive of a substantial program in that area. When it comes to commercialization—that is, actually taking projects and building them for the large private entities who would normally build it for themselves—I have reservations across the board about the way we'd do that.

Mr. JORDAN. You would be against the other commercial—when you get to the commercial portion, you would be against that for any—for ethanol, for solar, for anything?

Mr. BRADFORD. I'd rather——

Mr. JORDAN. I'm just trying to figure out——

Mr. BRADFORD. If you want to take the time to go criterion by criterion, project by project, I would be glad to do it. I kind of think you don't.

Mr. JORDAN. Do you support government picking winners and losers?

Mr. BRADFORD. I would be much happier with the government playing a much lighter role in the commercialization of all alternative energy technologies. I wouldn't say no role at all.

Mr. JORDAN. Doctor.

Mr. MAKHIJANI. Well, actually, Congressman, in my testimony on page 11, I say that in my opinion, government loan guarantees are not a suitable way to encourage development of any energy source. And I say, especially ones that are very risky due to combinations——

Mr. JORDAN. What about other forms of government support?

Mr. MAKHIJANI. Yeah. Now, I am actually not a proponent of subsidies. I think we've got a very complicated thing where some very old industries, like nuclear and coal and so on, have some subsidies, and you've got wind and solar that now have investment tax credits and production tax credits. I actually think that these production tax credits should be phased out in 8 or 10 years with this sunset, you know, whatever the legislation is. And the best way to support a new energy marketplace by government is for the government, Federal, State and local, to put its own house in order. I have been a proponent in my book and in other forums.

What I'm saying here is that if the government made its buildings and infrastructure, cars, vehicles more efficient, if the government at State and Federal levels simply put out a purchase order for the kind of energy sources that it wanted each year, I think even much of the R&D will take care of itself, because people would compete to develop new energy sources to supply the government with low CO–2 energy sources or energy sources with other similar attributes.

So I think the government should put its own clean energy house in order, and I am not a big proponent. I am actually fairly much a fiscal conservative in that I am not a proponent of big government subsidies for anything.

Mr. JORDAN. OK. Thank you, Mr. Chairman.

Mr. MAKHIJANI. And certainly not prolonged subsidies. I think nuclear has had R&D and subsidies for 50 years and continues to enjoy subsidies, and I think more than enough.

Mr. KUCINICH. The chair recognizes Mr. Foster.

Mr. FOSTER. I would put a price on carbon. That is the only thing I would add to what I said before. Well, the carbon is one example of an externality that we have to figure out how we'll deal with.

Another one is obviously the waste problem. You can't say that, oh, it's the free market, and if I want, I can set up a waste repository in my backyard without consulting my neighbors.

So we have to deal with the reality that it's a mixture of a regulated and a free-market environment that we're always going to be in. I actually see possibly that you actually agree in principle here. And it's something that's very much like what the approach taken in the Mackenzie report and other ways where you just do a hard economic analysis of what is the cost of producing energy, the levelized costs, the total project cost, factor it all in. But do the calculation right, OK? And with the exception of externalities, which we're going to have to argue about and get settled, that is the way that actually this should be handled.

And that those who advocate nuclear, I think that when you do that analysis right, you're going to show that—the Mackenzie report showed it was pretty much net present value neutral, as I recall, investments in nuclear. They viewed many of the renewable things had a very positive cost to the GDP, and they reviewed things like efficiency improvements as massively negative in terms of saving the economy money.

And I think that—do any of you really have an objection to that as the basic approach for setting policy here? And that what we really need to do is get these numbers right and set up some entity that we all trust to go through the real costs of these things.

I guess I'll start to the right here. Yes, Ms. Kass.

Ms. KASS. Thank you.

We obviously, our utilities, look at the levelized cost of electricity, and that's how they make their investment decisions for their precious capital as well. The third party I would recommend is the National Academy of Sciences. The National Research Council, for instance, put out a report in 2009 actually—yeah, in 2009, they have a draft report out that looks at the levelized costs across all technologies and shows that—for instance, nuclear's in the competitive range, as are many other technologies.

And the thing we get into is there's no single point estimate because every project has unique characteristics whether you're relying on natural resources, which is how windy is it somewhere, or whether you are looking at what the site geology and how much you have to compensate for that or transmission in your construction. So we find the National Academy of Sciences. We find EIA. And there are studies out there that I think are very helpful and accurate.

Mr. FOSTER. I believe the EIA has recently—in the last few years has actually stopped doing year-by-year reporting of these, and actually we have a piece of legislation where we've prepared in our office to try to reverse that. I think that was a very valuable part of the puzzle that's actually sort of ceased to exist and shouldn't have. Does anyone else want to try to——

Mr. SPENCER. If we're going down the line, it depends on who the who is that is using this information. I would disagree that——

Mr. KUCINICH. Do you want to bring that mic a little closer?

Mr. SPENCER. It depends on who the who is that is using that information. I would disagree, for example, that the government should use that information to develop an energy mix that they would then mandate. If, however, the nuclear industry or wind industry or the utilities use that information as a variable in the considerations of where they place their investments, then that's fine. So it just depends on who is using that for information and what for.

Mr. MAKHIJANI. Well, I recommend in my book that there should be a standing committee as part of the Scientific Advisory Board of the EPA on energy and climate. And I think that they have a pretty diverse representation on their Science Advisory Board. I have served on their Radiation Advisory Committee. They produce good reports generally and I think that would probably be—one possible venue, the National Academy, could be another.

Mr. FOSTER. So you'd like to institutionalize the report of the real levelized costs of electricity for whatever—whatever—as R&D proceeds on these different things, as we get better data for different classes and nuclear plants, whatever it is, to just have some third party sit there every year and say, OK, what does it look like this year with this year's cost of nickel and this year's cost of cement and everything that will cause you to reestimate a bunch of things.

Mr. MAKHIJANI. Cost is just one thing. I think energy and climate is a very complicated thing. And I think—and I think the public and Congress and the executive branch should have an annual report on energy and climate which covers cost issues, which looks out at R&D questions, but which also looks at the marketplace, which looks at CO–2 questions and whether we need to tighten CO–2 regulations or loosen them, and things are not as bad or worse than we thought. So I think we need a panel with the adequate expertise and public confidence in its independence that would report to the public each year and that has a requisite level of independence.

Mr. BRADFORD. Mr. Foster, with all due respect, I am in a different place, I'm afraid. You won't find a panel that can, as you put it, get it right for further into the future than this time next week. The costs of different energy sources, the cost of nuclear 10, 20 years in the future, no matter how sophisticated the models and how well intentioned the panel, the only thing you can be sure about their forecasts is that they'll be wrong.

What you need are systems that make the least damaging errors, systems that have the greatest degree of flexibility in responding to changes and events. You've got to get the principles right and not the prophecies, because we just don't have prophets that good.

Mr. FOSTER. I was referring to just this year's results. The actual true numbers for this, I think, should be knowable, level playing field.

Mr. BRADFORD. History is much easier to deal with than the future. Yes.

Mr. KUCINICH. The gentleman's time has expired.

Mr. Welch, do you have any questions right now? We're going to have another round.

Mr. WELCH. I will wait. Thank you.

Mr. KUCINICH. We're going to have one more round of the witnesses.

In thinking in terms of the risk here and what's confidential, it occurs to me that there ought to be a discussion about the economics of nuclear power plants and what would be the effect. I'd like Mr. Bradford and Mr. Makhijani—as a matter of fact, both panels might be able to answer this question. What will be the effect on the nuclear power plants if we experience decades of relatively weak prices for natural gas that the Energy Information Administration is predicting and as was reported in the March 11th issue of The Economist? So we are looking at decades of relatively weak prices for natural gas. What is going to be the effect, or what could be the effect, of this on the economics of nuclear power plants?

Mr. BRADFORD. It would be pretty devastating. I mean—because right now new nuclear is looking to sell 12-cent kilowatt hours into a 5 or 6-cent market. That's what today's natural gas prices are producing in the power markets in those parts of the country that use power markets. The gap of 5, 6 cents in those power markets and the 12 cents that's about the lowest responsible forecast I've seen for new nuclear is bigger than even loan guarantees can bridge, and so it would be hard to build nuclear plants at all in those parts of the country that use power markets. In those parts of the country that are regulated, where the costs can be charged to customers willy-nilly , you might still see a plant or two built. That would be primarily the Southeast. But at low gas prices, you won't see many.

Mr. KUCINICH. Dr. Makhijani.

Mr. MAKHIJANI. Yeah. Actually much more than nuclear waste, the thing that killed nuclear power in the 1980's and 1990's was low gas prices. Everybody was—and in this decade, in the last decade, everybody was building natural gas power plants because they were cheaper than anything else, and now——

Mr. KUCINICH. So if you have weak gas prices, what happens?

Mr. MAKHIJANI. If you have weak gas prices and loan guarantees, you are going to have a high likelihood of default on the loan guarantee, especially for merchant plants where they have to sell their power output on the open marketplace, in a deregulated marketplace. They won't be able to sell their power or won't be able to sell a significant fraction of it, which will drive up the fraction of the rest of it, because most of your costs in a nuclear plant is a fixed cost, whereas in a gas-fired power plant, most of your costs are in the fuel cost, so you can afford to remain flexible.

Mr. KUCINICH. Thank you, Doctor.

Mr. Spencer.

Mr. SPENCER. I think all things being equal, that's probably true. You decrease the demand for nuclear power. But all things will not be equal. And if we change the policies that would allow nuclear—new technologies to be developed and brought to the marketplace, that might have an impact on it.

And also, I think there is a case to be made that utilities may choose to just be more diversified, not be so dependent on natural gas, because we can't guarantee that prices will remain low forever. And I think that's something that nuclear really does bring to bear.

It's 100 years or 70 or 80 years of reliable, inexpensive power generation once you get those capital costs.

Mr. KUCINICH. Do you think, though, that given these dynamics, would it be less likely that Wall Street would decide to get back into the nuclear game then?

Mr. SPENCER. Well, I think we're going to build some power plants regardless.

Mr. KUCINICH. Who's "we?"

Mr. SPENCER. The United States. I think the United States will build a handful, five or six or seven nuclear power plants no matter what, because the Nuclear Policy Act of 2005 created enough subsidies or incentives or whatever we want to call them to make that worthwhile.

If natural gas remains low, I don't know—we shouldn't build nuclear plants just for the fun of building them, nor should we build wind or solar just for the fun of building them. But I do think that there is something to be said for nuclear in terms of it bringing predictable, affordable power for a good long time, and that—if we get the policy right—even with low gas prices, depending on how well and those sorts of things, could yield a pretty good incentive to continue moving forward with some nuclear bill.

Ms. KASS. Sir, if I could respond, too. Yeah. If we could absolutely predictably say that gas prices were going to remain very low, and there would be no carbon tax, my members would go gas, because, as I mentioned, they are very invested in these projects, and it would be imprudent for them to do it for stakeholders, shareholders, everybody, and they wouldn't make that mistake. But as we—when gas prices are low, we build more gas; the price spikes, and here we are. And that volatility is very difficult on customers and the economy. So I think they will look at what are the forecasts, what is the best mix to protect them from both gas volatility and a carbon tax. But if they could—they would be thrilled to know it would be very low for a very long time.

Mr. KUCINICH. I want to thank each of the panelists for weighing in on this. I will go to Mr. Jordan in a second here. I raise the question because The Economist March 11th issue has a prediction from the Energy Information Administration which relates to decades of relatively weak prices. Decades, they say. So I am glad that you all weighed in on this.

Mr. Jordan.

Mr. JORDAN. Thank you, Mr. Chairman. I appreciate that line of questioning, too. And I think Ms. Kass, her last couple of statements, were telling in that she said your members would build gas plants if the price of gas—they knew the price of gas was going to stay low and the carbon taxes. So, I mean, how much of it is driven by the idea that there's going to be cap-and-trade, there's going to be some carbon? That's got to be driving this movement, in my mind, to a large degree as well.

Ms. KASS. Absolutely on the uncertainty. If you see in the public utility filings where they debate this with their public utility commissions in a couple of the rate-regulated States, that's very much on their minds. Many of those States in the Southeast have had gas price shocks that have been very uncomfortable. And also when they look at the potential for a carbon tax, that changes the game.

Mr. JORDAN. I'm just curious. What is the operating cost—if you can give me some idea of the comparison—operating costs for a nuclear facility and a coal or gas facility? And I understand it depends on the price of coal and price of gas, but just kind of in a general sense.

Ms. KASS. Well, if you look at currently—and our plants are fully depreciated, as Jack mentioned, they are a 60-year asset right now—fully depreciated. We are the lowest cost at 1.87 cents per kilowatt hour, followed up by coal and gas after that. Those two are very dependent on fuel costs, so they occasionally will trade. But in the future—MIT did a study on the update of nuclear power, and they looked at the cost of nuclear versus coal and gas. Without carbon sequestration, if you gave them all favorable interest rates, they were all in roughly the 5 or 6 cents per kilowatt range. If you add a carbon tax, then nuclear remains stable, and then the other two rise.

Mr. JORDAN. I'm also curious on the construction side how much more expensive is a nuclear facility versus another type of facility?

Ms. KASS. It depends on size. Certainly our capital cost is much higher. We tend to have a bigger installation. The smallest units we're considering right now are 1,100 kilowatts and up—excuse me—1,100 megawatts and up, sorry. And we have all the safety systems and redundancy, and they are far more expensive on a capital front.

But when you start adding some of the environmental controls and look at some of the coal plants with IGCC plants and some of the plants that would have carbon-captured sequestration, then they start coming into the capital market we're in.

Mr. JORDAN. Does your agency take a position on subsidies for other forms of energy, wind, solar, ethanol, biofuels?

Ms. KASS. We are just looking for a level playing field. We found that the loan guarantee program—we're happy with the way it's structured, but we do need more loan volume—would be very effective for us. We believe it's going to take the full energy mix, and in the current environment our utilities again are also building wind farms, also building solar. What is it going to take to bring all these technologies to bear so they can keep up with demand, but also meet the mandate for clean energy.

Mr. JORDAN. Mr. Spencer, I raised the Yucca Mountain issue in the previous round, and you had sort of brought that in front of the committee, and I didn't give you a chance to talk about that. If you would like to elaborate on the uncertainty that not having a place to put the waste, and the cost, that you see that adding to potential investors' willingness to invest in these projects.

Mr. SPENCER. I think it's a substantial issue on a number of levels. First, in order to have a nuclear power plant license, we need to have a place to put the waste. Now, the Blue Ribbon Commission is supposed to give us that, but one of my fears is that by potentially killing Yucca Mountain before having a plan be in place, it could bring some uncertainty there. And that is real uncertainty that would have an impact on costs.

Then there's the longer-term impact of having the government in charge of nuclear waste. It really removes the economic incentives for those who would have the most need to come up with the waste

solution. The utilities, they are the ones who need a waste solution in order to sell their product.

I think that putting more responsibility on the utilities to develop a nuclear waste solution that includes Yucca Mountain as an alternative there would help bring those same market pressures and downward-priced pressures and competition both on the waste management side, but also on the nuclear technology side, because if you are responsible for your waste, you start caring about how that waste is produced. Keeping the government in charge of that nuclear waste really, I think, is one of the detriments to really getting us to where we need to be on the nuclear front that allows nuclear to be competitive with everything else even absent carbon caps potentially.

Mr. JORDAN. Thank you, Mr. Chairman.

Mr. KUCINICH. Thank you.

The Chair recognizes Mr. Welch of Vermont.

Mr. WELCH. I'm sorry I got here late. It's great to see Mr. Bradford from Vermont.

Mr. Spencer, you probably testified about this, but how would we deal with the waste issue as you proposed it, very succinctly, because I don't want to put my colleagues through hearing that again if you've answered it.

Second, would it be a prerequisite to the future of nuclear power that be dealt with before plunging in with these huge investments?

Mr. SPENCER. Well, I think we have a plan in place already where the waste goes to Yucca Mountain. That works for the time being, but that doesn't give us the comprehensive, I think, long-term sustainability that we need.

Mr. WELCH. But it's not working at Yucca Mountain.

Mr. SPENCER. I think that it could work. I don't think there's anything that——

Mr. WELCH. Well, that's my question.

Mr. SPENCER. Let me try to answer your question in 30 seconds, which I'm not going to be able to do because the red light's going to go on here. But here is what I think we need to do. The utilities should be in charge of their own nuclear waste. If they are in charge of that, then you start to create a marketplace for waste services.

I think Yucca Mountain or some geologic repository somewhere should be critical to that. Geologic repository space would then be looked at as a finite commodity. As it fills up, that sends the signal out to the marketplace you need to reprocess or do something else. I think that there's a way that we can introduce market forces into waste management that would get the politics out and allow us to come up with a long-term solution.

Mr. WELCH. All right. So would that have to be done first, and then that would make it possible for the market to proceed and make nongovernment-based—nonsubsidized decisions about investing in these massive assets?

Mr. SPENCER. I think that having a sustainable solution to nuclear waste will allow us to develop a long-term, economically viable nuclear industry. I don't think that we need to have that solution before we build or permit a new power plant.

Mr. WELCH. Mr. Makhijani.

Mr. MAKHIJANI. Thank you, Mr. Welch.

The Yucca Mountain question from the point of view of the utilities was really settled, at least as it was thought then, by the 1982 Nuclear Waste Policy Act. Ratepayers paid a tenth of a cent a kilowatt hour, and utilities had some certainty. When that certainty didn't come to pass, they sued the government, and the taxpayer is actually picking up the cost, at least in those suits that have been successful, and I believe that the government did violate its contracts. So the taxpayers are paying for the additional storage that will be required, and that liability is actually mounting. I don't think the industry is looking to significant extra costs because of this default, because the taxpayers are now on the hook for that money, and it's not coming out of the nuclear waste fund.

I am a supporter of a deep geologic repository, but I happen to think that Yucca Mountain, in my opinion, has been the worst single site that has been investigated in this country.

Mr. WELCH. Yeah. I'm going to stop you there. We don't need to go into it because those arguments are inevitable. Whatever, it's a huge NIMBY issue. Wherever you're going to be, there's going to be enormous opposition, and it really has raised the question in my mind as to whether or not there's a political capacity on the part of Congress to actually have a legislative outcome rather than have it be endless fights.

Let me go to Mr. Bradford. Your view on this? Thank you.

Mr. BRADFORD. Well, there's a lot to be said for Mr. Spencer's view, and I wish the program had unfolded that way from the beginning. In many ways the commitment to take the nuclear waste that the Federal Government has made which is unique to the nuclear industry—after all, the Federal Government doesn't offer to take the waste from any other industry—could be said to be one of the largest of all the subsidies that were—that was given to nuclear energy, and it's played out very badly for them. But it is a commitment that's in place now, and it's hard to see how we could develop a deep geological repository, all the transportation necessary to get it there, without a central role of some sort for the government, not necessarily the Department of Energy. Conceivably a differently constituted authority would be more successful. I just don't see us able to get from where we are to market principles today, although it would perhaps have been very desirable to have been there from the beginning.

With regard to the role of a waste repository in the context of new reactors, I agree that you can't really make a case that six or seven more plants change the nature of the waste dilemma in any fundamental way. In fact, it's less than operating the existing plants for additional years. We're going to be using pools and dry casks, and the only serious question is whether we centralize the dry cask storage somewhere in the next decade or two. I do think it's fair to say that before a major expansion beyond the so-called first mover plants, that it's reasonable to seek a higher degree of assurance than we have now that we know where the waste is going.

Mr. WELCH. Thank you. I yield back.

Mr. KUCINICH. I thank the gentleman.

Without objection, I am going to ask that this article from The Economist, the March 11th issue of The Economist, which says the Energy Information Administration, the statistical arm of America's Department of Energy, predicts decades of relatively weak prices for gas, that this be included in the hearing record.

[The information referred to follows:]

 For the record 04/20/10 Dennis J. Kucinich 





**Natural gas**

# An unconventional glut

**Newly economic, widely distributed sources are shifting the balance of power in the world's gas markets**

Mar 11th 2010 | HOUSTON | From *The Economist* print edition

SOME time in 2014 natural gas will be condensed into liquid and loaded onto a tanker docked in Kitimat, on Canada's Pacific coast, about 650km (400 miles) north-west of Vancouver. The ship will probably take its cargo to Asia. This proposed liquefied natural gas (LNG) plant, to be built by Apache Corporation, an American energy company, will not be North America's first. Gas has been shipped from Alaska to Japan since 1969. But if it makes it past the planning stages, Kitimat LNG will be one of the continent's most significant energy developments in decades.

Five years ago Kitimat was intended to be a point of import, not export, one of many terminals that would dot the coast of North America. There was good economic sense behind the rush. Local production of natural gas was waning, prices were surging and an energy-hungry America was worried about the lights going out.

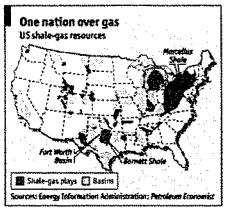
Now North America has an unforeseen surfeit of natural gas. The United States' purchases of LNG have dwindled. It has enough gas under its soil to inspire dreams of self-sufficiency. Other parts of the world may also be sitting on lots of gas. Those in the vanguard of this global gas revolution say it will transform the battle against carbon, threaten coal's domination of electricity generation and, by dramatically reducing the power of exporters of oil and conventional gas, turn the geopolitics of energy on its head.

### Deep in the heart of Texas

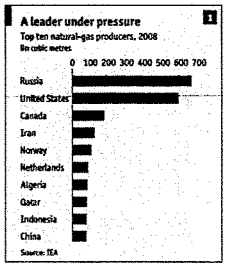
The source of America's transformation lies in the Barnett Shale, an underground geological structure near Fort Worth, Texas. It was there that a small firm of wildcat drillers, Mitchell Energy, pioneered the application of two oilfield techniques, hydraulic fracturing ("fracing", pronounced "fracking") and horizontal drilling, to release natural gas trapped in hardy shale-rock formations. Fracing involves blasting a cocktail of chemicals and other materials into the rock to shatter it into thousands of pieces, creating cracks that allow the gas to seep to the well for extraction. A "proppant", such as sand, stops the gas from escaping. Horizontal drilling allows the drill bit to penetrate the earth vertically before moving sideways for hundreds or thousands of metres.

These techniques have unlocked vast tracts of gas-bearing shale in America (see map). Geologists had always known of it, and Mitchell had been working on exploiting it since the early 1990s. But only as prices surged in recent years did such drilling become commercially viable. Since then, economies of scale and improvements in techniques have halved the production costs of shale gas, making it cheaper even than some conventional sources.

The Barnett Shale alone accounts for 7% of American gas supplies. Shale and other reservoirs once considered unexploitable (coal-bed methane and "tight gas") now meet half the country's demand. New shale prospects are sprinkled across North America, from Texas to British Columbia. One authority says supplies will last 100 years; many think that is conservative. In 2008 Russia was the world's biggest gas producer (see chart 1); last year, with output of more than 600 billion cubic metres, America probably overhauled it. North American gas prices have slumped from more than $13 per million British thermal units in mid-2008 to less than $5. The "unconventional"—tricky and expensive, in the language of the oil industry—has become conventional.

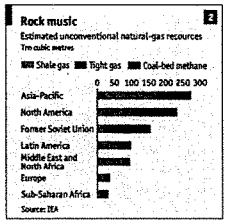



The availability of abundant reserves in North America contrasts with the narrowing of Western firms' oil opportunities elsewhere in recent years. Politics was largely to blame, as surging commodity prices emboldened resource-rich countries such as Russia and Venezuela to restrict foreign access to their hydrocarbons. "Everyone would like to find more oil," says Richard Herbert, an executive at Talisman Energy, a Canadian firm using a conventional North Sea oil business to finance heavy investment in North American shale. "The problem is, where do you go? It's either in deep water or in countries that aren't accessible." This is forcing big oil companies to get gassier.




The oil majors watched from the sidelines as more entrepreneurial drillers proved shale's viability. Now they want to join in. In December Exxon Mobil paid $41 billion for XTO, a "pure-play" gas firm with a large shale business. BP, Statoil, Total and others are sniffing around the North American gas patch, signing joint ventures with producers such as Chesapeake Energy. A wave of consolidation is likely in the coming months, as gas prices remain low, the drillers seek capital and the majors hunt for the choicest acreage.

Shale is almost ubiquitous, so in theory North America's success can be repeated elsewhere. How plentiful unconventional resources might be in other regions, however, is far from established. The International Energy Agency (IEA) estimates the global total to be 921 trillion cubic metres (see chart 2), more than five times proven conventional reserves. Some think there is far more. No one will really know until companies explore and drill.




The drillers are already arriving in Europe and China, which are both expected to import increasing amounts of gas—and are therefore keen to produce their own. China has set its companies a target of producing 30 billion cubic metres a year from shale, equivalent to almost half the country's demand in 2008. Several foreign firms, including Shell, are already scouring Chinese shales. After a meeting between the American and Chinese presidents last November, the White House announced a "US-China shale gas initiative": American knowledge in exchange for investment opportunities. The IEA says China and India could have "large" reserves, far greater than the conventional resource.

Exploration is also under way in Austria, Germany, Hungary, Poland and other European countries. The oil industry's minnows led this scramble, but now the big firms are arriving too. Austria's OMV is working on a promising basin near Vienna. Exxon Mobil is drilling in Germany. Talisman recently signed a deal to explore for shale in Poland. ConocoPhillips is already there. The first results from wells being drilled in Poland, in what some analysts believe is a shale formation similar to Barnett, should be released this year.

No one expects production of shale gas in Europe to make a material difference to the continent's supply for at least a decade. But the explorers in China and Europe present a long-term worry for those who have bet on exporting to these markets. Gazprom, Russia's gas giant, is the company most exposed to this threat, because its strategy relies on developing large—and costly—gasfields in inhospitable places. But Australia, Qatar and other

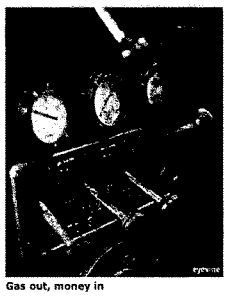
exporters also face a shift in the basics of their business.

**Choked**

These producers are already getting a taste of the global gas glut. Almost in tandem with the surge in American production, recession brought a slump in world demand. The IEA says consumption in 2009 fell by 3%. In Europe, the drop was 7%. Consumption in the European Union will grow marginally if at all this year and will not be sufficient to clear an overhang of supplies, contracted through take-or-pay agreements signed in the dash for gas of the past decade. IHS Global Insight, a consultancy, reckons that the excess could amount to 110 billion cubic metres this year, almost a quarter of the EU's demand in 2008.

The glut has been exacerbated by the suddenly greater availability of LNG. Importers with the infrastructure to receive and regasify LNG can now easily tap the global market for spot cargoes. This is partly a product of the recession, which dampened demand from Japan and South Korea, the leading LNG buyers. But another cause is that many exporters, not least Qatar, the world's LNG powerhouse, spent the past decade ramping up supplies aimed at the American market. That now looks like a blunder.

America is still taking some of this LNG, but the exporters' bonanza is over before it ever really began. "You'll always find a buyer in North America," says Frank Harris, an analyst at Wood Mackenzie, a consultancy, "but you might not like the price." And LNG will grow increasingly abundant as new projects due to come on stream this year add another 80m tonnes to annual supply, almost 50% more than in 2008.



**Gas out, money in**

Qatar's low production costs mean it can still make money, even in North America. Others cannot. In February, for example, Gazprom postponed its Shtokman gasfield project by three years because of the change in the market. Some of the gas from that field, in the Barents Sea, was to be exported to America. But Shtokman's gas will be costly, because the field is complex and its location makes it one of the world's most difficult energy projects to execute. Some analysts now wonder whether gas will ever flow from Shtokman.

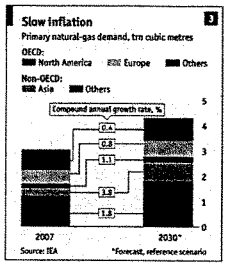
China offers some hope for ambitious exporters, but even there the outlook has become cloudier. The Chinese authorities want natural gas to account for at least 10% of the country's energy mix by 2020 and are building LNG import terminals. With that target in mind, Australia, which has its own burgeoning conventional and unconventional gas supplies, has been busily building an LNG export business. But warning lights are coming on. In January, PetroChina let a deal to buy gas from Australia's Browse LNG project expire. The original agreement was made in 2007, when LNG prices were soaring in Asia, but China can afford to be picky now. "Too many Australian LNG plants are chasing too little demand," says Mr Harris.

The shift in the global market has left China well-placed to dictate prices. This will be another blow to Gazprom, which has long talked of exporting gas to the country. Indeed, while the Chinese and the Russians have squabbled over the terms, Turkmenistan has quietly built its own export route to China. Even if Beijing's shale-gas plans come to nothing, supplies from Central Asia and new regasification terminals along its coast may allow China to reach its natural-gas consumption targets without pricey Siberian supplies.

The glut has weakened Gazprom's position in Europe, too. It has been losing market share to cheaper Norwegian and spot-market supplies. In 2007 Gazprom talked of increasing its annual exports to the EU to 250 billion cubic metres. Now, says Jonathan Stern, of the Oxford Institute for Energy Studies, Gazprom will probably only ever supply the EU with 200 billion cubic metres a year (it shipped about 130 billion in 2008). The company forecast in 2008 that its gas prices in Europe would triple, to around $1,500 per 1,000 cubic metres, on the back of rising oil prices, which help set prices in long-term contracts. But the price dropped to about $350 last year and is expected to fall again in 2010. The weak market could last for another five years, believes Wood Mackenzie. Gazprom has been renegotiating with leading customers, injecting elements of spot pricing into contracts to make them more attractive.

**Shtokman shtymied**

Moreover, Europe's need for new pipelines to guarantee supplies suddenly looks less pressing. Construction of Nord Stream, Gazprom's flagship project to export gas directly to Germany through the Baltic Sea, will begin next month. It is due to come on stream in 2011. The scheduled doubling of its capacity to 55 billion cubic metres a year is in doubt, says Mr Stern, because Shtokman was to have supplied the gas for it.




Demand is a bigger problem. Even without recession or European shale, the assumption that Europe's consumption will keep growing is looking shaky, because the EU's efforts to boost efficiency and reduce carbon emissions are making gradual headway. Edward Christie, an economist at the Vienna Institute for International Economic Studies, says the EU could be importing a third less natural gas in 2030 than the European Commission forecast in 2005. That makes the case for additional supply lines much less compelling. The IEA expects rich European countries' demand to grow by only 0.8% a year in the next two decades, against 1.5% for the world as a whole (see chart 3).

An age of plenty for gas consumers and of worry for conventional-gas producers thus seems to be dawning. But two factors could reverse the picture again. The first surrounds the uncertainty about how fruitful shale exploration will be outside North America. A clearer understanding of the geology will emerge from pilot wells in the coming months. Second, there are reasons for caution above ground, too. Despite natural gas's greener credentials than oil's or coal's, shale drilling has critics among environmentalists, who worry that water sources will be poisoned and landscapes despoiled.

The industry says cement casing of wells and the depth to which they are drilled make the practice safe and relatively unobtrusive. But so far it has been drilling mainly in North America, where land is plentiful and people are accustomed to the sight of oilmen's detritus. In densely populated Europe, the rapacious rate at which shale plays must be drilled to sustain production is less likely to be tolerated.

Even in America, opposition to shale gas is rising. New York state has imposed a moratorium on drilling in its portion of the Marcellus Shale, which it shares with Pennsylvania. Lawmakers in Congress want to study the ecological impact of fracing. The Environmental Protection Agency, a federal body, also raised concerns about "potential risks" to the watershed.

The path of demand in gas's new age is hard to predict, but abundant new sources could bring about profound change in patterns of energy consumption. Some of the downward pressure on price will ease: despite sedate growth, the LNG glut should dissipate, probably by 2014, says Mr Harris; and low prices will kill more projects, clearing the inventory. France's Total thinks global demand will recover strongly enough to require another 100m tonnes a year of LNG by 2020, on top of plants already planned. However, the Energy Information Administration, the statistical arm of America's Department of Energy, predicts decades of relatively weak prices.

If this is correct, it makes sense, for both environmental and economic reasons, for the country to gasify its power generation, half of which comes from coal-fired plants. This could be done cheaply and quickly, because America's total gas-fired capacity (as opposed to production) already exceeds that for coal. Put a price of only $30 a tonne on carbon, say supporters, and natural gas would quickly displace coal, because gas-fired power stations emit about half as much carbon as the cleanest coal plants. The IEA agrees that penalising carbon emissions would benefit natural gas at the expense of dirtier fuels.

There would be political obstacles. The coal lobby remains strong in Washington, DC. Climate legislation struggling through Congress even includes provisions to protect "clean coal", a term covering an array of measures, so far uncommercial, to reduce emissions from burning the black stuff. Ironically, oil companies that were once suspicious of proposals to control carbon now regard a carbon price or even a carbon tax as a potential boon to their new gas businesses.

A more radical idea, and one that would have ramifications for the global oil sector, is to gasify transport. T. Boone Pickens, a corporate raider turned energy speculator, has launched a campaign to promote this, and has support from the gas industry. By converting North America's fleet of 18-wheeled trucks to natural gas, says Randy Eresman, boss of EnCana, a Canadian gas company, America could halve its imports of Middle Eastern oil. EnCana is promoting "natural gas transportation corridors": highways served by filling stations offering natural gas.

All this is some way off. The coal industry will not surrender the power sector without a fight. The gasification of transport, if it happens, could also take a less direct form, with cars fuelled by electricity generated from gas.

A gasified American economy would have profound effects on both international politics and the battle against climate change. Displacement of oil by natural gas would strengthen a trend away from crude in rich countries, where the IEA believes demand has already peaked as a result of the recent spike in oil prices. Another consequence of the energy market's bull

run, the unearthing of vast new supplies of gas, could bring further upheaval. If the past decade was characterised by the energy-security concerns of consumers, the coming years could give even the world's powerful oil producers reason to worry, as a subterranean revolution shifts the geopolitics of global energy supply again.

**Readers' comments**

Readers have commented on this article (the window for new comments is now closed).

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Mr. KUCINICH. And I want to thank this panel. I think that it's been an important discussion. The market economics are not a small matter here in trying to determine which way this might go, and I want to thank each of you for participating.

So we're going to go to the next panel now. Thank you, Mr. Bradford, Dr. Makhijani, Mr. Spencer and Ms. Kass. Thank you.

We are going to take a 3-minute recess until the room is prepared for the second panel.

[Recess.]

Mr. KUCINICH. That buzzer does not signify a meltdown. We are waiting. The committee is going to come to order.

I want to thank all of you who are present. I am going to introduce the second panel of witnesses and begin with Dr. Mark Cooper.

Thank you for being here.

Dr. Cooper is a senior fellow for economic analysis at the Institute for Energy and the Environment at Vermont Law School. He is the author of dozens of articles and six books on energy, technology and telecommunications. He's provided expert testimony in over 250 cases for public interest clients including State attorneys general and citizen intervenors before State and Federal agencies and courts. Dr. Cooper received his Ph.D. from Yale University.

Mr. Henry Sokolski, welcome.

He was the executive director of the Nonproliferation Policy Education Center from 1989 to 1993. Mr. Sokolski served in the Bush administration, the Office of the Secretary of Defense. Previously he served as senior military legislative aide to Senator Dan Quayle and a special assistant on nuclear energy matters to Senator Gordon Humphrey. He's also had an association with the Heritage Foundation and the Hoover Institute. Mr. Sokolski is the author and editor of several books and numerous papers.

Mr. Richard Caperton, thank you for being here, is energy policy analyst at the Center for American Progress, where he's concentrated on the analysis of financing mechanisms and incentive structures intended to encourage clean-energy technology. Previously he's worked at the National Rural Electric Cooperative Association. He's a graduate of Pomona College and Georgetown University's McDonough School of Business.

Mr. Michael Scott, thank you for being here, is managing director at the investment bank Miller Buckfire, and heads its U.S. Government advisory practice. Previously Mr. Scott was senior adviser to SEC Chairman Christopher Cox. Before that he was managing director and head of the U.S. Government entities at Bank of America Securities, where he advised companies on Federal loan guarantees to build a proposed Alaska natural gas pipeline, as well as those associated with advanced energy facilities, including the Energy Policy Act of 2005.

Before that, Mr. Scott served for 5 years at the U.S. Department of Treasury as senior adviser. There he was principal architect of the Federal credit policy. He negotiated and structured programs that provided Federal credit to a wide range of industries, including airlines, banks, rural telecommunications and energy companies. He was also responsible for Treasury's role in the Air Transportation Stabilization Board, where he structured and negotiated

loan guarantees supporting the $429 million unsecured loan to America West Airlines.

And finally, Mr. Christopher Guith is vice president for policy at the U.S. Chamber of Commerce Institute for 21st Century Energy.

Thank you for being here.

Previously Mr. Guith served as the Deputy Assistant Secretary For Nuclear Energy at the U.S. Department of Energy and represented the Bush administration during the drafting of the Energy Policy Act of 2005. Before that he was legislative director for former Congressman Bob Barr. He is a graduate of Syracuse University School of Law and University of California at Santa Barbara.

Again, I want to thank each and every one of the witnesses for being here. This is indeed a distinguished panel, as was our previous panel. I want to thank you and also tell you that it is the policy of our Committee on Oversight and Government Reform to swear in all witnesses before they testify. I would ask that you rise and please raise your right hands.

[Witnesses sworn.]

Mr. KUCINICH. Let the record reflect that each of the witnesses answered in the affirmative.

I would ask that each witness give a brief summary of your testimony. Please try to keep the summary under 5 minutes in duration. Your entire written statement will be included in the record of the hearing.

Dr. Cooper, our first witness on the panel, I would ask you to proceed.

**STATEMENTS OF MARK COOPER, SENIOR FELLOW FOR ECONOMIC ANALYSIS, INSTITUTE FOR ENERGY AND THE ENVIRONMENT, VERMONT LAW SCHOOL; HENRY SOKOLSKI, FORMER DEPUTY FOR NONPROLIFERATION POLICY, OFFICE OF THE SECRETARY OF DEFENSE, PRESIDENT AND EXECUTIVE DIRECTOR, NONPROLIFERATION POLICY EDUCATION CENTER; RICHARD CAPERTON, POLICY ANALYST, CENTER FOR AMERICAN PROGRESS; MICHAEL D. SCOTT, MANAGING DIRECTOR, MILLER BUCKFIRE & CO., LLC; AND CHRISTOPHER GUITH, VICE PRESIDENT OF PUBLIC POLICY, U.S. CHAMBER OF COMMERCE**

**STATEMENT OF MARK COOPER**

Mr. COOPER. The fundamental economics of nuclear power should determine whether a new generation of reactors is constructed in the United States. In my testimony I show the basic supply and demand fundamentals of new nuclear reactor economics that have led Wall Street to refuse to put up the funds to finance new reactors, and why policymakers in Washington should not force taxpayers to do what the capital markets will not.

I answered four questions posed to me by the committee. First, cost overruns in the construction of nuclear power plants are not a thing of the past. They are an occurring present-day problem. Cost escalation and overruns afflicted the industry in the 1970's and 1980's when the final reactors built were seven times as expensive as the initial cost estimates for that round of construction. The

escalation in projected costs since the beginning of the so-called nuclear renaissance has rivaled that historical experience. In less than a decade the projected costs have more than quadrupled.

The causes of this escalation are well known. Reactor design is complex, site-specific and nonstandardized. In extremely large, complex megaprojects that are dependent upon sequential and complementary activities, delays tend to escalate into interruptions. These one-of-a-kind specialized projects have few suppliers, so any interruption or delay in delivery cannot be easily accommodated, and any increase in demand or disruption in supply sends the cost of components skyrocketing.

Material costs have been rising, and skilled labor is in short supply. The energy-intensive materials and construction processes that are involved in nuclear reactors entail processes that are likely to be deeply affected by any carbon policy, so the cost escalation will be built in. The current costs of nuclear reactors are extremely expensive, uneconomic, and those costs are likely to escalate, not decline, if these reactors are ever built.

Second, we do not currently have such demand for electric power plants that we need to rush into the construction of multiple nuclear reactors. We have time to experiment and to see what does and doesn't work before we proceed, whether or not climate policies, enacted efficiency in several widely available renewables, are substantially less expensive than nuclear reactors. They can push out any need for these facilities for decades. So the rational approach is to build the low-cost, low-hanging fruit available, and take the time to develop alternative low-cost options.

Third, Wall Street won't invest in nuclear power plants for very good reasons. In addition to the supply and demand factors I have already mentioned, these plants are subject to dozens of risks—technology risks, policy risks, regulatory risks, execution risks, marketplace risks—which make them a bad investment. A combination of these risks are what created the financial disaster in the last round of nuclear construction. Given these risks, Moody's is right to have declared investments in these projects a "bet-the-farm" decision, and other analysts want a return on investment, a risk premium two or three times as large as the normal premium. That is why Wall Street will not invest in these projects.

Finally, increased loan guarantees for nuclear power plants misdirect resources that could be better used for energy efficiency and renewables. Loan guarantees induce utilities to develop the wrong resources. They choose high-cost, high-risk, capital-intensive projects that pump up their rate base—that's how they make money—and leave behind the more economic, less costly facilities. The result is a dramatic increase in the consumer's bill.

You heard a suggestion that Georgia Power/Southern Co. estimates a $15 to $20-million-a-year savings from the loan guarantee. The excess costs of those facilities is between $500 million and $1 billion a year. It's a bad deal for the ratepayer.

The rejection of financial markets that has afflicted nuclear reactors is not an example of market failure. It is, in fact, a market success, an instance—and frankly there have been too few lately—where the marketplace has properly evaluated risk and refuses to put private capital on the table. If Congress were to override that

decision, ignore the indication of Wall Street, it would place ratepayers and taxpayers at severe risks that I think would amount in the end to trillions, not billions or even hundreds of billions, of dollars.

Thank you.

[The prepared statement of Mr. Cooper follows:]

Testimony of

Dr. Mark Cooper

Senior Fellow for Economic Analysis
Institute for Energy and the Environment, Vermont Law School

Economic Advisability of Increasing Loan Guarantees for the Construction of Nuclear Power Plants

Domestic Policy Subcommittee
Committee on Oversight and Government Reform
U.S. House of Representatives

April 20, 2010

My name is Dr. Mark Cooper. I am a senior fellow for economic analysis at the Institute for Energy and the Environment at Vermont Law School. In my 30 years of public policy analysis, I have testified approximately 350 times before federal and state legislatures and regulatory bodies on energy and communications issues, always on behalf of consumer, low income and public interest groups, as well as People's Counsels and Attorneys General.

The Committee has requested that I address four questions about the economics of nuclear reactors and loan guarantees. I will do so on the basis of my two recent reports on these topics – *The Economics of Nuclear Reactors: Renaissance or Relapse*[1] and *All Risk, No Reward: The Economics of Subsidizing the 'Nuclear Renaissance' with Loan Guarantees and Construction Work in Progress.*[2] These are publicly available at the Vermont Law School web site and I have submitted copies for the record. I have presented the results of my analyses in briefings on Capitol Hill, in the Indiana legislature, and to the San Antonio City Council, as well as presentations to academic and trade conferences, and in testimony before the Florida Public Service Commission.[3]

I commend the subcommittee for asking the hard questions about the cost of nuclear reactors and the impact that subsidies will have on taxpayers and ratepayers. As a lifelong consumer advocate, I believe that the fundamental economics of nuclear power should determine whether a new generation of reactors is constructed in the United States. In answering the Committee's questions, I take a broad view of the issues raised. I change the order slightly to address the basic supply and demand side fundamentals of nuclear reactor economics first. Then I explain why Wall Street will not put up the funds to finance new reactors and why policy makers in Washington, D. C. should not force taxpayers to do what the capital markets will not. I also show why state legislatures and regulatory commissions should not force ratepayers to bear the extraordinary risk of nuclear construction projects that Wall Street has rejected.

[1] http://www.vermontlaw.edu/Documents/Cooper%20Report%20on%20Nuclear%20Economics%20FINAL[1].pdf
[2] http://www.vermontlaw.edu/Documents/11_03_09_Cooper%20All%20Risk%20Full%20Report.pdf
[3] http://www.eesi.org/can-addressing-climate-change-provide-economic-benefits-06-nov-2009, http://www.terry.uga.edu/exec_ed/bonbright/docs/Cooper_Keynote_Providing_Affordable_Energy.pdf, http://www.floridapsc.com/library/filings/09/07157-09/07157-09.pdf

**Are cost overruns in the construction of nuclear power plants a thing of the past, or a recurring, present day problem?**

The problems of cost escalation and cost overruns are endemic to the nuclear industry. Cost escalation and overruns afflicted the industry during the construction boom of the 1970s and 1980s, with the final reactors built in the U.S. costing more than seven times as much as the initial cost projections offered for the first reactors in the building cycle. As I showed in my first paper, and summarize in Exhibit 1, the escalation of projected costs since the early 2000s (the beginning of the so-called "nuclear renaissance") has rivaled the historical experience of the industry. In less than a decade, projected costs have quadrupled.

Contrary to the claims of the industry that costs will come down because there will be learning effects or economies of scale will be achieved, there are strong economic reasons and processes that push costs up, which overwhelm any tendency for learning or scale effects to reduce costs. Inherent cost escalation afflicts mega projects, a category into which nuclear reactors certainly fall. The endemic problems that affect nuclear reactors take on particular importance in an industry in which the supply train is stretched thin.

- Reactor design is complex, site-specific, and non-standardized.
- In extremely large, complex projects that are dependent on sequential and complementary activities, delays tend to cascade into interruptions.
- These one of a kind, specialized products have few suppliers. Any increase in demand or disruption in supply sends prices skyrocketing.
- Any interruption or delay in delivery cannot be easily accommodated and ripples through the supply chain and the implementation of the project.
- Material costs have been rising and skilled labor is in short supply.
- The energy intensive materials and construction process that nuclear reactors entail are likely to suffer disproportionate upward pressures in a carbon-constrained environment.

There is a second reason – a political reason – that the industry has been afflicted by cost escalation compared to the original cost projections, which is also highlighted in Exhibit 1. The industry tends to lowball the original estimates to get its foot in the door. Quoting extremely low estimates induces public utility commissions to allow the projects to commence. Once public utility commissions allow utilities to begin to incur costs to build nuclear reactors, there is a tendency to not want to abandon costs that have been sunk into the project, even when the costs to complete the project are above the total cost of feasible alternatives. One of the strongest findings in the burgeoning field of behavioral economics is that that people are loss averse. The initial lowball estimates are a form of bait and switch that play on human nature.

I conclude that these problems are endemic to nuclear reactor technology because the same problems that afflict the U.S. industry also afflict the French nuclear program, which is frequently held up as a "model" for others to follow. Exhibit 2 compares the results of a recent study of French nuclear reactor construction costs to my analysis of U.S. costs. For a short

period the French managed to control costs. They did so with a state run monopoly, a licensed U.S. technology, and by keeping their reactors small. However, when they sought to increase the capacity of a design that was more original – i.e. a "Frenchified" version of the existing design -- they lost control of costs. The two large French reactor projects that are currently under construction, one in France and one in Finland, have run into severe design, cost and delay problems. The French model, which is so highly touted by some in the U.S., does not work much better than the U.S. model at controlling cost escalation, i.e. it does not work very well at all.

Thus, historical and contemporary experiences suggest that, if the US industry ever begins to actually build new reactors, costs will escalate farther. In sum, the current cost projections make power from nuclear reactors extremely expensive and uneconomic and those costs are likely to escalate, not decline, if these reactors are ever built.

**Do we currently have such a demand for electric power plants that we need to rush into construction of multiple nuclear plants, or do we have time to experiment and to see what does work and what does not?**

There is no need for these reactors today, nor is their likely to be one, if policy makers in Washington and utility regulators in the states pursue a least-cost approach to meeting the needs for electricity in the future, even if policies are adopted to reduce carbon emissions. The lack of demand for nuclear reactors stems, in part, from the recent downturn in the economy and likely long-term shift of demand growth and, in part, from the fact that there are so many lower-cost alternatives available that it does not make economic sense to build nuclear reactors.

Exhibit 3 shows historical data on the consumption of electricity in the U.S. since the end of World War II. This highlights the impact of the oil price shocks of the 1970s on demand. It hypothesizes a shift in demand in the wake of the great recession. Many analysts have suggested that the bursting of the financial and housing bubbles and the devastating hit that household wealth has taken may cause a fundamental shift in behavior. Exhibit 3 also includes an estimate of where demand would be if we were to achieve a 20 percent additional contribution of energy efficiency/renewables, which has been called for by some analysts and included in some versions of climate change legislation.

The Exhibit includes a similar analysis for Florida. Many of the utilities that have proposed nuclear reactors did so on the basis of the decade or so just prior to the bursting of the financial and housing bubbles. For many of these utilities, the shift in demand has pushed the peaks that had been projected in the near term out substantially. Moreover, climate polity that includes a substantial amount of efficiency will push the need even farther into the future.

In fact, as shown in Exhibit 4, whether or not climate policy is enacted, efficiency and several widely available renewables (e.g. biomass, wind, geothermal) are substantially less costly than nuclear. If low-cost policies can push out peak demand by decades, the rational approach would be to pursue the lower cost alternatives, during which time new, lower cost technologies will certainly be developed.

The Lawrence Berkeley National Laboratory and McKinsey and company have recently estimated that efficiency alone could lower demand 20-30 percent below business as usual in the next two decades. Adding in low-cost renewables, as shown in Exhibit 5, suggests that the demand for electricity from low-carbon sources would be met at lower costs than building nuclear reactors for decades at least. The increasing availability and declining price of natural gas also make it an increasingly attractive transitional source of energy. Pursuing low-cost alternatives in the short and middle term means that ratepayers and taxpayers pay less while a variety of new technologies including next generation efficiency, renewables, and energy storage, are developed.

**Why won't Wall Street invest in nuclear power plants, and why does Moody's call then a "bet-the-farm" investment?**

Exhibits 3, 4 and 5, which demonstrate the supply and demand side factors that make nuclear reactors uneconomic, suggest why Wall Street has refused to underwrite these projects. The nuclear reactors are far more costly and will not be needed for decades, and there is little likelihood that things will get any better for nuclear reactor economics any time soon. The challenges that nuclear reactor construction faces go well beyond these two factors. As shown in Exhibit 6, there are over three-dozen specific risk factors that nuclear reactors face that fall into six broad categories – technology, policy, regulatory, execution, marketplace, and financial risk.

**Technology risk** stems from the fact that the new generation of nuclear reactors are just that, new and uncertain. Cost estimates have increased dramatically over the past five years, doubling, tripling or even quadrupling. At the same time, the technologies of alternatives, efficiency and renewables, are stable and well known, with their costs are declining and availability is rising

**Policy risk** stems for the fact that federal policy is in flux. It is ironic that nuclear advocates have looked to climate policy, which may put a price tag on carbon emissions, as a primary driver of the opportunity to expand the role of nuclear power, but they have failed to take account of the equally strong possibility that climate policy will create a very substantial mandate for conservation and renewables, which will dramatically shrink the need for new, nonrenewable generating capacity. It is not only renewable portfolio standards and energy efficiency resource standards that will have this effect; it is also building codes, appliance efficiency standards, and huge increases in the commitment of funds for weatherization and energy retrofitting of buildings that will have this effect.

**Regulatory risk** stems from the chance that regulators will move slowly in approving reactors or authorizing their cost recovery. The fact that these are new designs has proven challenging. The reference designs that were supposed to be the templates to speed the future regulatory approval process have gone through numerous revisions. Site-specific issues, which cannot be standardized, have proven contentious. While a few states have approved construction work in progress (including full recovery of the cost of cancelled plants) and other measures to ensure utility cost recovery, the vast majority has not.

In the economic **marketplace**, demand-side risks flow from the current recession, the worst since the Great Depression, which has not only resulted in the largest drop in electricity

demand since the 1970s, but also appears to have caused a fundamental shift in consumption patterns that will lower the long terms growth rate of electricity demand dramatically. On the supply-side of the market, there are a host of alternatives that have lower cost to meet the need for electricity in a carbon-constrained environment and there is growing confidence in the cost and availability of alternatives.

**Execution risk** stems from the fact that these reactors are new and the industry does not have a great deal of capacity. Of the 18 projects that have applied for licenses at the Nuclear Regulatory Commission, 16 have suffered from one or more of the following problems: delay, cancellation, cost escalation or financial downgrade.

All of the above risks create a huge **financial risk** for utilities contemplating building reactors. The nature of the projects imposes additional financial risks, so much so that, for most utilities, the projects are so large that Moody's has called them "bet the farm" decisions.

The historical experience in the nuclear industry also deserves mention. The industry made similar "bet the farm" decisions in the face of adverse circumstances in the 1970s and 1980s and the results were disastrous for the industry and consumers with half the reactors originally ordered cancelled or abandoned and the remainder suffering severe cost overruns. A combination of risks similar to those we observe today created a financial disaster for utilities and a rate shock for consumers.

Given these risks and this experience, it is not surprising that Moody's concluded that the decision to build a nuclear reactor is a "bet the farm" decision or that another financial analyst has suggested that the risk premium necessary to make nuclear construction projects attractive to utilities would be two to three times the normal risk premium. Thus, there is little wonder that capital markets are hesitant to finances the construction of new nuclear reactors.

**Do increased loan guarantees for nuclear power plants misdirect resources that could be better used for energy efficiency and renewables power projects?**

Loan guarantees are an effort to override the judgment of Wall Street. It is ironic that as the nation continues to suffer from the misallocation of risk by companies in the financial sector, some of the strongest supporters of free markets and critics of government action are urging a massive federal subsidy for nuclear power.

The nuclear industry would like new rules that would allow it to gobble up funds earmarked for clean energy technologies; elimination of conditions that would protect taxpayers in the event of loan defaults; dramatic increases in tax and insurance subsidies; and accelerated and assured recovery of construction costs from ratepayers authorized by state regulators.

These direct subsidies would total in the hundreds of billions of dollars. Yet the stakes for consumers would be still higher. Nuclear subsidies would induce utilities to choose high capital-cost nuclear reactors that expand their rate base and forego much lower-cost alternatives, such as greater energy efficiency and renewable energy, imposing excessive costs on consumers that eventually could run into the trillions of dollars.

In an attempt to circumvent the sound judgment of capital markets, advocates erroneously claim that subsidies lower the financing costs for nuclear reactors and are good for consumers. However, shifting risk does not eliminate it, and subsidies induce utilities and regulators to take greater risks that will cost taxpayers and ratepayers dearly.

- Because the subsidy induces the utility to choose an option that is not the least-cost option available, ratepayers will bear a higher burden.
- Because subsidies induce the utility to undertake risky behaviors that they would not have engaged in, when those undertakings go bad, the costs of the failures will be born by taxpayers and ratepayers in the form of expenditures on facilities that do not produce a flow of goods and services.
- If the pre-approval process reduces scrutiny over cost escalation and overruns, ratepayers will end up paying a higher price than anticipated.
- Even with subsidies, these project are so risky and large, they tend to have adverse impacts on the utility's financial rating, which results in substantial increases in the cost of service.
- For cash strapped consumers, taking after-tax dollars out of their pockets is a severe burden. If taxpayers and ratepayers have a higher discount rate than the utility rate of return, they would be better off having the present use of their money.

There is a high probability that some or all of these factors will impose high costs on taxpayers and ratepayers (as described in Exhibit 7).

**The Bottom Line on Nuclear Subsidies**

From the societal point of view, the push to subsidize large numbers of reactors in the next couple of decades is not compelling. While it can be argued that some of the challenges that nuclear reactors face can be seen as "market failures" that might justify government intervention, most of the obstacles are not market failures: they are a reflection of the market's sound judgment about the nature of the technology and the economic conditions new nuclear reactors face. The rejection of nuclear reactors by financial markets is not a case of market failure, it is an example of market success, markets properly assessing risk and acting accordingly by refusing to underwrite unacceptable risks. The existence of numerous lower-cost, lower-risk options to meet the need for electricity in a low carbon environment undercuts the claim that nuclear reactors are a solution to the externality problem of climate change.

It is critically important to get the fundamental economic analysis correct by having realistic estimates of nuclear costs and considering the full range of alternatives. The CBO analysis on the subject from 2008, vastly underestimated the cost of nuclear reactors (see Exhibit 8) and failed to consider the full range of alternatives (see Exhibit 4). As a result, it reached the incorrect conclusion that nuclear reactors might be cost competitive at modest levels of carbon dioxide costs. When the CBO analysis is adjusted for these flaws, nuclear reactors would not be built on economic grounds for the foreseeable future (see Exhibit 9).

All of these indicators of risk call to mind the previous effort to build nuclear reactors in the U.S., when

- half of the reactors ordered were cancelled or abandoned;
- those that were completed took, on average, twice as long to build as originally planned and cost twice as much as originally estimated;
- four-fifths of the utilities that undertook nuclear construction suffered large financial downgrades and all suffered substantial financial distress; and
- there were spectacular bankruptcies of both investor owned and publicly owned utilities.

The last time the nuclear industry circumvented the judgment of the marketplace it resulted in what Forbes magazine called the "largest managerial failure in American history." The past could be prologue and lead to a repetition of that history with taxpayers and ratepayers as the underwriters of nuclear reactors. This time the failure could cost not just hundreds of billions in losses on reactors that are cancelled, but also trillions in excessive costs for reactors that are brought to completion by utilities that fail to pursue the lower cost, less risky options that are available.

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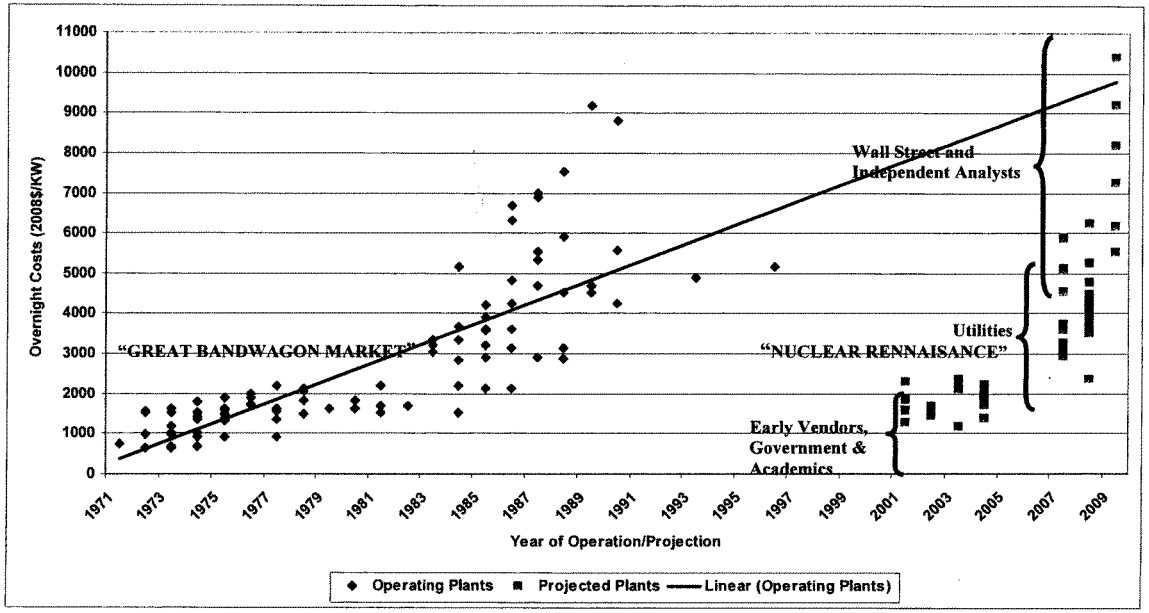
## Exhibits

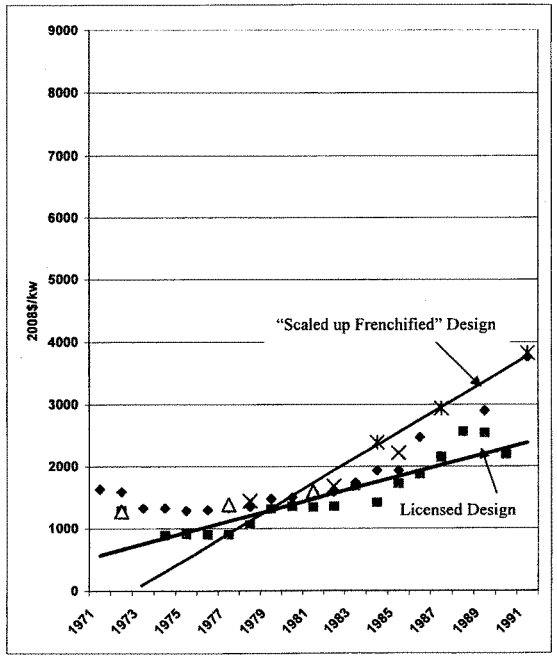
**Exhibit 1: Completed Nuclear Reactors Compared to Projected Costs of Future Reactors**




Sources: Cooper, 2009a, p. 3; Koomey and Hulttman, 2007, Data Appendix; University of Chicago 2004, p. S-2, p. S-8; University of Chicago estimate, MIT, 2003, p. 42; Tennessee Valley Authority, 2005, p. I-7; Klein, p. 14; Keystone Center, 2007, p.42; Kaplan, 2008 Appendix B for utility estimates, p. 39; Harding, 2007, p. 71; Lovins and Shiekh, 2008b, p. 2; Congressional Budget Office, 2008, p. 13; Lazard, 2008, p. 2; Lazard, 2009, p. 2; Moody s, 2008, p. 15; Standard and Poor, 2008, p. 11; Severance, 2009, pp. 35-36; Schlissel and Biewald, 2008, p. 2; Energy Information Administration, 2009, p. 89; Harding, 2009. PPL, 2009; Deutch, et al., 2009, p. 6. California Energy Commission, August 2009, p. 18; see Bibliography for full citations.

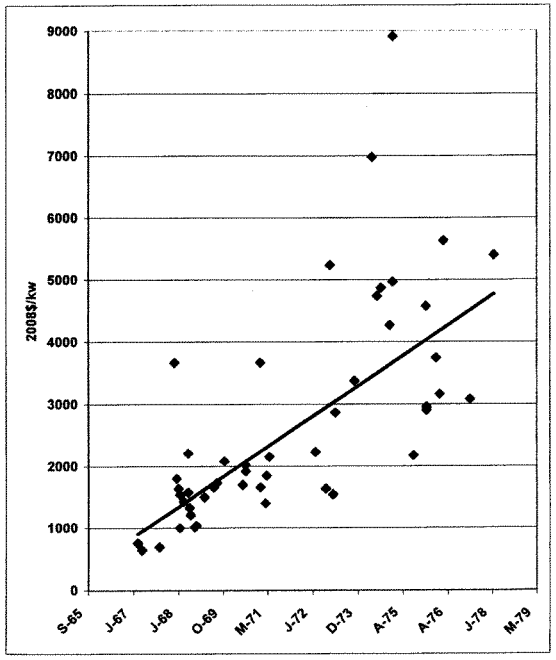
**Exhibit 2: Pressurized Water Reactor Cost Treads**

**France**




Source: Grubler, 2009, Figure 8; Komanoff, 2010, Figure 1

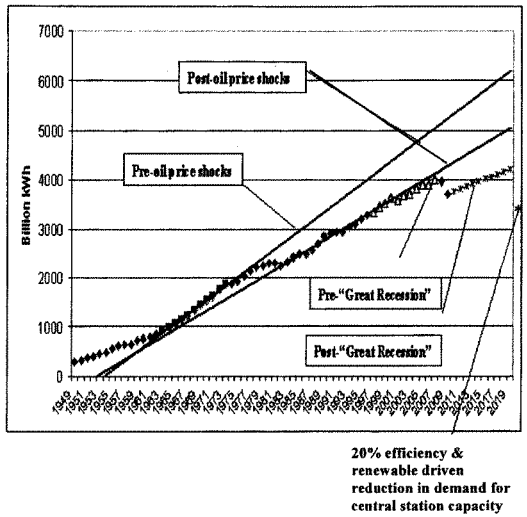
**United States**



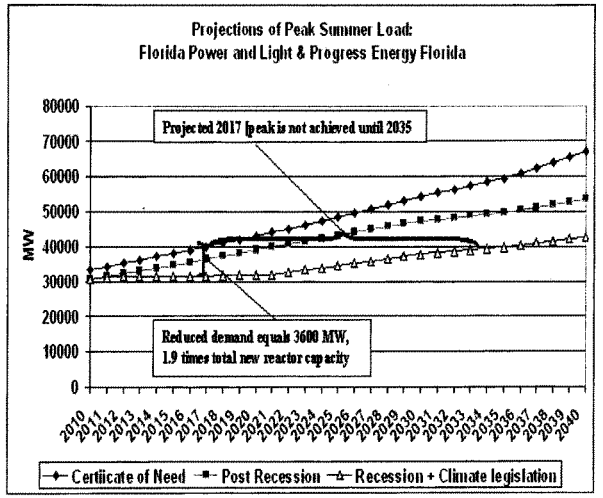

Source: Cooper, 2009a, database, updated

**Exhibit 3: The Impact of Declining Demand and Potential Efficiency on Electricity Load**

External Shocks and Public Policy Shift the Level and Growth Rate of Demand

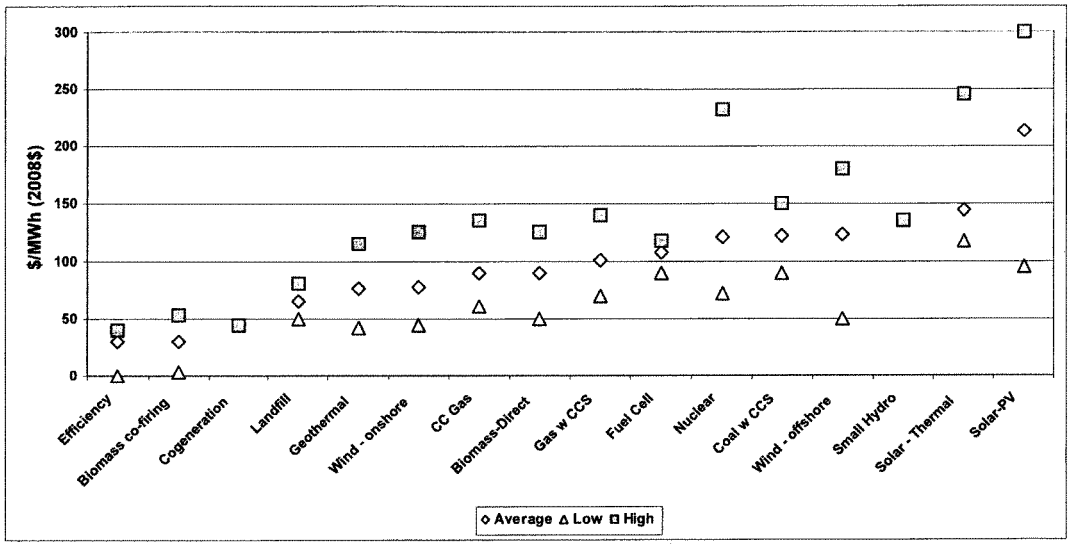



Sources: Cooper, 2009b, p. 33. U.S. Energy Information Administration, *Monthly Energy Review*, various issues author calculation



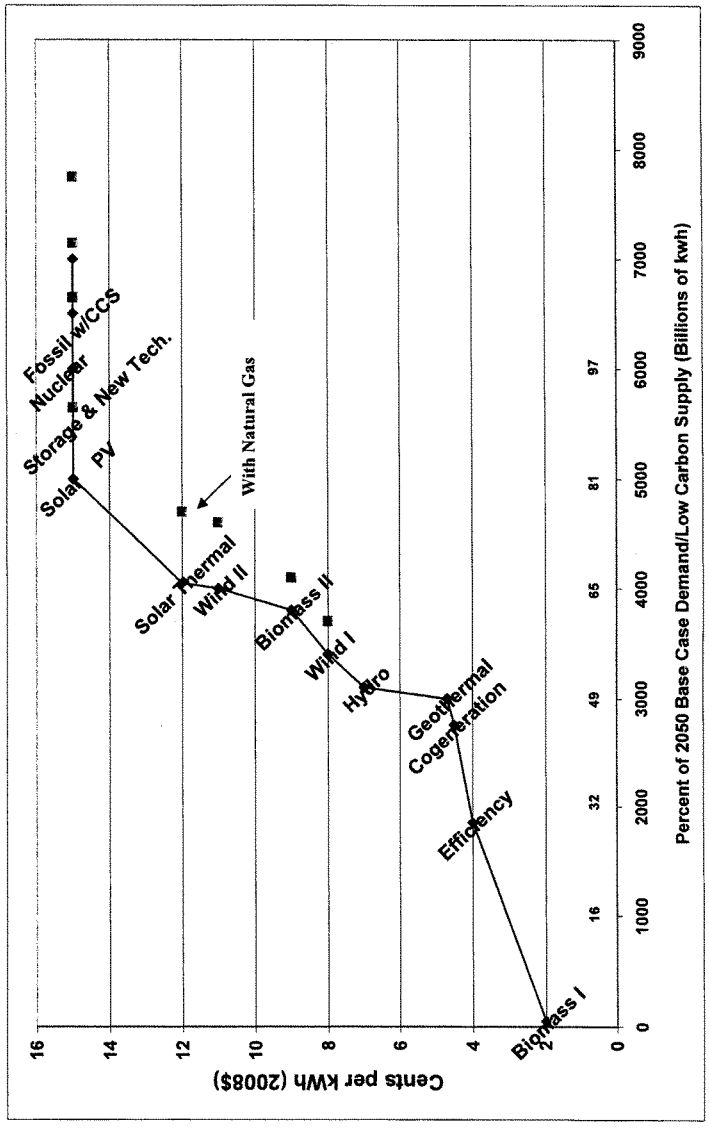

Source: Cooper, 2009c, Exhibits MNC-7 and MNC-8.

**Exhibit 4: Levelized Cost of Low Carbon Options to Meet Electricity Needs**



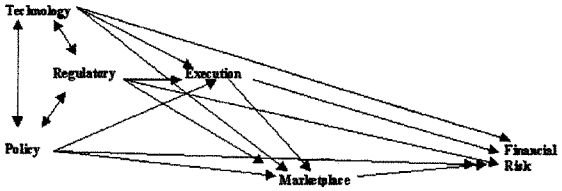

**Sources: Cooper, 2009b, p. 30; Congressional Budget Office, May 2008, p.13; Kaplan, Stan, November 13, 2008, Appendix B; California Energy Commission, August, 2009, p. 18; Lazard, June 2008, p. 10; Lovins, Shiekh, and Markevich, December 31, 2008. p. 2; Moody's, May 2008, p. 15; National Research Council of the National Academies, 2009, p. 58; Renewable Energy Policy Network for the 21st Century, 2008; Standard and Poors, August 13, 2008, p. 11.**

**Exhibit 5: Meeting Electricity Needs in a Carbon Constrained Environment (Cost of Alternatives Substitution Curve)**




Source: Cooper 2009a, p. 52

**Exhibit 6: The Economic Risks of Nuclear Reactor Projects**




| Risk Category | Source | Specific Risks |
|---|---|---|
| Technology | New Technology Risk | First of a kind costs |
| | | Long Lead times |
| | Alternative technologies | Efficiency potential identified |
| | | Renewable cost declines |
| Policy | Shifting focus | Emphasis on efficiency reduces need |
| | | Renewables reduce need |
| | Flexible GHG reductions | Lowers carbon cost |
| Regulatory | NRC Regulatory Reviews | Lack of experience |
| | | Change of requirements |
| | | Design flaws and revisions |
| | | Site-specific conditions |
| | Loan Guarantee Conditions | Taxpayer protections inhibit loan |
| | Rate Review | Recovery of costs challenged |
| Execution | Construction Risk | Lack of experience |
| | | Counterparty risk |
| | EPC contract uncertainties | Cost escalation and volatility |
| | Size, cost and complexity | Cost overruns |
| | | Delays |
| | | Rework costs |
| Marketplace | Uncertain demand growth | Slowing due to recession |
| | | Shifting due to wealth loss |
| | Uncertain fuel costs | Natural gas price decline |
| | Reactor Costs | Long lead times |
| | | Cost overruns |
| | | Rate shock reduces demand |
| Financial | General Conditions | Tight money |
| | | New liquidity requirements |
| | | High-risk premiums |
| | Utility Finance | Increased nuclear exposure |
| | | Finance ratio deterioration |
| | | Rising cost of debt |
| | | Declining cash & equivalents |
| | | Weak balance sheets |
| | | Underfunded pension plans |
| | Project Finance | High hurdle rates |
| | | Impact of large project |
| | | Debt load and service burden |
| | | Capital structure distortion |

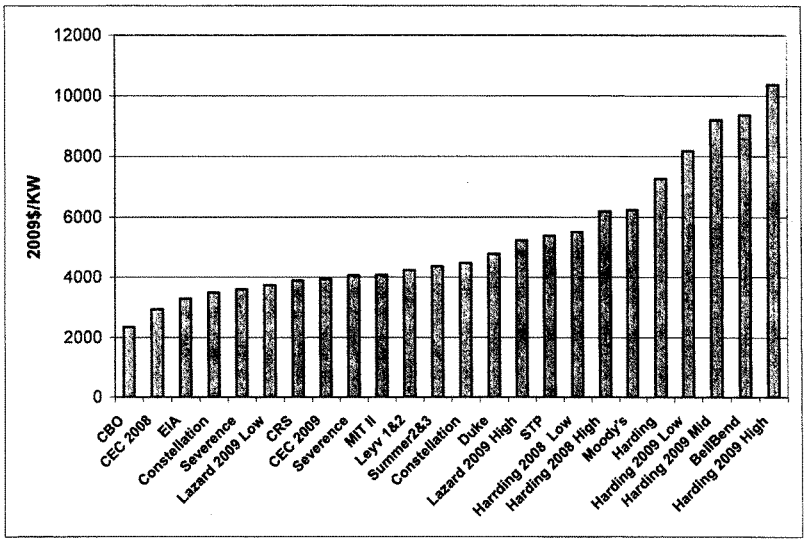
**Source: Cooper, 2009b, pp. 11, 13.**

**Exhibit 7: Threats to Taxpayers and Ratepayers from Nuclear Reactor Subsidies**

| Area of Impact | Threat to Taxpayers and Ratepayers | Likelihood of Impact |
|---|---|---|
| Technology choice | Failure to adopt least cost approach | Certain |
| Project completion | Burden of failed projects | Highly likely |
| Project oversight | Lax review of project management | Highly likely |
| Financial ratings | Downgrade or Negative | Near certainty |
| Discount rate | Misallocation of resources | Certain |

Source: Cooper, 2009b, p. 17.

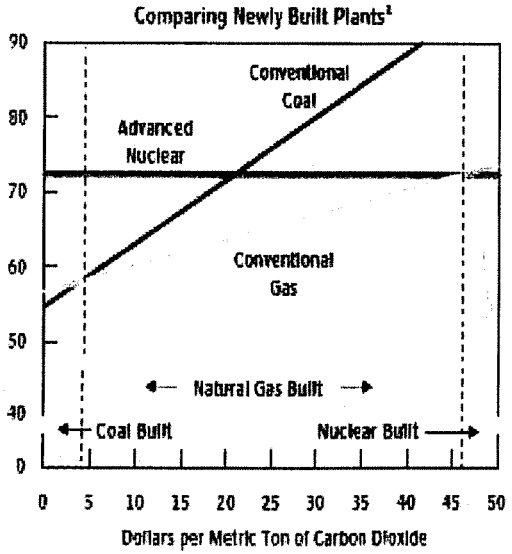
**Exhibit 8: CBO vastly underestimated the capital cost of new nuclear reactors compared to other cost estimates in 2008-2009**



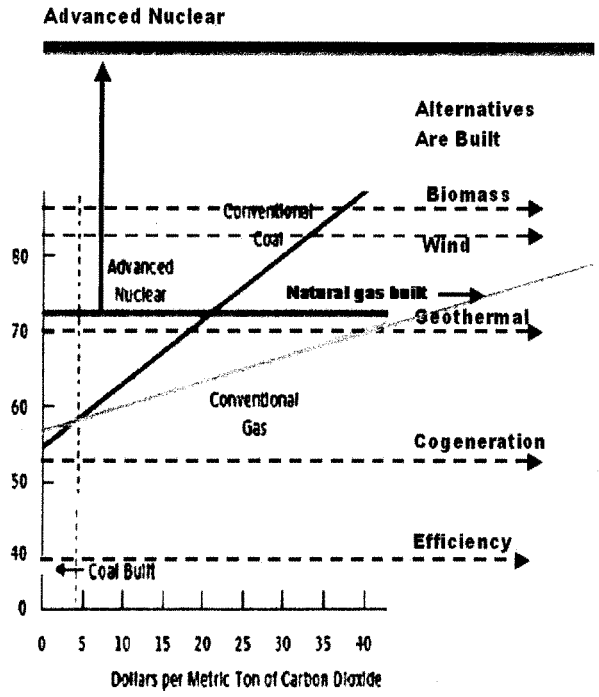

Sources: See Exhibit 1

**Exhibit 9: CBO's conclusion that nuclear would be built at CO2 costs above $45 is wrong because higher nuclear costs and abundant lower cost, low carbon alternatives mean nuclear is not needed for the foreseeable future.**

**CBO original technology choice analysis**




**CBO adjusted for higher nuclear costs and more alternatives**




Source: Lazard 2009 overlaid on CBO

Mr. KUCINICH. I want to make sure for the record that I have the pronunciation of your name. The copy that I have in front of me says "Sokoloski." Now, your name card says "Sokolski." Help me out here.

Mr. SOKOLSKI. I kind of prefer the latter.

Mr. KUCINICH. OK. Well, that's what it is. It's Sokolski. Well, where I'm from in Cleveland, Sokolski is a well-known name. And the copy here did say Sokoloski. But it's Mr. Sokolski. Welcome.

Mr. SOKOLSKI. I don't make helicopters either.

Mr. KUCINICH. Welcome.

**STATEMENT OF HENRY SOKOLSKI**

Mr. SOKOLSKI. Thank you, Mr. Chairman and members of the committee, for allowing me to testify before you today on whether or not creating additional Federal loan guarantees for new civilian nuclear energy plants is advisable. My short answer is it's a bad idea.

Mr. KUCINICH. Pull that mic a little closer.

Mr. SOKOLSKI. This is based upon the findings of a 2-year study that my center just completed on nuclear economics, the key findings of which I am releasing today. I'd ask the committee if I could present this as an exhibit along with two other short op-eds.

Mr. KUCINICH. So ordered, without objection.

Mr. SOKOLSKI. In general, my views are like that of many of the panelists you've already heard. I think the key problem new nuclear power plants have is that to become economically competitive, they have to reduce their capital construction costs considerably. I think piling on more government financial incentives beyond those you've already voted for and approved to promote commercial deployment of nuclear power is only likely to reduce market pressures on the industry to meet this critical goal of reducing capital costs.

This then brings me to the committee's four questions. Are cost overruns and the construction of nuclear power plants a thing of the past? I think if we understand what's happening in Finland, France, Canada and the United States, the answer is no. In addition to the Finnish and American cases you've already heard, we have the French case of EDF struggling to keep construction of a similar plant to that being made in Finland on schedule. And in France, the project's now running more than 20 percent over budget and at least 2 years behind schedule. In Canada, the government of Ontario put its power plans on the table to build two large reactors and decided to put them on hold after receiving a $26 billion bid that was nearly four times higher than the $7 billion bid the government set aside for the project only 2 years before. As you heard, in the United States, projects at an advanced stage of planning have seen their cost projections soar fourfold in less than a decade and are still rising.

Why won't Wall Street invest in nuclear power plants, and why does Moody's call them "bet-the-farm" investments? Three reasons. First, projections of new nuclear power plant construction costs are far higher today than several nonnuclear alternatives, while the long-term requirements for ever larger numbers of baseload gen-

erators, nuclear or nonnuclear, could easily decline as a result of energy technology innovations.

Betting nuclear power will make money through 2080, when nuclear power plants clearly cost far more to build now and take far longer to construct than cheaper alternatives, is too large of a gamble for private investors. Like U.S. spending on canals in the early 1800's, which was undercut by the advent of steam locomotives, the risk of investing in expensive nuclear plants is that energy innovations in the storage, generation, distribution or use of electricity could easily wipe out the value of whatever commercial nuclear investments are made.

You have already heard about the history and how unkind it's been to nuclear power projects in the past. I think this is the reason why the nuclear industry is seeking more Federal loan guarantees.

Finally, the value of Federal loan guarantees is so uncertain, and the ability of the utilities to cover their risks with their own capital is so low that even with loan guarantees, private investors are leery.

I would like to associate myself with the recommendations already made that you really need to make sure the Congress demands that DOE supply Congress with answers to the questions about the costs of these loan subsidy fees that you need to get clear. Without that, the private industry's going to be very leery about getting involved even with loan guarantees.

You asked, do increased loan guarantees for nuclear power plants misdirect resources that could be better used for energy efficiency and renewable power projects? I will keep my comments short. The short answer is yes. Experience with syn fuel, breeder reactors, ethanol mandates and the like should teach us all not to repeat.

Finally, do increased loan guarantees for nuclear power plants misdirect U.S. financial resources for the benefit of other countries? Here the short answer again is yes. AREVA and EDF, who design and build the Evolutionary Power Reactors planned for the United States, are key beneficiaries along with Hitachi and Toshiba, the Japanese firms who have teamed up with Westinghouse and General Electric, who now have a controlling or a significant ownership portion of these companies. URENCO, a European consortium that is building an enrichment plant in New Mexico, also stands to benefit, as does AREVA, which is building enrichment plants in Idaho. Almost all of the manufacturing jobs associated with these plants and construction will either be done abroad or in plants owned by these firms.

The bottom line: if renewable natural gas and carbon prices were all clearly rising, and the technologies for electricity storage, distribution were static, the case for government intervention in promoting commercial nuclear power, although wrong in principle and practice, would at least be stronger. Yet just the opposite seems to be the case. I believe getting into this further than we already have is risky business, and pure risk at that. I think the losses are quite possible, and the gains simply are not there.

Thank you very much.
Mr. KUCINICH. Thank you very much, Mr. Sokolski.
[The prepared statement of Mr. Sokolski follows:]

# Pure Risk: Federal Loan Guarantees for New Nuclear Plants

Testimony
By
Henry David Sokolski
Executive Director
The Nonproliferation Policy Education Center
www.npec-web.org

Domestic Policy Subcommittee
of the
Oversight and Government Reform Committee

"Nuclear Power Federal Loan Guarantees: The Next Multi-Billion Dollar Bailout?"

2154 Rayburn House Office Building
Tuesday, April 20, 2010
2:00 p.m.

I would like to thank Chairman Kucinich and Ranking Member Jordan along with other Members of the Subcommittee for allowing me to testify before you today on whether creating additional federal loan guarantees for new civilian nuclear energy plants is advisable. My short answer to your committee is that it's a bad idea.

My own nonprofit organization, the Nonproliferation Policy Education Center (NPEC), just completed a two-year assessment of the economics of building new civilian nuclear energy plants. This project, *Weighing the Costs and Risks of Nuclear Power's Global Expansion*, was funded by four national foundations with very different political outlooks -- from very conservative to very liberal -- and commissioned over 20 of the world's leading energy economists to assess the economic costs and risks of new reactor construction and operations. These experts' general conclusion was that the best way to promote the optimal mix of energy types was to rely more on market mechanisms and to back off piling on more government financial incentives to promote the commercial deployment of nuclear power or any other specific energy type.

Their findings turned primarily on nuclear power's key disadvantages -- its relatively high capital construction costs. If nuclear power is to have any viable economic future against its alternatives, its construction costs must come down and it must build a strong enough record of success to attract substantial private investment. In this regard, reducing market pressures on industry to compete for financial resources by extending federal loan guarantees is only likely to make matters worse.

This, then, brings me to your committee's four questions:

1. ***Are cost overruns in the construction of nuclear power plants a thing of the past?*** If we understand what is happening in Finland, France, Canada, the US, and China, the short answer is no. In Finland the French government owned nuclear vendor AREVA is trying to complete its most modern reactor for a turnkey price. This project was supposed to prove that nuclear power reactors could be built on time and on budget. So far, the project is more than three years behind schedule and roughly 80 percent over budget. In France, the state owned utility company Électricité de France (EDF) is struggling to keep construction of a similar reactor, Flamanville 3, on schedule. French nuclear regulators have raised questions regarding one quarter of the welds in the

reactor's secondary containment shell and found cracks in the reactor's concrete base. At one point, French regulators actually suspended the pouring of concrete at the site. The project is now reported to be running more than 20 percent over budget and at least 2 years late. In Canada, last summer, the government of Ontario put its nuclear plans to build two large power plants on hold after receiving a $26 billion bid that was nearly four times higher than the $7 billion the government originally set aside for the project only two years before. In the U.S. actual construction of new nuclear reactor designs has not yet gotten underway. However, projects at an advanced stage of planning have seen their cost projections soar. In the U.S., the estimated cost of two reactors that Toshiba is planning to build for NRG Energy and the city of San Antonio recently jumped from $14 billion to $17 billion. As a result, the city board sued NRG. High-end estimates of the full costs to bring a new nuclear plant on line reflect this pattern of cost escalation, as San Antonio's experience has been replicated in many other places. As a result, estimated construction costs (exclusive of financing) for an installed kilowatt have jumped from a little over $1,000 in 2002 to well over $7,000 in 2009. China, meanwhile, has over 20 reactors under construction including both French and U.S.-designed plants. The Chinese state published overnight construction cost projections for these plants are seductively low – between $2 billion and $3 billion for a single Westinghouse AP 1000. However, there are two reasons to question how relevant these projections might be for possible construction in the US. First, the Chinese nuclear industry has experienced substantial corruption. Just last summer, Kang Rixin, the president of China National Nuclear Corporation, which is building AP 1000 plants, was arrested for his involvement in a $250 million bid-rigging scheme. Second, the AP 1000 plants China is now building are not ones that our own Nuclear Regulatory Commission would permit in the US. In fact none of them meet the post-9/11 U.S. safety regulations. These require that new reactors be able to sustain direct hits by large airliners. What will these reactor designs look like and cost? We don't know: Westinghouse submitted its design modifications to the NRC to meet the post-911 safety requirements last year but the NRC rejected them as being inadequate.

2. ***Why won't Wall Street invest in nuclear power plants, and why does Moody's call them a "bet-the-farm" investment?*** For three reasons:

A. Projections of new nuclear plant construction costs are far higher today than several nonnuclear alternatives while the long-term requirements for ever larger numbers of base load generators – nuclear or nonnuclear – could easily decline as a result of energy technology innovation. The nuclear industry likes to say that future nuclear power plants are projected by selected analysts to be "competitive". What's competitive, however, is in the eye of the beholder and Wall Street is not buying the nuclear industry's arguments. The bottom line reason why is nuclear power's high costs compared with its alternatives. Domestic dirty coal is substantially cheaper than projected new nuclear. Meanwhile, domestic conventional and unconventional natural gas, which emits roughly half the carbon as coal, has become so plentiful and cheap domestically and internationally that it is almost certain in the near and mid-term to cost less than nuclear. Unlike nuclear, it will

be able to service both peak and base-load demand. Here, it is worth noting that new natural gas projects have been able to secure private financing, whereas new nuclear projects have not. As for renewables, their costs are still comparatively high but unlike nuclear – which has seen its projected overnight costs increase by roughly 400 percent in the last six years – the costs of renewables are coming down. Given that no new nuclear plants are likely to come on line domestically much before 2020 and these plants are designed to operate for 60 years, the danger of nuclear investments being devalued by new technical developments is real. Beyond the alternative generators and fuel types (gas, carbon sequestered coal, wind, solar, etc.) that are or could turn out to be cheaper than nuclear, systemic changes that could make nuclear and all large base load generators far less salient -- electric storage systems, fuel cells, distributed electrical systems, etc. – might well emerge in the next ten to fifteen years. Betting that nuclear will break even financially or even make money through 2080 when nuclear power plants clearly cost far more to build now and take far longer to construct than cheaper alternatives is too large a gamble for private investors. Like U.S. public spending on canals in the early 1800s, which was undercut by the invention of the steam locomotive, the risk of investing in expensive long-lived nuclear plants is that energy innovations could easily wipe out the value of whatever commercial nuclear investments are made.

B. History has been unkind to nuclear power projects, with over half of all plants ever to receive construction permits in the US being canceled. Most senior bank investment analysts are old enough to remember the financial disasters that followed the mismanagement of the construction of nuclear plants for the Washington Public Power Supply System (WPPSS). Here, project costs kept rising until they exceeded original estimates by more than 300 to 400 percent. The utility was forced to default on $2.25 billion in bonds. From the late 1960s on, over half of the nuclear plant orders in the U.S. were cancelled and almost ninety percent of the projected plants globally were never built. This trend and the prospect of a significant portion of new nuclear projects defaulting on their loans again have soured Wall Street's enthusiasm for such projects. Certainly, the financial risks of construction and management errors and delays are enough to destroy billions of dollars of investment. That's why the nuclear industry has pushed to secure massive new federal loan guarantees or sought to get their rate payers to pay for the capital construction costs in advance. It also helps explain why some at the U.S. Department of Energy (DoE) are willing to ask industry for a mere one to two percent loan subsidy fee to cover what they believe the risks of default on these projects might be, but private financiers clearly do not. If, as some official assessments suggest, the DoE is wrong on the likely default rate for these nuclear projects and the loan fee is set too low, it costs DoE nothing. However, if private investors put their money down, their reading of the risks of default is such that without massive loan guarantees, they will lose most or all of what they invest.

C. The value of federal loan guarantees is so uncertain and the ability of the utilities to cover their risks with their own capital so low that even with loan guarantees, private investors are leery of putting their own money at risk. One of the worries Moody's report, New Nuclear Generation: Ratings Pressure Increasing," raised when it was released last June is that the loan guarantees that the federal government is offering to the

nuclear industry are too conditional. Will loan guarantees apply to plants that the NRC has stopped construction for safety reasons? Will the loan guarantees only be paid after a utility project goes bankrupt or some time before? In the case of default, who has first call on the remaining assets – the US Treasury or other creditors (those that cover the required remaining 20 percent of the project's capital costs)? What will the DoE assess the loan subsidy fee to be to cover the costs of such defaults? Will they assess this fee to be one or two percent of the loan, which the nuclear industry says it can tolerate or will the fees be higher? How much might the fees vary from project to project? Will the DoE continue to argue that this information is proprietary and must be kept from the public? Without clear answers to these and other questions, private investors (including the firms that might consume the electricity produced and are being asked to pay higher rates to help cover the unguaranteed portion of the financing) are unlikely to find proposed federal loan guarantees entirely comforting. A simple fix on this would be to have Congress demand that DoE supply Congress with the answers before authorizes such guarantees. .

3. ***Do increased loan guarantees for nuclear power plants misdirect resources that could be better used for energy efficiency and renewable power projects?*** **Yes**. One of the repeated findings of the analysts from institutions as disparate as the American Enterprise Institute, The Heritage Foundation, The Cato Institute, Greenpeace, and the Union of Concerned Scientists is that if we are serious about promoting clean energy experimentation, our government should stay out of picking commercial winners and losers by granting federal loan guarantees. One of the concerns repeatedly raised by these analysts is how much government investments in energy commercialization projects distorts and represses the kind of innovation we need. Historically, when the U.S. government has lent its financial support to specific commercial energy projects, the results have been abysmal. Among our government's most prominent initiatives are such losers as synthetic fuels, breeder reactors, and corn ethanol. Mistakes, of course, can always happen but with the federal government, such errors dominate while admission to them comes late and at great expense. Indeed, generally, government energy commercialization projects continue to receive federal support well after it is clear they are white elephants. What's worse, the government all too frequently tries to cover its mismanagement tracks by demanding that the public pay out of their own pockets to buy the costly commercial production of such schemes (e.g., corn ethanol mandates, which cost private U.S. consumers roughly $10 billion last year). Unlike small businesses, who pay for their cockups, the bill is passed on to the public. This is not to argue that there is not an important role for the federal government in promoting clean energy technologies and fuel. There is but it isn't in spending on or off budget on commercialization efforts. Instead, what is needed is to have Washington work to promote increased energy market competition through regulatory reforms that state governments should undertake. These reforms would, among other things, (1) set standard rules for selling electricity through the grid; (2) remove conflicts of interest for existing grid or pipeline operations to block new entrants; (3) ensure regulated utilities have similar incentives to invest in efficiency as they do in expanding generation plants and energy supplies; (4) encourage key market

constraints, be they carbon limits or liability coverage, through the market pricing system rather than through government subsidies; and (5) increase pricing visibility for power to final customers. Finally, as long as state utilities commissions do not allow utilities to profit fully from introducing fuel efficiencies, there will continue to be a role for the federal government to encourage and fund energy research and development directly.

4. ***Do increased loan guarantees for nuclear power plants misdirect United States financial resources for the benefit of other countries?*** In a word, yes. AREVA and EDF, who design and build the Evolutionary Power Reactors (EPR) planned for the US, are key beneficiaries along with Hitachi and Toshiba, the Japanese firms who have teamed up with Westinghouse and General Electric (which these Japanese firms now have controlling or major ownership of). URENCO, a European consortium that enriches uranium fuel and is building an enrichment plant in New Mexico also stands to benefit as does AREVA again, which is building an enrichment plant in Idaho. Since the US does not make nuclear reactors, almost all of the manufacturing jobs associated with reactor construction will either be done abroad or in plants owned by these foreign firms. All of these firms have applied for federal loan guarantees either alone or in concert with American partners. Also, when it comes to the nuclear divisions of General Electric and Westinghouse, it is arguable that they are any longer entirely or truly American. Toshiba owns roughly 70 percent of Westinghouse's nuclear division. Hitachi controls 40 percent of General Electric's nuclear business. As for AREVA and EDF, they are not even private firms: Over 80 percent of AREVA and EDF are owned by the government of France. Finally, roughly 80 percent of the fuel for our commercial nuclear reactors currently is imported from Russia and Europe. This may change when AREVA and URENCO complete enrichment plants in the US. When they do, though, what is produced in the U.S. will be almost entirely produced by these foreign firms. AREVA also hopes to secure federal loan guarantees for its US enrichment project as well.

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**Conclusion: What Should Guide Investments in Commercial Nuclear Power?**

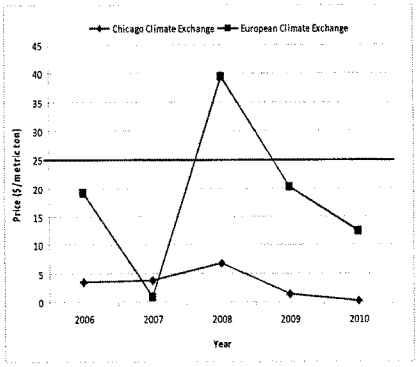
Last September, Chris Crane, president of Exelon, America's largest owner and operator of nuclear power plants, and the World Nuclear Association's Vice Chairman, publicly cautioned other utility executives against investing in new nuclear generating capacity until both natural gas prices rose and stayed above $8 dollars per 1,000 cubic feet (mcf) ***and*** carbon prices or taxes rose and stayed above 25 dollars a ton. Looking at available price data over the last decade, as my center did as a part of its economic assessment of nuclear power, suggests why neither condition, much less both, are likely to be met any time soon (see Figure 1 below):

Figure 1

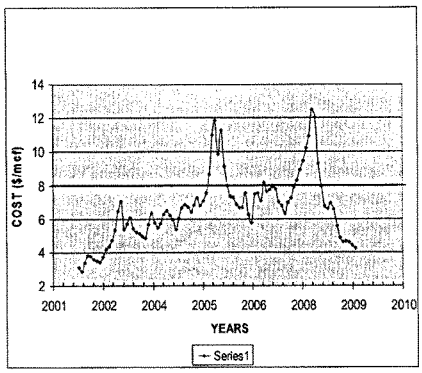
**Natural Gas and Carbon Prices -- Hardly Steady or High Enough to Underwrite Private Nuclear Investments**



**European Climate Exchange Carbon Prices in Constant 2009 dollars**




**US Natural Gas Prices in Constant 2009 Dollars**




Recent developments suggest why continued skepticism is warranted. After the latest international conference to control carbon emissions held in Copenhagen, carbon prices in the European carbon market hit a near all-time low. There is little reason to believe that prices will increase either in or outside of the EU any time soon. Domestic natural gas prices, meanwhile, driven by reduced demand, massive increases in supplies and newly discovered reserves, have dropped precipitously and have stayed low even through a very harsh winter. For a variety of reasons, well explained in *The Economist,* "An Unconventional Glut," (13 March 2010, pp. 72-74, available at http://www.economist.com/business-finance/displaystory.cfm?story_id=15661889), natural gas prices are unlikely to rise significantly either in the near or mid-term.

Bottom line: If the prices for renewables, natural gas and carbon were all rising, consensus about carbon emissions and global warming was solid, and private industry was still only investing in dirty coal, the case for government intervention in promoting commercial nuclear power, although still wrong both in principle and in practice, would be much stronger. Yet, none of these conditions prevail. If anything, just the opposite seems to be the case. That ought to inform us about the advisability of saddling the U.S. public with massive nuclear federal loan guarantees. It's bad business and pure risk: Losses are quite possible; gains are not.

# Nuclear Power, Energy Markets, and Proliferation

By

Henry Sokolski

When security and arms control analysts list what has helped keep nuclear weapons technologies from spreading further than they already have, energy economics is rarely, if ever, mentioned. Yet, large civilian nuclear energy programs can -- and have -- brought states quite a way towards developing nuclear weapons;[1] and it has been market economics, more than any other force, that has kept most states from starting or completing these programs. Since the early 1950s, every major government in the Western Hemisphere, Asia, the Middle East and Europe has been drawn to atomic power's allure only to have market realities prevent most of their nuclear investment plans from being fully realized.

With any luck, this past will be our future. Certainly, if nuclear power programs continue to be as difficult and expensive to complete as they have been compared to their nonnuclear alternatives, only additional government support and public spending will be able to save them. In this case, one needs to ask why governments would bother, especially in light of the security risks that would inevitably arise with nuclear power's further proliferation.. On the other hand, if nuclear power evolves into the quickest and least expensive way to produce electricity while abating carbon emissions, little short of a nuclear explosion traceable to a "peaceful" nuclear facility would stem this technology's further spread -- no matter what its security risks might be.

Adam Smith's Invisible Hand, then, could well determine just how far civilian nuclear energy expands, and how much attention its attendant security risks deserve. Certainly, if

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1. See, e.g., Albert Wohlstetter, et. al., *Swords from Plowshares: The Military Potential of Civilian Nuclear Energy* (Chicago, IL: University of Chicago Press, 1979), pp. vii-32; Matthew Fuhrman, "Spreading Temptation: Proliferation and Peaceful Nuclear Cooperation Agreements," *International Security*, Summer 2009, pp. 7-41, available at http://belfercenter.ksg.harvard.edu/files/IS3401_pp007-041_Fuhrmann.pdf; and Victor Gilinsky, et al., "A Fresh Examination f the Proliferation Dangers of Light Water Reactors," in Henry Sokolski, editor, *Taming the Next Set of Strategic Weapons Threats* (Carlisle, PA: US Army War College, Strategic Studies Institute, 2005), available at http://www.npec-web.org/Essays/20041022-GilinskyEtAl-lwr.pdf.

nuclear power's economics remain negative, diplomats and policy makers could leverage this point, work to limit legitimate nuclear commerce to what is economically competitive, and so gain a powerful tool to help limit nuclear proliferation. If nuclear power finally breaks from its past and becomes the cheapest of clean technologies, though, it is unlikely that diplomats and policy makers will be anywhere near as able or willing to prevent insecure or hostile states from developing nuclear energy programs to help them make atomic weapons.

**Nuclear Power's Past, Present, and Projected Future**

Consider nuclear power's performance over the last half century. In the early 1950s, U.S. Atomic Energy Commission Chairman Lewis Strauss trumpeted the prospect of nuclear electricity "too cheap to meter."[2] An international competition, orchestrated under President Dwight D. Eisenhower's Atoms for Peace Program, ensued between the U.S. Russia, India, Japan and much of Western Europe to develop commercial reactors. Several reactor and nuclear fuel plants were designed and built, endless amounts of technology declassified and shared world-wide with thousands of technicians, and numerous research reactors exported in the 1950s. Yet, ultimately relatively cheap, abundant oil and coal assured that only a handful of large power plants were actually built.[3]

The next drive for nuclear power came in the late 1960s just before the energy "crisis" of the early 1970s. President Richard Nixon, in announcing his "Project Independence," insisted that expanding commercial nuclear energy was crucial to reducing U.S. and allied dependence on Middle Eastern oil.[4] France, Japan, and Germany, meanwhile, expanded their nuclear power construction programs in a similar push to establish energy independence. The U.S., Russia, Germany and France also promoted nuclear power exports at the same time. Four thousand nuclear power plants were to be brought on line world-wide by the year 2000.

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2. Lewis L. Strauss, Chairman of the U.S. Atomic Energy Commission, Speech to the national Association of Science Writers, New York City, September 16, 1954.

3. On this history, see Joseph F. Pilat, editor, *Atoms for Peace: An Analysis after Thirty Years* (Boulder CO: Westview Press, 1985); Richard Hewlett and Jack Holl, *Atoms for Peace and War, 1953-1961: Eisenhower and the Atomic Energy Commission* (Berkley CA: University of California Press, 1989);

4. President Richard Nixon, "Special Message to the Congress Proposing Emergency Energy Legislation," November 8, 1973, available at http://www.presidency.ucsb.edu/ws/index.php?pid=4035.

But, market forces -- coupled with adverse nuclear power plant operating experience -- pushed back. As nuclear power plant operations went awry (e.g., fuel cladding failures, cracking pipes, fires and ultimately Three Mile Island), spiraling nuclear construction costs and delays, as well as the disastrous accident at Chernobyl, killed the dream. More than half the nuclear plant orders in the U.S. were cancelled and almost ninety percent of the projected plants globally – including a surprisingly large number of proposed projects in the Middle East -- were never built.[5]

Today, a third wave of nuclear power promotion is underway buoyed by international interest in reducing greenhouse gas emissions and national concerns in enhancing energy security at least as measured in terms of reliance on oil. The nuclear industry in the U.S. has been lobbying Congress to finance the construction of more than $100 billion in reactors with federal loan guarantees.[6] President Obama has responded by proposing $36 billion dollars in new federal loan guarantees for nuclear power.[7] Other governments in Asia, the Middle East, and Latin America have renewed their plans for reactor construction as well. Even Europe is reconsidering its post-Chernobyl ambivalence with nuclear power: Finland, France, Italy, and Eastern Europe are again either building or planning to build power reactor projects of their own. Germany and Sweden, meanwhile, are reconsidering their planned shutdown of existing reactors.

In all this, the hands of government are evident. Certainly, if nuclear power were ever truly too cheap to meter, could assure energy security, or eliminate greenhouse gas emissions economically, private investors would be clamoring to bid on nuclear power projects without governmental financial incentives. So far, though, private investors have kept from putting any of their own capital at risk. Why? They fear nuclear energy's future will rhyme with its past. In the 1970s and 1980s, new nuclear power projects ran so far behind schedule and over budget, most of the ordered plants had to be cancelled. Even those that reached completion were financial losers for their original utility and outside investors, and the banking sector became wary.

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5. See, Yves Marignac, *Nuclear Power, the Great Illusion: Promises, Setbacks and Threats*, October 2008, p. 42, available at http://www.global-chance.org/spip.php?article89 and the Testimony of Thomas B. Cochran before the Senate Committee on Energy and Natural Resources, Subcommittee on Energy Research and Development, June 8, 1977, available at http://docs.nrdc.org/nuclear/files/nuc_77060801a_23.pdf.

6. See Simon Lomax, "Nuclear Industry 'Restart' Means More Loan Guarantees," *Bloomberg.com*, October 27, 2009, available at http://www.bloomberg.com/apps/news?pid=20601072&sid=aR1MVERYEgAs.

7. See U.S. Office of Management and Budget, "The Federal Budget Fiscal Year 2011: Creating the Clean Energy Economy of Tomorrow," The President's Budget: Fact Sheet, available at http://www.whitehouse.gov/omb/factsheet_key_clean_energy/

In this regard, little has changed. In Finland, a turnkey reactor project has been led by the French manufacturer AREVA, in part as a way to demonstrate just how inexpensively and quickly new nuclear plants could be built. The project is now more than three years behind schedule and at least 80 percent over budget. Finland says AREVA is to blame for the cost overruns and construction delays. AREVA blames Finland and has threatened to suspend construction entirely in hopes of securing a more favorable rate of return.[8]

Meanwhile, in Canada, the government of Ontario chose to avoid this fate. It put its nuclear plans to build two large power plants on hold after receiving a $26 billion bid that was nearly four times higher than the $7 billion the government originally set aside for the project only two years before.[9]

In the U.S., the estimated cost of two reactors that Toshiba was planning to build for NRG Energy and the city of San Antonio recently jumped from $14 billion to $17 billion. Consequently, the city board delayed its approval of $400 million in financing for the project, sued NRG, and reduced its share of the project from roughly 50 percent to less than 8 percent.[10] [High-end estimates of the full costs to bring a new nuclear plant on line reflect this pattern of cost escalation, as San Antonio's experience has been replicated in many other places. Estimated construction costs (exclusive of financing) for an installed kilowatt have jumped from a little over 1,000 dollars in 2002 to well over $7,000 in 2009 (see the range of rising estimates over the last decade in Figure 1 below):

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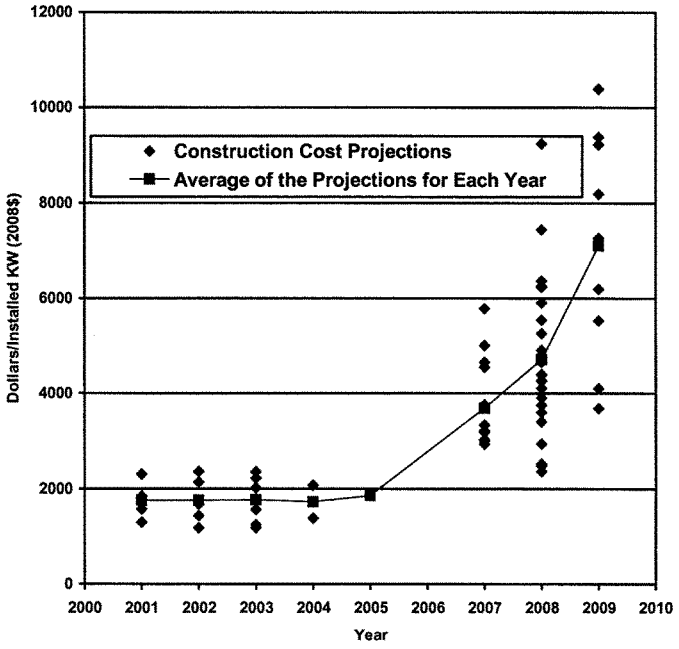
8. *Nucleonics Week*, "Financial crisis nips nuclear revival in the bud, WNA told," September 17, 2009, available at http://www.carnegieendowment.org/static/npp/pdf/NW_Sep2009_reprint.pdf and *Reuters*, "Analysis-Delays, hitches hamper Areva's reactor export plan, December 10, 2009, available at http://in.news.yahoo.com/137/20091210/371/tbs-analysis-delays-hitches-hamper-areva.html.

9. See, Tyler Hamilton, "$26B Cost Killed Nuclear Bid: Ontario Ditched Plan over High Price Tag that Would Wipe Out 20-Year Budget," *The Star,* July 14, 2009, available at http://www.thestar.com/article/665644.

10. See, Rebecca Smith, "Costs Cloud Texas Nuclear Plan," *The Wall Street Journal*, December 5, 2009, available at http://online.wsj.com/article/SB125997132402577475.html; Dow Jones, "CPS Energy, NRG Energy Complete Nuclear Power Project Settlement," March 1, 2010, available at http://www.nasdaq.com/aspx/stock-market-news story.aspx?storyid=201003011204dowjonesdjonline000515&title=cps-energynrg-energy-complete-nuclear-power-project-settlement; and Anton Caputo, "Nuclear Could Still Edge Out Gas," My SA News, December 15, 2009 available at http://www.mysanantonio.com/news/local_news/79283092.html.

Figure 1:

**Overnight Capital Costs Projections for New Power Reactors (2008 $s/installed KW) -- High and Rising**[11]




11. This graph, which reflects some the most recent nuclear cost projections, is based on a chart originally generated by Mark Cooper and spotlighted by Sharon Squassoni. See, Mark Cooper, *The Economics of Nuclear Reactors: Renaissance or Relapse?* Vermont University, Institute for Energy and the Environment, June 2009. available at http://www.vermontlaw.edu/Documents/Cooper%20Report%20on%20Nuclear%20Economics%20FINAL%5B1%5D.pdf and Sharon Squassoni, *The U.S. Nuclear Industry: Current Status and Prospects under the Obama Administration*, Nuclear Energy Futures Paper No. 7, The Centre for International Governance Innovation, November 2009, available at http://www.carnegieendowment.org/files/Nuclear_Energy_7_0.pdf.

To address these concerns, the U.S. nuclear industry has succeeded in getting Congress to implement a growing number of subsidies, including nuclear energy-production tax credits and very large federal loan guarantees. Industry estimates indicate that proposed loan guarantees alone would save an American utility at least $13 billion over 30 years in the financing a modern nuclear reactor.[12] Granting these and additional government incentives, though, may not be sufficient. First, in 2003, the Congressional Budget Office estimated that the nuclear industry would probably be forced to default on nearly 50 percent these loans.[13] Second, most recently, Moody's warned that barring a dramatic positive change in utility-industry balance sheets, the ratings firm would downgrade any power provider that invested in new nuclear reactor construction on the basis that these projects were "bet the farm" gambles. Moody's threat to reduce credit ratings included utilities that might secure federal loan guarantees, which Moody's described as too "conditional" to be relied on.[14]

Meanwhile, the president of America's largest fleet of nuclear power plants who now serves as the World Nuclear Association's Vice Chairman, publicly cautioned that investing in new nuclear generating capacity would not make sense until both natural gas prices rise and stay above $8 dollars per 1,000 cubic feet (mcf) *and* carbon prices or taxes rise and stay above 25 dollars a ton.[15] Yet industry officials believe that neither condition,

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12. See the discussion of Constellation's calculations regarding its planned reactor build at Calvert Cliffs, Maryland in Doug Koplow, "Nuclear Power as Taxpayer Patronage: A Case Study of Subsidies to Calvert Cliffs Unit 3" (Washington DC: NPEC, 7 July 2009), available at http://www.npec-web.org/Essays/Koplow%20-%20CalvertCliffs3.pdf.

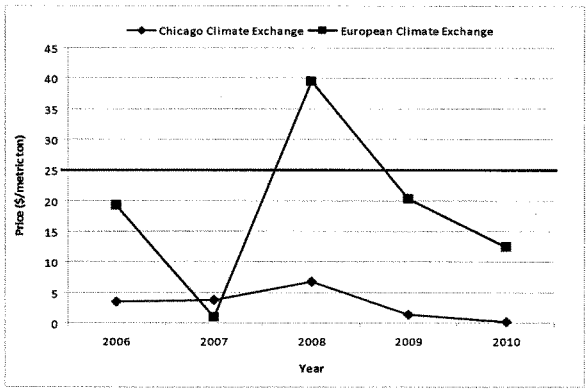
13. U.S. Congressional Budget Office, "Cost Estimate of S.14 Energy Policy Act of 2003," May 7, 2003, available at http://www.cbo.gov/ftpdocs/42xx/doc4206/s14.pdf. The Congressional Budget office optimistically assumed that about half of the value of the projects that defaulted would be recovered in bankruptcy, for a net loss of around 25 percent of guaranteed principle. The Department of Energy (DoE) has tried to discredit even these figures, claiming that the real figures will be much lower but recently said it would not publicly disclose its own calculations of how much of an upfront loan fee to charge to cover for potential defaults on nuclear projects. Industry officials, meanwhile, have made it clear that if the DoE charges them much more than 1 or 2 percent of the amount borrowed to cover these risks, they will not take the loans. See, Kate Sheppard," Energy Sec Unaware that Nuclear Loans Have 50 Percent Risk of Default, February 16, 2010, available at http://motherjones.com/blue-marble/2010/02/chu-not-aware-nuclear-default-rates and *Etopia News*, "DoE Spokesperson Says that Credit Subsidy number is 'Proprietary and Will Remain Confidential'", available at http://etopianews.blogspot.com/2010/03/doe-spokesperson-says-that-credit.html.

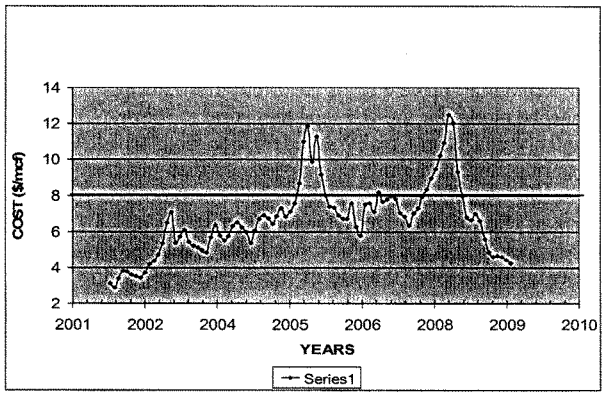
14. See Moody's Global, "New Nuclear Generation: Ratings Pressure Increasing," June 2009 available at http://www.nukefreetexas.org/downloads/Moodys_June_2009.pdf.

15. See *Nucleonics Week*, "Financial Crisis Nips Nuclear," note 8 above.

much less both, are likely to be met any time soon. Past price history suggests why (see Figure 2 below):

**Figure 2: Natural Gas and Carbon Prices -- Hardly Steady or High Enough to Underwrite Private Nuclear Investments**[16]




16. Data for these charts were drawn from Chicago Climate Exchange, "Closing Prices", December 2009. http://www.chicagoclimatex.com/market/data/summary.jsf
European Climate Exchange, "Prices, Volume & Open Interest: EXC EUA Futures Contract", December 2009. http://www.ecx.eu/EUA-Futures
http://www.bloomberg.com/apps/news?pid=20601109&sid=aNykpTP9hnIo
and the United States Energy Information Administration, "U.S. Natural Gas Electric Power Price", October 30, 2009. http://tonto.eia.doe.gov/dnav/ng/hist/n3045us3m.htm
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Recent developments suggest their skepticism is warranted. After the latest international conference to control carbon emissions held in December 2009 in Copenhagen, carbon prices in the European carbon market hit a near all-time low. U.S. natural gas prices, meanwhile, driven by reduced demand and massive increases in supplies and newly discovered reserves have also dropped precipitously. There is good reason to believe that they are unlikely to rise significantly any time soon.[17] Conclusion: Without significant additional government financial incentives, private investments in new nuclear electricity are unlikely to be made.

**Energy Security and Global Warming**

Many decision makers in the energy sector understand this. This, in turn, has given rise to public focus on another, less measurable but possible nuclear power benefit: Energy security. The case here, though, is also yet to be demonstrated. In most large industrial countries, oil is only rarely used to produce electricity, but rather is being consumed at increasing rates to fuel a growing fleet of cars and trucks. This makes the link between oil imports and nuclear power quite tenuous at present. The argument put forth by some experts is future-oriented: that some day nuclear power could supply the electricity and hydrogen to power the world's transport fleets. For both electric and hydrogen vehicles, much is unknown about the costs, rate of market penetration, and even whether nuclear will prove to be the most economical way to produce the needed energy resources.

Unfortunately, few of these central issues are given serious attention in popular news media. Instead, France, which made a massive investment in nuclear power in the 1970s, and now produces about 80 percent of its electricity from nuclear energy, is held up as an energy-independence model for the U.S. and the world to follow.[18] This nuclear example, however, cost plenty and hasn't really saved France from its oil kick. France covered much of the startup and operating cost of its civilian nuclear program by initially integrating the sector with its military nuclear-weapons-production program. It also used massive amounts of cheap French government financing to pay for the program's capital construction. As a result, it is unclear how much the French program cost overall, or how much plant costs escalated over the life of the French program – although they clearly

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17. See, e.g., Rebecca Smith and Ben Casselman, "Lower Natural-Gas Price Leaves Coal Out in Cold," The Wall Street Journal, June 15, 2009, available at http://online.wsj.com/article/SB124502125590313729.html and Edward L. Morse, "Low and Behold: Making the Most of Cheap Oil," *Foreign Affairs*, September/October 2009, available at http://www.foreignaffairs.com/articles/65242/edward-l-morse/low-and-behold.

18. See, e.g., Steve Kroft, "France: Vive Les Nukes: How France is Becoming the Mode3l for Nuclear Energy Generation, *60 Minutes*, April 6, 2007 available at http://www.cbsnews.com/stories/2007/04/06/60minutes/main2655782.shtml.

did.[19] What is undisputed, however, is that from the 1970s to the present, France's per-capita rate of oil consumption never declined; and that the country has needed to import increasing amounts of expensive peak-load electricity from its immediate neighbors due to the supply inflexibility of base-load nuclear.[20] Despite these facts, the story of French nuclear energy independence persists.

Another assertion nuclear power supporters frequently make is that the need to abate carbon emissions will make nuclear energy economically competitive through rising carbon prices. Once carbon is no longer free, nuclear proponents believe that their zero carbon emission power plants will be the clear, clean-energy victor over coal with carbon capture systems, natural gas, and renewables. Yet, by industry's own projections, nuclear power may already have priced itself out of the running in any carbon abatement competition. Factoring industry construction, operation and decommissioning costs, the total cost of abating one ton of carbon by substituting a new nuclear power plant for a modern coal-fired generator has been pegged at least $120. This figure, which includes the costs of public subsidies, assumes fairly low capital construction costs (roughly one-half of the industry's latest high-end cost projections). If one uses industry's high-end projections, the cost for each ton of carbon abated approaches $200. This is expensive. Certainly, there currently are much cheaper and quicker ways to reduce carbon emissions (see Figure 4 below):

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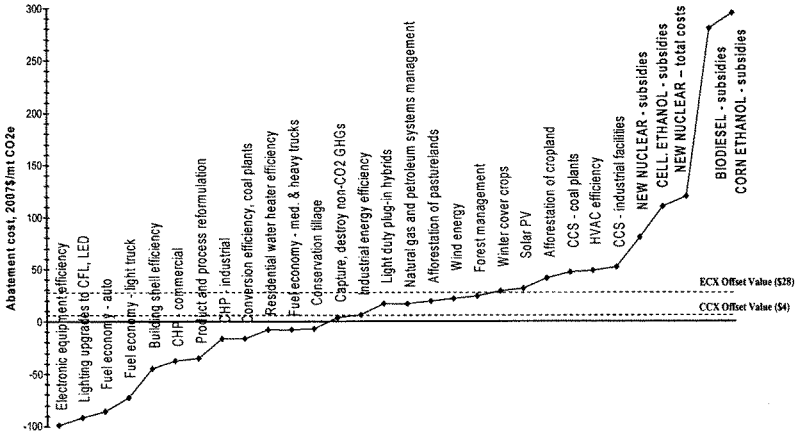
19. For the most recent and thorough attempts, see Arnulf Grubler, *An Assessment of the Costs of the French Nuclear Program, and 1970-2000*, available at http://www.iiasa.ac.at/Admin/PUB/Documents/IR-09-036.pdf and Charles Komanoff, "Cost Escalation in France's Nuclear Reactors: A Statistical Examination," January 2010, available at http://www.slideshare.net/myatom/nuclear-reactor-cost-escalationin-france-komanoff.

20. The French civilian nuclear industry and power utility system, unlike the American one, is almost entirely nationalized. As a result, France still produces incredibly opaque financial statements regarding its civilian nuclear program. What is not in dispute, however, is that because of its over investments in base-load nuclear generators, France must export much of its production and import expensive peak load capacity, which it still lacks. For an explanation of base-load and peak load electricity, see note 47. See, Mycle Schneider, "Nuclear Power in France: Beyond the Myth," (Washington, DC: NPEC, 2009), available at http://www.npec-web.org/Reports/20081200-Schneider-NuclearPowerInFrance.pdf.

**Figure 4**

## New Nuclear Power: An Expensive Way to Abate Carbon




*Abatement technologies*: McKinsey & Company (2007), mid-range case.
*Offset prices*: Average of contract values from CCX (2008-10) and ECX (2008-12), *Public Subsidy Values* Koplow (2009).

Just how rapidly a nuclear approach can begin abating carbon emissions (compared to its alternatives) is also a significant issue. Certainly, if one is interested in abating carbon in the quickest, least expensive fashion, building expensive nuclear plants that take up to a decade to bring on line will have difficulty abating carbon competitively no matter how much carbon is taxed. That's why in North and South America and the Middle East, building natural gas burning generators is currently an attractive, near-term option. Advanced gas-fired power plants can halve carbon emissions as compared to coal fired plants, can serve as base or peak power generators, and be brought on line in 18 to 30 months rather than the 5 to 10 years need to build large reactors. Advanced gas-fired generator construction costs, meanwhile, are a fraction of those projected for nuclear power.[21]

21. For a detailed description of natural gas fired electrical generating technologies, their cost and performance, see International Energy Agency, OECD, Energy Technology System Analysis Program, "Gas-Fired Power," available at http://www.etsap.org/E-techDS/EB/EB_E02_Gas_fired%20power_gs-gct.pdf.

Where natural gas is plentiful, as it clearly already is in the Middle East and the U.S., these economic facts should matter.[22] The benefits of gas become even more evident once one factors in the nuclear-specific burdens for nations with no current capacity to create proper regulatory agencies and prepare the grid for large base load generator.[23]

**A Future Unlike Our Past?**

The counter argument to this, of course, is that fossil fuel resources are finite and, in time, will run out. This is irrefutable in principle, but in practice when and how one runs out matters. Backers of renewables,[24] for example, insist that renewables' costs are coming down significantly. Proponents of wind power argue that their costs have declined by more than 80 percent over the last 20 years.[25] Solar photovoltaic generated electricity has also been falling (see, for example, the costs of delivered solar electricity in Figure 3 below).

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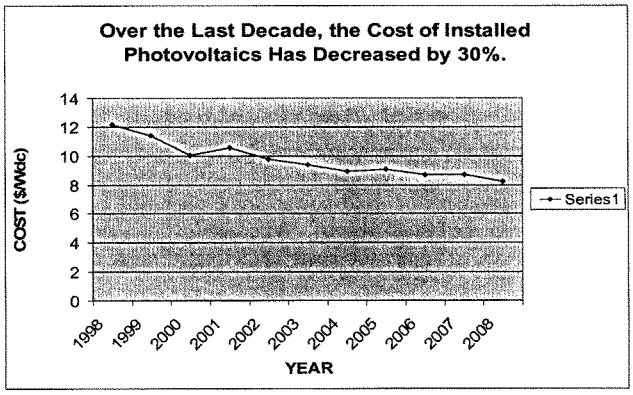
22. On the growing availability of natural gas in the Western Hemisphere, Europe and Asia, see "An Unconventional Glut," The Economist, pp. 72-74, available at http://www.economist.com/business-finance/displaystory.cfm?story_id=15661889; Ben Casselman, " U.S. Gas Fields Go from Bust to Boom, April 30, 2009 and "U.S. Natural-Gas Supplies Surge," *The Wall Street Journal,* April 30, 2009 and June 18, 2009, available at http://online.wsj.com/article/SB124104549891270585.html and http://online.wsj.com/article/SB124527293718124619.html and Gary Schmitt, "Europe's Road to Energy Security: Unconventional Gas Could Free the EU from Dependence on Russian Gas Supplies," *The European Wall Street Journal*, March 11, 2010, available at http://online.wsj.com/article/SB10001424052748704187204575101344074618882.html

23. For an analysis relevant to the Middle East, see Peter Tynan and John Stephenson, "Nuclear Power in Saudi Arabia, Egypt and Turkey: How Cost Effective?" (Washington, DC: NPEC) available at http://www.npec-web.org/Frameset.asp?PageType=Single&PDFFile=Dalberg-MiddleEast-carbon&PDFFolder=Essays and Wyn Bowen and James Acton, "Atoms for Peace in the Middle East: The Technical and Regulatory Requirement," (Washington, DC: NPEC), available at http://www.npec-web.org/Frameset.asp?PageType=Projects..

24. See Amory B. Lovins, Imran Sheikh, and Alex Markevich, " Nuclear Power: Climate Fix or Folly?" updated by Amory B. Lovins December 31, 2008 for NPEC, available at http://www.npec-web.org/Frameset.asp?PageType=Single&PDFFile=Lovins-NuclearPowerClimateFixorFolly&PDFFolder=Essays.

25. See the analysis of the American Wind Association, available at http://www.awea.org/faq/cost.html

**Figure 3**




Many energy experts contend that significant changes would have to be made in how electricity is currently distributed and stored before intermittent generators like renewables could compete in addressing base load demand. Yet, as renewables' costs continue to decline, the incentives needed to prompt these changes are likely to increase.[26] Meanwhile, nuclear power's costs are high and rising. Finally, with new sources of oil and gas now projected to come on line, it is unclear when or how much fossil fuel prices might increase. All of this presents significant uncertainty and risk for nuclear power investors.

In the mid-term, -- i.e., the next two decades, when nuclear supporters see their power source reemerging -- a number of energy developments could easily destroy whatever value might be credited to investments made in commercial nuclear energy today. As noted, new electrical grid concepts could be employed incrementally to make the transmission of intermittent wind and solar much more practical; as could the development of practical electrical storage and of viable distributed electrical systems.[27] Economical

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26. For an analysis that renewables are already more economical than nuclear or coal base load generations, though, see Amory Lovins, "Mighty Mice," *Nuclear Engineering International*, December 21, 2004, available at http://www.neimagazine.com/story.asp?storyCode=2033302.

27. See, e.g., Mason Willrich, "Electricity Transmission for America: Enabling a Smart Grid, End-to-End," *Energy Innovation Working Paper Series*, Massachusetts Institute of Technology, July 2009, available at http://web.mit.edu/ipc/research/energy/pdf/EIP_09-003.pdf; Sharon Gauin, "Bloom Fuel Cell: Individual Power in a Box," *Business Week*,

sequestration of carbon from coal-fired plants also may emerge along with increased efficient use of electricity and smart metering that could change and reduce demand patterns.

Although none of these developments are guaranteed, any one of them could have a dramatic impact on the long-term economic viability of investing now in nuclear systems that would operate for 60 years or more after coming on line in 2020 and beyond. In fact, the uncertainties surrounding what the costs for electricity generation, distribution, transmission, storage and consumption and what form each is likely to take over the next two decades are all very much in play for the first time in over a century. This very flexible and uncertain situation not only argues for great caution in the allocation of public funds on any energy commercialization project, but also underscores the importance in ensuring neutral markets in which multiple solutions are forced to compete against each other.

**Government Nuclear Power**

Governments, on the other hand, view matters differently. The energy market uncertainties noted above have only encouraged them to invest more in clean energy commercialization options. In practice, this has meant they have invested most heavily in the most capital intensive options. Thus, the current carbon and energy security challenges have been addressed by Japan, South Korea, India, Russia, France, and the U.S. not only by initiating investments in carbon sequestration and renewables, but by continuing and significantly increasing massive subsidies -- e.g., loan guarantees, commercial export loans, energy production credits, accident liability caps and indemnification, and construction delay insurance programs -- for the construction of new, large nuclear power plants.

In addition, two other factors fortify many governments' instinct to support nuclear commercialization.

First, in several important cases -- e.g., in France, Russia, India, South Korea, and Japan -- the nuclear industry's payrolls have long been large and are essentially public: Commercial nuclear activities in these states are run through entities that are primarily government-owned. Exposing these industries to the full force of market realities could result in significant layoffs – dislocations large enough to produce negative political results. Continuing to subsidize them, on the other hand, is politically astute.

Second and less immediate, commercial nuclear power's historical links to national security continues to make government support a natural. Within the oldest and most

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February 24, 2010, available at http://www.businessweek.com/idg/2010-02-24/bloom-fuel-cell-individual-power-plant-in-a-box.html.

significant nuclear states – the U.S., the U.K., France, Russia, and India – government-run, dual-use reactors were long connected to electrical grids to produce nuclear weapons fuels and electricity. In the U.S., this includes the Hanford dual-purpose reactor in Washington State (which is no longer), and the Tennessee Valley Authority's tritium-producing light water reactors (whose operations are about to be expanded). It includes Russia's RMBK reactors, which made plutonium for Russia's arsenal until the 1990s; France's gas cooled natural uranium and breeder reactors, which did the same for France through the 1980s; India's heavy water reactors and planned breeder reactors, which currently provide tritium and plutonium for India's nuclear weapons program; and Britain's Magnox plants, which provided the bulk of the plutonium for the United Kingdom's nuclear arsenal. As for the most popular of nuclear power systems, pressurized light-water reactors (versions of which Germany, France, Russia, Japan, South Korea all now export and operate), these were originally developed in the U.S. for nuclear submarine and naval propulsion.

This strong history of government involvement has made the new government financial incentives to promote the construction of additional nuclear power and fuel making plants seem normal. Yet, pushing such government support of energy commercialization projects, both nuclear *and* non-nuclear, actually flies in the face of what market forces would otherwise recommend. More important, it hides the full costs and risks associated of each energy option. This, in turn, is undesirable for several reasons.

**Commercial Energy Innovation**

Conventional wisdom holds that government subsidies to commercialize technology optimize and catalyze commercial energy modernization. In reality, subsidy policies are politically challenging to implement. Not surprisingly, those that do make it into law most often support the more established and powerful players in the market independent of technical merit. As such, government imposition of energy commercialization subsidies makes it *more* difficult for winning ideas to emerge or prevail against large scale losers, and this difficulty can increase over time. The reason is simple: Once government officials make a financial commitment to a commercially significant project, it becomes politically difficult for them to admit it might be losing money, or that it was ever a mistake to have supported it -- even when such conclusions are economically clear. A "lock-in" effect begins to take hold: Not only won't governments terminate funding to clear losers; they may actually shore up such projects with additional funding or legal mandates to force the public to buy the project's commercial production even when cheaper alternatives clearly exist.[28]

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28. For a detailed case study of such effects in the case of bio-fuel commercialization programs, see David Victor, *The Politics of Fossil Fuel Subsidies* (Geneva, Switzerland: The Global Subsides Initiative, October 2009), available at http://www.globalsubsidies.org/files/assets/politics_ffs.pdf.

Thus, it was evident to most that the U.S. government's commercial synfuels and breeder reactor projects were economically untenable years before Congress finally decided to kill both projects. The delay in terminating these projects cost taxpayers billions of dollars. These projects, though, at least died. With government mandated energy commercialization programs, such as corn ethanol, the U.S. government has essentially mandated that the product be produced and bought by the public in increasing amounts in the face of little or no market demand. Besides costing U.S. consumers billions of dollars annually, this program is becoming institutionalized in such a manner as to make it more difficult to phase-out or end it in the future. In France, Japan, Russia, Korea, and India, where the power of the government in commercial matters is even stronger, this tendency is even more pronounced.

**Nuclear Safety and Off-site Damage**

With nuclear-specific energy commercialization subsidies, such as low priced nuclear accident liability insurance, private sector incentives that would otherwise improve operational and design safety also take a hit. Under U.S. law, U.S. commercial nuclear reactor operators (about 100 in number) must secure private insurance sufficient to cover roughly the first $300 million of damages any nuclear accident might inflict on third parties off site. After any accident, the law provides that each nuclear utility should also pay up to approximately $96 million per reactor in annual installments of $15 million each (plus a bit more earmarked for legal fees) should the first tier policy be exceeded. This requirement, however, can be delayed or waived entirely by the Secretary of Energy if, in his judgment, it would threaten the financial stability of the firm paying it. These retrospective premiums are paid in a nondiscriminatory fashion: They are virtually identical for both the safest and worst run utilities.[29]

By most accounts, such pooling lessens the cost of nuclear insurance significantly to the nuclear industry as a whole.[30] A key argument for such pooling is that it is unreasonable to ask the nuclear industry to assume the full costs of insuring against nuclear accidents

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29. On this point see the testimony of David Lochbaum, before a hearing of the Subcommittee on Energy and Resources of the House Committee on Government Reform, "Next Generation of Nuclear Power," June 29, 2005, available at http://ftp.resource.org/gpo.gov/hearings/109h/23408.txt'.

30. Estimates of how much Price-Anderson nuclear accident liability limits on third party damages are worth range widely between .5 and 2.5 cents per kilowatt hour. For details see Anthony Heyes, ,"Determining the Price of Price Anderson", *Regulation,* Winter 2002 – 2003, pp. 26-30, available at http://www.cato.org/pubs/regulation/regv25n4/v25n4-8.pdf and Koplow, "Nuclear Power as Taxpayer Patronage,": available at http://www.npec-web.org/Essays/Koplow%20-%20CalvertCliffs3.pdf'

and nuclear terrorism; that these risks are simply too large.[31] This certainly has been the logic behind the passage of the U.S. Terrorism Risk Insurance Act of 2002 and its repeated extension.[32] Yet, these acts are claimed by their backers only to be "temporary", i.e., designed to allow private insurers the time to adjust to a new risk market.

As both the U.S. Congressional Budget Office and the U.S. Treasury Department have argued, capping private firms' need to insure against catastrophic losses only make sense if the risks of such losses are very low and unlikely to persist. In such cases, federal subsidies for insurance "could be justified as a means of avoiding expensive and unnecessary effort to reduce losses." If, as is more likely, in the case of nuclear safety and vulnerability to terrorist attacks, the long term risks are either long-lived or -- after 911 and the aging of the existing reactor fleet -- likely to increase,[33] such federal "assistance" "could be costly to the economy because it could further delay owners of assets from making adjustments to mitigate their risk and reduce potential loses."[34] Here, it is worth

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31. Cf. however, Peter A. Bradford, former U.S. Nuclear Regulatory Commissioner, Testimony before the United States Senate Committee on Environment and Public Works Subcommittee on Nuclear Regulation, "Renewal of Price Anderson Act", January 23, 2002 available at http://epw.senate.gov/107th/Bradford_01-23-02.htm

32. See Public Law 107-297-Nov. 26, 2002 available at http://www.treas.gov/officies/enforcement/ofac/legal/statutes/pl107_297.pdf and The Terrorism Risk Insurance Extension Act of 2005 available at http://www.cbo.gov/ftpdocs/69xx/docs6978/s467.pdf.

33. For post 9/11 overviews of the growing number of civilian nuclear-related terrorism concerns, see U.S. Congressional Research Service, Carl Behrens and Mark Holt, "Nuclear Power Plants: Vulnerability to Terrorist Attack" (Report for Congress, RS21131, August 9, 2005), available at http://www.fas.org/sgp/crs/terrror/RS21131.pdf; National Research Council of the National Academies, San Luis Obispo Mothers for Peace v. Nuclear Regulator Commission, No. 03-74628, 2006 WL 151889 (9th Cir. June 2, 2006; "Safety and Security of Commercial Spent Fuel Storage", Public Report (April 6, 2005); and Henry Sokolski, "Too Speculative? Getting Serious about Nuclear Terrorism," *The New Atlantis,* Fall 2006, pp. 119-124, available at http://www.thenewatlantis.com/publications/too-speculative.

34. See U.S. Congressional Budget Office, "Federal Terrorism Reinsurance: An Update," January 2005 section three of six, "Long-term Effects" available at http://www.cbo.gov/showdoc.cfm?index=6049&sequence=2#pt3 and The U.S. Department of the Treasury, Report to Congress, *Assessment: The Terrorism Risk Insurance Act of 2002* (Washington, DC: The U.S. Department of the Treasury, Office of Economic Policy, June 30, 2005), pp. 10-12, 111-113, and 125-140. Yet another shortcoming with the current cap on nuclear accident insurance liability for third parties in the US is the lack of commonsense differentiation between the safest and least safe and the most remotely located reactors and those located near high value urban real estate. This too discourages industry from engaging in best practices. See notes 26 and 34.

noting that neither General Electric nor Westinghouse has yet succeeded in producing a reactor design that can meet the Nuclear Regulatory Commission's latest requirement that the plant be able to sustain a large, direct airplane hit. Westinghouse's latest submission to meet this requirement was actually found to be wanting and was rejected because it created unintended vulnerabilities to natural disasters, such as earthquakes.[35]

Unfortunately, on this point, the U.S. nuclear industry has been increasingly schizophrenic. Originally, in 1957 when the nuclear industry first secured legislation capping its nuclear accident liability for damages suffered by third parties, it claimed that it only needed the protection until utilities had a chance to demonstrate nuclear power's safety record – i.e., until 1967. A half century later, though, industry officials pleaded with Congress that without another 20-year extension, commercial nuclear power would die. They also insisted that they were still unwilling to export US nuclear goods to foreign states that have not yet explicitly absolved nuclear vendors from liability for damages parties located off site might suffer in the case of an accident.[36]

The future, however, is supposed to be better. Industry backers of the latest reactor designs claim that their new machines will be dramatically safer than those currently operating and, for this reason government accident insurance caps could be phased out.[37] Certainly, industry arguments against even higher coverage requirements under their Price-Anderson coverage seem implausible. The nuclear industry in the US is already is more than willing to pay for insurance to cover damages to their own nuclear assets. In fact, for a single power plant location, most nuclear utilities are buying over ten times the amount of insurance to protect against on-site accident damage and forced outages than Price-Anderson requires them to carry for against off-site property and health damages for the entire U.S. At a minimum, this suggests that the insurers and utilities are able to provide substantially more than the $300 million in primary coverage for off-site accidents that they currently purchase voluntarily. Finally, several U.S. nuclear reactor vendors rely heavily upon taxpayer appropriations to help pay for their advanced "safer" commercial reactor designs. These "accident-resistant" reactors are precisely the ones that industry

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35. U.S. Nuclear Regulatory Commission, "NRC Informs Westinghouse of Safety Issues with AP1000 Shield Building," Press Release 09-173, October 15, 2009, available at http://www.nrc.gov/reading-rm/doc-collections/news/2009/09-173.html.

36. See Letter from Omer F. Brown III to Deputy Secretary of State Richard Armitage, Re: Nuclear Liability, December 18, 2003 available at http://foreignaffairs.house.gov/110/sok061208.pdf.

37. See, e.g., the testimony of David Baldwin, senior Vice President of General Atomics before a hearing of the Subcommittee on Energy and Resources of the House Committee on Government Reform, "Next Generation of Nuclear Power," June 29, 2005, available at http://ftp.resource.org/gpo.gov/hearings/109h/23408.txt.

says will come on line by 2025 – the date the current nuclear insurance liability limits under Price-Anderson legislation will run out.

Though nuclear liability coverage in the U.S. seems quite inadequate, it is regrettably even worse abroad. For example, within Europe, the second largest nuclear powered region in the world, nuclear accident insurance requirements are not just inadequate, but also egregiously inconsistent. Thus, nuclear accident insurance requirements that are much lower in Eastern Europe than in the EU currently are encouraging reactor construction in states with the least stringent liability requirements and some of the weakest nuclear safety regulatory standards. Because of this worry, some experts are now arguing that the EU should adopt a nuclear insurance pooling scheme at least as tough as that in the United States. To avoid the problems that allowing the pool to charge too little would incur, they argue that the pool should require higher payments than in the U.S. Yet, they note, any uniform insurance requirement would be better than none. [38]

**Proliferation**

Finally, with commercial nuclear energy projects, especially those exported overseas, there is a major additional worry -- nuclear energy's link to nuclear weapons proliferation. Here, the security risks are real. In the Middle East, Israel, the U.S., Iran, and Iraq have launched aerial bombing or missile strikes against International Atomic Energy Agency (IAEA) safeguarded reactors – Osirak and Bushehr -- even though the owners of these plants – Iran and Iraq -- were active members of the International Atomic Energy Agency were members of the NPT. If one includes the 2007 Israeli attack against Syria's reactor and Iraq's failed missile strike against Dimona during the first Gulf War, there have been no fewer than 13 acts of war directed against nuclear reactors

Such facts should put a security premium on efforts to subsidize the construction of such projects both here and abroad. Certainly, the more the US and other advanced economies go out of their way to use government financial incentives to promote the expansion of nuclear power programs domestically or overseas, the more difficult it is to dissuade developing nations from making similar investments. This dynamic will exist even if the nuclear projects in question are clearly uncompetitive with nonnuclear alternatives; and the

38. See Antony Frogget, "Nuclear Third Party Insurance, the Nuclear Sector's Silent Subsidy, and the State of Play in and Opportunities in Europe" (Washington, DC: November 5, 2007), available at http://www.npec-web.org/Essays/DRAFT-20071105-Froggatt-NuclearThirdPartyInsurancePaper.pdf and Simon Carroll, "European Challenges to Promoting International Pooling and Compensation for Nuclear Reactor Accidents (Washington, DC: NPEC, January 2, 2009), available at http://www.npec-web.org/Essays/20090201-Carroll-DRAFT-EuroNuclearAccidentPooling_.pdf.

subsidies will substantially assist these states to move closer to developing nuclear weapons options.

Consider Iran. The United States, perhaps more than any other country, was responsible for encouraging the Shah to develop nuclear power in the 1970s. Because we saw the Shah as a close ally, too little thought was given to the potential security implications of our sharing advanced nuclear technology with Iran. When Iran's revolutionary government began to rebuild its Bushehr power station with Russian help, though, the U.S. rightly became concerned about the proliferation risks.

Presidents Clinton and Bush warned that Bushehr could be used as a cover for illicit nuclear weapons related activities. This problem is only likely to increase over time: Once the reactor comes on line, it produces scores of bombs' worth of weapons-usable plutonium annually, which can be diverted to make bombs.[39] The fresh fuel, meanwhile, could be used to accelerate a uranium enrichment program.[40] It was because of these facts that during the first term of the Bush 43 Administration, the State Department went to great lengths to challenge the economic viability of the Iranian nuclear program as compared to burning plentiful natural gas. President Bush also insisted publicly that no new nuclear power state needed to make nuclear fuel to enjoy the benefits of nuclear power.[41]

In its second term, however, the Bush Administration decided domestically to add significant new nuclear subsidies to promote nuclear power plant construction in the U.S. under the Energy Policy Act of 2005 and to encourage an expansion of nuclear fuel making with new technologies where it was already commercially underway. It was roughly during this period that the U.S. also decided to "grandfather" Bushehr and offered Iran power reactor assistance if it would only suspend its nuclear fuel making program.

With this, the U.S. essentially let go of its economic critique of Iran's power program. In July of 2007, President Bush and Russian President Putin publicly recommended that

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39. On these points, see House Permanent Select Committee on Intelligence, Subcommittee on Intelligence, *Recognizing Iran as a Strategic Threat: An Intelligence Challenge for the United States*, staff report, August 23,2006, p. 11, at http://intelligence.house.gov/Media/PDFS/IranReport082206v2.pdf.

40. Thus, when it became clear that North Korea had reneged on its promise not attempt to enrich uranium for weapons, the Bush Administration stopped construction of two light water reactors it had promised Pyongyang because in the words of Secretary of State Rice, North Korea could not be "trusted" with them.

41. See Remarks by the President on Weapons of Mass Destruction Proliferation, Fort Leslie J. McNair, National Defense University, February 11, 2004, available at http://www.acronym.org.uk/dd/dd75/75news06.htm.

international and regional development banks make cheap loans for civilian nuclear power programs.[42] The White House also began encouraging the development of nuclear power throughout the Middle East as a way to put the lie to Iran's claim that the U.S. and its partners were trying to deny all Muslim's the "peaceful atom."[43] The economic merits of the last move, as has already been noted, are dubious. Yet, Russia, France, South Korea, the U.S., China and India are nonetheless openly competing to secure contracts in the Middle East and beyond using a variety of government supported subsidies to drive down nuclear bidding prices.

**Linking Security with Economy and the NPT**

For observers and officials worried about the nuclear power's proliferation risks, merely arguing for governments to be more consistent and neutral economically in their selection of different power generation systems might seem cynically inattentive to the substantial security dangers nuclear power's expansion poses. Certainly, the US and other states have oversold how well international nuclear inspections can prevent military diversions from civilian nuclear programs. Even today, the IAEA cannot yet keep reliable track of spent or fresh fuel for roughly two-thirds of the sites it monitors. Worse, diversions of this material, which can be used as feed for nuclear weapons fuel making plants, could be made without the IAEA necessarily detecting them.[44] As for large fuel making plants, the IAEA acknowledges that it cannot reliably spot hidden facilities and annually loses track of many bombs' worth of material at declared plants. With new money and authority, the IAEA could perhaps track fresh and spent fuel better; however, the laws of physics are unfriendly to the agency ever being able to reliably detect diversions from nuclear fuel making plants.[45]

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42. White House Press Release, "Text of Declaration on Nuclear Energy and Nonproliferation Joint Actions (July 03, 2007)," available at http://moscow.usembassy.gov/st_07032007.html.

43. See Jay Solomon and Margret Coker, "Oil-Rich Arab State Pushes Nuclear Bid with U.S. Help," *The Wall Street Journal*, April 2, 2009, available at http://online.wsj.com/article/SB123862439816779973.html and Dan Murphy, "Middle East Racing to Nuclear Power," November 1,2007, *The Christian Science Monitor*, http://www.csmonitor.com/2007/1101/p01s03-wome.html.

44 See, "In Pursuit of the Undoable, Troubling Flaws in the World's Nuclear Safeguards," *The Economist*, August, 23, 2007, available at http://www.economist.com/world/international/displaystory.cfm?story_id=9687869.

45. On these points, see Henry D. Sokolski, editor, *Falling Behind: International Scrutiny of the Peaceful Atom* (Carlisle, PA: US Army War College, Strategic Studies Institute, 2008), available online at http://www.npec-web.org/Books/20080327-FallingBehind.pdf.

If international nuclear inspections cannot protect us against possible nuclear proliferation, though, what can? It would help if there were more candor about the limits of what nuclear inspections can reliably detect or prevent. But just as critical is more frankness about how little economic sense most new nuclear power programs make. It is governments and their publics, after all, which determine whether or not more large civilian energy plants will be built. If government officials and the public believe backing nuclear power is a good investment, public monies will be spent to build more plants in more countries no matter how dangerous or unsafeguardable they might be.

In this regard, it is useful to note that the Nuclear Nonproliferation Treaty (NPT) is dedicated to sharing the "benefits" of peaceful nuclear energy. These benefits presumably must be measurably "beneficial". At the very least, what nuclear activities and materials the NPT protects as being peaceful and beneficial ought not to be clearly dangerous and unprofitable. That, after all, is why under Articles I and V, the NPT bans the transfer of civilian nuclear explosives to nonweapons states and their development by nonweapons states. It is also is why the NPT's original 1968 offer of providing nuclear explosive services has never been acted upon and is dead letter now: Not only was it determined that it was too costly to use nuclear explosives for civil engineering projects (the cost of clean up was off the charts), but some states (e.g., Russia and India) claimed they were developing peaceful nuclear explosives when, in fact, they were conducting nuclear weapons tests.[46]

What, then, should be protected under the Nuclear Nonproliferation Treaty (NPT) as being "peaceful" today? Are large nuclear programs economically competitive, i.e., "beneficial" in places like the Middle East when compared to making power with readily available natural gas? What of making enriched uranium fuel for one or a small number of reactors? Would it not be far cheaper simply to buy fresh fuel from other producers? Does reprocessing make economic sense anywhere? Can nuclear fuel making be reliably safeguarded to detect military diversions in a timely fashion? Aren't such activities dangerously close to bomb making? Should these activities be allowed to be expanded in nonweapons states and to new locales or, like "peaceful" nuclear explosives, are the benefits of these program so negative and the activities in question so close to bomb making or testing to put them outside of the bounds of NPT protection? What of large reactors, which are fueled with large amounts of fresh enriched uranium or that produce large amounts of plutonium-laden spent fuel? Should these be viewed as being safeguardable in hostile or questionable states, such as Iran or North Korea, that have a record of breaking IAEA inspection rules?

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46. On these points, see Eldon Greenberg, "The NPT and Plutonium," (Washington, DC: NCI, 1993), available at http://npec.xykon-llc.com/files/Article930507%20Greenberg%20-%20The%20NPT%20and%20Plutonium%20-%20May%207%20%201993.pdf and Robert Zarate, "The NPT, IAEA Safeguards, and Peaceful Nuclear Energy," in *Falling Behind*, pp. 252 ff, available at http://www.npec-web.org/Books/20080327-FallingBehind.pdf.

Again, getting all of the world's nations to agree on the answers to these questions will be difficult if nuclear power is truly the least expensive way to produce low or no carbon emission power. In this case, it may be impossible to prevent nuclear technology useful to making bombs from spreading world-wide. But if civilian nuclear energy projects are not economically competitive against their nonnuclear alternatives, just the opposite would ensue and the case against states spending extra to promote the commercial expansion of potentially dangerous commercial nuclear projects would be far stronger.

**Uncertainties**

The only thing certain about nuclear power's future ability to compete against other commercial energy alternatives in the future is its uncertainty. This is so for several reasons.

First, 20 years out, we do not know if our car will plug into our house (outlets) or if our houses will plug into our car (batteries): It is uncertain how much future power will be distributed off a centralized grid and how much will come from more distributed systems (e.g., local grids, cogeneration plants, storage batteries, and the like). This is important since two-thirds of the cost of electricity at the house or business outlet is unrelated to the cost of generating the electricity: Instead, it pertains to the cost of transporting the electricity over the grid and balancing and conditioning the power inputs and outputs on that grid to assure that it does not fail.

Second, it is unclear how many base load generators will be needed 10 to 20 years out since so much of the current demand for electrical generating capacity in advanced economies is driven by the need to have spinning follow on load capacity that frequently remains idle.[47] If one can figure out how to store electricity economically (and a number of schemes are now being tried out), the current premium placed on having significant reserves of additional base load follow on capacity generators -- typically supplied by large coal fired plants, large hydro, or nuclear reactors -- could be reduced significantly.

Third, there is much uncertainty with respect to carbon charges on which nuclear economics heavily depend. Will carbon be taxed and, if so, at what rate? What sectors

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47. Because large amounts of electricity cannot currently be stored, electrical companies must estimate how much electricity their customers will use and secure the electrical generating capacity to supply this demand. The difference between these estimates and real demand produces temporary imbalances in the electrical grid that the electrical transmission system operator must correct for by either reducing the amount of electricity being put on the grid or by bringing more electricity on to the grid. The later is done by accessing electrical generators that are on the ready or "spinning" to supply follow on load capacity electricity. For a more detailed slide tutorial on these points, see, "Spinning Reserves, Balancing the Net", *Leonardo Energy Minute Lectures,* available at http://www.slideshare.net/sustenergy/spinning-reserve.

will be grandfathered; which will benefit the most from the constraints? The EU has a cap and trade system that the U.S. Congress is thinking of emulating. Under this system, government authorities allocate carbon allowances to different industrial concerns and sectors. Initial grants of credits follow patterns of most subsidies, with some sectors -- often the most politically powerful -- benefiting far more than others. "Winners" under the new system shift from economic and technical performance to political.

All of this seems an odd way to promote cost competitive clean energy. Instead, it would make more sense simply to focus on cost comparisons for future plants that incorporated the full value of government subsidies and reflected a standardized carbon cost (e.g., a price on the carbon content of different fuels). To foster the proper use of such information, though, we will need to rely more, not less on market mechanisms to help guide our way.

**Policy Implications**

Again, the general take away is that governments should spend less time trying to determine what energy technologies should be commercialized and focus instead on how market mechanisms might best be employed to make these determinations possible. This, in turn, suggests six specific steps governments might consider:

*1.* ***Encouraging more complete, routine comparisons of civilian nuclear energy's costs with its nonnuclear alternatives.*** The starting point for any rational commercial energy investment decision is a proper evaluation of the costs of selecting one option over another. Here, as already detailed, governments have a weak track record.

*Account for Nuclear Power's Full Costs*: One way they could improve their performance is to take what few economic energy assessments they must do more seriously and conduct them routinely. The U.S. Congressional Budget Office (CBO), for example, must score the public costs of guaranteeing commercial energy loans, including the nuclear industry in the U.S. The CBO has been asked to do this by Congress several times in the last decade. Yet, the last time the CBO made the assessment for proposed loan guarantees in 2008, it failed to give a figure for the probable rate of default on nuclear projects. The CBO's director claims that without proprietary information, the CBO has no way to make such estimates. The last time CBO attempted such projections was in 2003, when it pegged the likely default rate under proposed loan guarantee legislation at the time at 50 percent.[48] The Department of Energy, meanwhile, announced that essentially it viewed such

48. On these points, see The Congressional Budget Office, "Congressional Budget Office Cost Estimate: S. 14 Energy Policy Act of 2003," May 7, 2003, available at http://www.cbo.gov/ftpdocs/42xx/doc4206/s14.pdf; Congressional Budget Office, Director's Blog, "Department of Energy's Loan Guarantees for Nuclear Power Plants," March 4, 2010, available at http://cboblog.cbo.gov/?p=478.

information to be proprietary. It would be useful for the CBO to get the information it needs to update and qualify such projections. At a minimum, the CBO should tackle this question every time it estimates what any commercial energy loan guarantees will cost. Congress, meanwhile, should demand that DoE make all of its own estimates relating to these issue public. Also, every time the CBO or DoE make such projections they should be reviewed in public hearings before Congress.

*Compare Nuclear with Nonnuclear:* Yet another way the U.S. government could improve its commercial energy cost comparisons is by finally implementing Title V of the Nuclear Nonproliferation Act of 1978, which calls on the Executive Branch to conduct energy assessments in cooperation with, and on behalf of, key developing states. The focus of this cooperation was to be on nonnuclear, nonfossil-fueled alternative sources of energy. Yet, for these cost assessments to have any currency, they would have to be compared with the full life-cycle costs of nuclear power and traditional energy sources estimates. This work also should be supported by the United Nations' newly proposed International Renewable Energy Agency (IRENA).[49] Finally, in order for any of these efforts to produce sound cost comparisons, though, more accurate tallies of what government energy subsidies are worth for each energy type will be required.

*Increase the Number of Energy Subsidy Economists*: The number of full-time energy subsidy economists is currently measured in the scores rather than in the hundreds. Government and privately funded fellowships, full-time positions and the like may be called for to increase these numbers.

2. ***Increasing compliance with existing international energy understandings that call for internalizing the full costs of large energy projects and for competing them in open international bidding.*** The Global Energy Charter for Sustainable Development, which the US and many other states support, already calls on states to internalize as many of external costs (e.g., those associated with government subsidies and quantifiable environmental costs such as the probable taxes on carbon) in the pricing large energy projects. Meanwhile, the Energy Charter Treaty, which is backed by the EU, calls on states to compete any large energy project or transaction in open international bidding.[50] Since these agreements were drafted, international interest in abating carbon emissions in the quickest, cheapest fashion has increased significantly. The only way to assure this is to include all the relevant government subsidies in the price of competing energy sources and technologies, assign a range of probable prices to carbon, and use these figures to determine what the lowest cost energy source or technology might be in relation to a specific time line. This suggests that any follow-on to the Kyoto understandings should

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49. The International Renewable Energy Agency (IREA) was created in 2009. For more on its mandate, go to http://www.irena.org/.

50. For more on each of these agreements, go to http://www.encharter.org/ and http://www.cmdc.net/echarter.html.

require international enforcement of such energy comparisons by at least referencing the principles laid out in the Energy Charter Treaty and the Global Energy Charter for Sustainable Development. Enforcing international adherence to these principles will be challenging. A good place to start would be to work with G-20 to agree to a modest follow-on action plan to Copenhagen that would include establishing common energy project cost accounting and international bidding rules that track these agreements. Beyond this, it would be useful to call on the G-20 to give the IAEA notice of any state decisions they believe might violate these principles to favoring nuclear power over cheaper alternatives. The aim here would be to encourage the IAEA to ascertain the true purpose of such nuclear projects.

*3.* ***Discouraging the use of government financial incentives to promote commercial nuclear power.*** This was recommendation was made by the Congressional Commission on the Prevention of Weapons of Mass Destruction Proliferation and Terrorism.[51] It would clearly include discouraging new, additional federal loan guarantees for nuclear fuel or power plant construction of the type now being proposed by President Obama and the nuclear industry. Although this stricture should also be applied against other types of energy (e.g., coal, renewables, natural gas, etc.) as well, the security risks associated with the further spread of civilian nuclear energy make it especially salient in the case of nuclear. This same prohibition should also be applied against U.S. support for developmental bank loans (i.e., subsidized loans) for commercial nuclear development and against other states' (e.g., France, Japan, Germany, Russia, China, and South Korea) use of subsidized government financing to secure civilian nuclear exports. In some cases, these foreign export loan credits are being used in the US in conjunction with US federal loan guarantees and local state tax incentives to all but eliminate the risks of investing in new nuclear power plant construction. This should be discouraged. In the case of every large civilian nuclear project, domestic or foreign, every effort should be made to place as much private capital at risk as possible in order to assure due diligence in these projects' execution. Even under the existing U.S. federal loan guarantee program, 20 percent of each nuclear project must be financed without federal protection. For purposes of implementing this law, this nominal figure should be covered entirely with private investment; not by resort to rate hikes for ratepayers.[52]

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51. See, The Commission on the Prevention of Weapons of Mass Destruction Proliferation and Terrorism, *The World At Risk: The Report of the Commission on the Prevention of WMD Proliferation and Terrorism* (New York, NY: Vintage Books December 2008), pp. 55-56 available at http://documents.scribd.com/docs/15bq1nrl9aerfu0yu9qd.pdf.

52. On this point see, e.g., Steven Mufson, "Nuclear Projects Face Financial Obstacles: *The Washington Post*, March 2, 2010, p. 1, available at http://www.washingtonpost.com/wp-dyn/content/article/2010/03/01/AR2010030103975.html.

4. ***Employing more market mechanisms to guide national and international nuclear fuel cycle and waste management decisions.*** One of the clear advantages of civilian nuclear power plants over other conventional fossil fueled plants is that nuclear power is much cheaper to fuel. Governments, however, can undermine this advantage by taking steps to increase nuclear fuel cycle costs that are unrelated to the need to assure safety or international security. In this regard, states that use public money to close the fuel cycle by commercializing any form of spent fuel recycling will actually make nuclear power less competitive with its nonnuclear alternatives.

*Managing Nuclear Waste:* Today, the lowest cost interim solution to storing spent fuel (good for 50 to several hundred years) is dry cask storage above ground at reactor sites. Recycling spent fuel, on the other hand, is not only more expensive, but runs much greater proliferation, terrorism and nuclear theft risks. For these reasons, President Bush in 2004, the IAEA in 2005, and the bipartisan U.S. Congressional Commission on the Prevention of Weapons of Mass Destruction Proliferation and Terrorism in 2008 all called for the imposition of a moratorium on commercial reprocessing.[53] This reflects economic commonsense. Unfortunately, in many advanced states that operate nuclear power reactors, the governments own and operate the power plants. As a result, full employment, development of nuclear weapons options, and other political or military concerns often override straightforward cost benefit analysis.[54] In the U.S., this tendency can be avoided by having the nuclear utilities themselves assume a significant portion of the costs of nuclear waste management and reactor site decommissioning. This would require changing the law in the US, which stipulates that all of the costs of final spent fuel storage are to be paid for by off budget federal user fees.

*Making Nuclear Fuel:* As for the front end of the nuclear fuel cycle, firm nuclear fuel contracts in hand, rather than government funding or loan guarantees secured should dictate any new construction of nuclear fuel making facilities or their expansion. With such contracts in hand, it should be possible to secure private financing for such projects. There currently is substantial interest in creating international fuel banks to assure reliable supply of fresh nuclear fuel and of reprocessing services to states that foreswear making their own nuclear fuel. If any such banks are created, though, they should charge whatever the prevailing market price might be for the nuclear products and services they provide. The rationale for this is simple: Subsidizing the price risks creating a false demand for risky near weapons usable fuels, such as mixed oxide and other plutonium-based fuels. Currently, states can satisfy their demand for fresh fuel without having to resort to any

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53. See *World at Risk*, p. 51 and Mohamed ElBaradei, Nobel Lecture, December 10, 2005, available at http://nobelprize.org/nobel_prizes/peace/laureates/2005/elbaradei-lecture-en.html.

54. See Frank Von Hippel, Why Reprocessing Persists in Some Countries and Not in Others: The Costs and Benefits of Reprocessing (Washington, DC: NPEC, April 9, 2009), available at http://www.npec-web.org/Essays/vonhippel%20-%20TheCostsandBenefits.pdf.

international bank and no state has a need to reprocess for any reason. Subsidizing these fuel services has been proposed as a way to induce states to eschew making their own nuclear fuels. This proposal however, seems unsound. .First, it is unclear who the customers are. India and Canada, already make their own natural uranium fuels, which require no enrichment. Several others – France, Russia, Japan, Brazil, and China -- enrich their own fuel and the remaining nuclear fuel consuming states seem content to buy their fuels from U.S. providers, Russia, URENCO, or Eurodif. Second, it is unlikely that nuclear fuel subsidies would be sufficient to block determined proliferators: After all, only a small percent of any nuclear power plant's life cycle costs are associated with its fueling requirements. Again, given the dangers of propping up dangerous reprocessing activities and the dubious requirement to provide enriched fuel, the world can well afford to depend more on market mechanisms to determine when and how these services are provided.

*Use of Weapons Grade Uranium Fuels:* Finally, the use of nuclear weapons usable highly enriched uranium is a nuclear fuel cycle option that is no longer necessary in the production of power or isotopes. There are fewer and fewer research reactors that use highly enriched uranium (HEU) but what few operators there are, are more than willing to pay to continue to use this fuel rather than to pay the costs of converting to low enriched uranium alternatives. Given the direct usability of HEU to make nuclear weapons, however, the elimination and blending down of these fuels are imperative to avoid nuclear proliferation and terrorism risks. In the U.S., the handful of remaining HEU-fueled plants receive government funding. This should end by establishing a date certain for these few remaining reactors to be converted to use LEU-based fuels.[55]

5. ***Increasing and further privatizing nuclear insurance liability coverage to encourage best construction and operations practices.*** Officials within the nuclear industry frequently note that a nuclear industry accident anywhere would impact nuclear operators negatively everywhere. Yet, the potential financial and political fall out following a major nuclear accident would be even more significant if there was a lack of adequate nuclear accident liability insurance. For this reason alone, efforts should be made to increase the minimum amounts of liability insurance coverage currently required of any civilian nuclear plant operators and to make those requirements less subject to over-ride or forgiveness by officials of the state. Here, amounts required by the international Convention on Supplementary Compensation for Nuclear Damage (CSC)[56] should be considered to be the minimum. For the EU, which is currently struggling to set a standard for its members, the coverage requirements set by CSC should be considered to be the

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55. For more detail on these points, see NRDC's Petition to the U.S. Nuclear Regulatory Commission For Rulemaking to Ban Future Civil Use of Highly Enriched Uranium, March 24, 2008, available at http://docs.nrdc.org/nuclear/files/nuc_08032501a.pdf.

54. See Information Circular 367 , 22 July 1998, Convention on Supplementary Compensation for Nuclear Damage, available at http://www.iaea.org/Publications/Documents/Infcircs/1998/infcirc567.shtml

floor from which any specific EU standard is created. Far preferable would be for the EU to adopt insurance levels that the US currently requires under its domestic Price-Anderson legislation. The US, meanwhile, needs to raise international nuclear insurance standards by first announcing its intention to back out of underwriting insurance against terrorist incidents as it currently does and instead require private insurance firms to assume this requirement as they did before 9/11. Second, Washington needs to make good on its original objective under the 1957 Price-Anderson legislation eventually to stop underwriting coverage for damages a nuclear operator might inflict on off-site third parties. Washington would do best by going about this early and incrementally by announcing that starting in 2025, federal Price-Anderson coverage will no longer apply to any civilian nuclear facility operating in the US. This announcement should be made now so that the nuclear utility and vendor industry can develop their own alternative private system of insurance to cover offsite damages. At a minimum, the requisite amounts of capital to fund such a system should be amassed well in advance of the need to bring the new insurance system into force. Under any new system, each nuclear utility, service provider, and vending firm should be free to buy as much or as little third-party liability insurance for themselves as each sees fit from private insurance firms so long as the amount was at least as much as Price-Anderson currently requires to cover any one accident (roughly $10 billion for each accident). The rates for this coverage would be set for each firm by private insurers based on each firm's safety performance, the age of the plant, and the experience of the firm's staff, etc. Of course, each nuclear firm should be free to work with other nuclear utilities and companies to create private insurance pools. Even in this case, though, rates for each firm should be set in a manner that would reward the best nuclear operators and vendors. By doing this, the government would finally be able get industry to internalize the full costs of off-site nuclear accident liability insurance. Given that some US nuclear firms already believe that their products are safe enough for them to soon forgo Price Anderson subsidies and that the nuclear industry generally is arguing that their safety record has improved and will only get better, this transition over the next 15 years should go relatively smoothly.

6. ***Increasing experimentation in the commercial distribution of and the tapping of alternative sources of energy through federal government-led regulatory reform.*** To foster energy experimentation and competition, the federal government should promote regulatory reforms that would, among other things (1) set standard rules for selling electricity through the grid; (2) remove conflicts of interest for existing grid or pipeline operations to block new entrants; (3) ensure regulated utilities have similar incentives to invest in efficiencies as they do in expanding generation plants and energy supplies; (4) encourage key market constraints, be they carbon limits or liability coverage, through the market pricing systems rather than through government subsidies; and (5) increase pricing visibility for power to final customers.

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# More Nuclear Aid Would Bomb Economics

January 12, 2010 3:19 PM
By Henry D. Sokolski

Late last year, the bipartisan congressionally mandated Commission on the Prevention of Weapons of Mass Destruction Proliferation and Terrorism, upon which I serve, made several nuclear-related recommendations. Perhaps the most important of these is that the U.S. should work to strengthen the nonproliferation regime by discouraging the use of government financial incentives in the promotion of nuclear power. For all the fiscal and energy policy reasons already detailed on this blog, this recommendation rightly ought to be applied to all energy commercialization projects -- nuclear or nonnuclear -- across the board. Yet, the WMD commission determined that this recommendation was particularly salient in the case of nuclear power because of the serious nuclear weapons proliferation implications of failing to do so.

Large nuclear reactors do not just boil water. They also produce scores of bombs worth of nuclear weapons-usable plutonium annually that can be chemically stripped out from the spent fuel in a relatively short amount of time. In addition, these reactors ar...

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Large nuclear reactors do not just boil water. They also produce scores of bombs worth of nuclear weapons-usable plutonium annually that can be chemically stripped out from the spent fuel in a relatively short amount of time. In addition, these reactors are fueled with low enriched uranium that can be diverted and enriched into weapons grade uranium. It is no accident, therefore, that every major weapons state first mastered the operation of a large reactor before acquiring its first bomb. France, the U.S., Russia, the U.K. and India all made most of their first plutonium bombs from plutonium produced in reactors tied to the electrical grid. Even the vaunted "proliferation-resistant" light water reactor used by the U.S. produces not just power, but the tritium the U.S. needs for its thermonuclear

weapons arsenal. North Korea demanded that the U.S., Japan and South Korea supply it with two modern power reactors so it might have the electricity it needed in exchange for giving up its own nuclear reactor activities . Ultimately, however, the U.S. decided it could not trust North Korea with such machines, each of which could produce roughly 50 bombs worth of near weapons grade plutonium in their first 12 to 15 months of operation. Before the U.S. gave up trying to kill Iran's large power reactor project at Bushehr, both presidents Clinton and Bush opposed its completion on nuclear proliferation grounds.

Nor are such nuclear programs easy to safeguard against illicit military diversions. This much has been demonstrated by the nuclear inspections gaffs we have seen in Iraq, Iran, North Korea, Syria, Algeria, Taiwan, Japan, and South Korea and the many bombs worth of plutonium and uranium products that go missing as "material unaccounted for (MUF) at declared nuclear fuel making plants. Rather than rely in international inspectors, Israel bombed Syria's large reactor in 2007 and Iraq bombed Iran's Bushehr reactor in the early 1980s even though all of these states signed the Nuclear Nonproliferation Treaty and have nuclear safeguards agreements with the International Atomic Energy Agency. These violent votes of no confidence in international nuclear inspections, as well as other deadly covert operations taken against other nuclear projects, highlight the security concerns these "civilian" activities raise when sited in dangerous regions.

What does any of this have to do with whether or not we should pile on additional nuclear subsidies to support the construction of new commercial power reactors in the U.S.? Plenty. If, after more than a half century of government subsidies and federal research and development support, nuclear power should finally turn out to be the cheapest, quickest way to produce electricity and to reduce carbon emissions, it would be difficult to prevent its increased use commercially not only here but abroad. Even if other countries might use this technology to illicitly acquire what they need to make nuclear bombs, the lure of export profits would be hard to resist. The nuclear weapons proliferation risks would simply be an additional price we would pay and try somehow (however fecklessly) to limit.

Yet, if nuclear power is so risky investment that no private bank (domestic or foreign) will invest in building new plants, why should our government go out of its way to do so by offering new, additional loan guarantees or other nuclear-specific subsidies? Wouldn't the granting of such largesse only make it even more difficult for the U.S. to discourage the governments of Syria, Saudi Arabia, Algeria, Iran, Egypt, Jordan, Iraq, Libya, and Turkey from making similar nuclear specific investments? All of these states have access to inexpensive, relatively clean burning natural gas that could fuel much cheaper advanced gas-fired plants but, then, arguably, so does the U.S. On what economic grounds might we be able to object to them building an $8 billion nuclear power plant and spending further billions on related infrastructure? And if we could not, why and how could we reasonably object to them making their own nuclear fuel? True, this is even more uneconomical and unprofitable than building the power reactor, but only slightly so: A small, crude reprocessing plant could be built for a fraction of the cost of a single new larger power reactor. Would we tell them that they cannot be trusted with such

technology even though chemical reprocessing is less complicated than nuclear power production?

As it is, Adam Smith's "invisible hand" clearly favors nuclear nonproliferation and sound energy policies. Creating a biased competition with more nuclear-specific federal subsidies for commercial power reactor projects, though, does not. Indeed, it is a bad business, which is best not done at all.

NATIONAL REVIEW ONLINE www.nationalreview.com PRINT

HENRY SOKOLSKI



OCTOBER 21, 2009 4:00 A.M.

# Cap and Bribe

Obama offers handouts in return for Republican votes.

Although bipartisan support for legislation generally constitutes a political Good Housekeeping Seal of Approval, sometimes it's little more than the residue of cynical logrolling at the public's expense. A case in point is the emerging Senate "consensus" in favor of cap-and-trade legislation, which will be the subject of Senate hearings October 26. Rather than sell the legislation on its reputed environmental and economic merits, the White House and its allies are now planning to use federal largesse to buy the handful of Republican votes needed to get this legislative monster over the hump in a floor vote, possibly before the Thanksgiving recess.

Now, most Republicans support the free market and question federal interference in the private sector. This explains their skepticism about Obama's push for federal health-care reform. But in the energy sector, the White House is banking on a few Republican senators — the press has indentified Lindsey Graham (S.C.), John McCain (Ariz.), and Lisa Murkowski (Alaska) — giving up their economic principles in exchange for more federal subsidies for their preferred form of energy: super-expensive, financially risky nuclear power.

Normally, this wouldn't work. Certainly, before the Energy Department and the White House began offering billions of dollars in federal loan guarantees for the construction of new nuclear-power reactors, most Republicans understood that federal largesse for commercial energy projects was anything but free.

Consider loan guarantees. Bringing just one nuclear plant on line can cost as much as $10 billion, and supporters of nuclear power want to build scores of these plants in the next two decades. That's a lot to loan. In fact, in 2003, the Congressional Budget Office determined that "well over half" of the electric utilities pleading for such handouts would be likely to default, leaving taxpayers holding the bag for billions upon billions of dollars. There's plenty of reason to believe that this projection is all too relevant today.

In any case, this is an old saw. The last time the federal government pushed commercial-energy loan

guarantees, it was for a single synfuels project, which, after years of mismanagement and technical difficulties, finally tanked, leaving the public with a bill for $13 billion. More recently, Washington's darling has been corn ethanol, supported with tax credits and direct subsidies. This has produced an even larger financial black hole. The most recent estimates have the U.S. losing roughly $10 billion on this bet for the year of 2008 alone. In fact, corn ethanol is now so uncompetitive, the only way to keep its production viable is by the federal government's dictating that gasoline producers and consumers buy and use it.

Unfortunately, none of this history has deterred enthusiasts for wind, solar power, "clean" coal, or nuclear power from demanding similar federal handouts. It ought, however, to deter Congress, which has already bailed out failed banks and automakers with well over $1 trillion in Treasury funds. After such an orgy of spending, the last thing we need is for Congress to spend more taxpayer money to support yet more multi-billion-dollar commercial ventures, many of which are sure to fail and will have to be bailed out in turn.

More important, fiscal conservatives, energy experts, the best of the environmental community, and pro-nuclear nonprofits understand that when the federal government tries to pick commercial-energy winners and losers, it not only gets things wrong, but also jacks up the cost of energy for everyone and makes it harder for the real winners and losers to emerge. Ultimately, it's not just wasteful, it's a super-regressive tax on energy innovation.

That such incentives would be used as a sweetener for cap-and-trade legislation, which itself is a massive tax on the U.S. economy, at the very time that the U.S. is suffering its worst recession since World War II, gives political cynicism a bad name. Most fiscal conservatives, no matter what they think about global warming, know that spending and taxing to reduce carbon emissions is something that can and should wait until we have gotten our economy rolling again. The best also have demonstrated that using a cap-and-trade market is far less efficient and sensible than simply imposing a tax on the carbon content of different fuels.

How, then, could Senate Republicans be seduced into supporting all of this? Simple: self-deception. Expanding nuclear power, they argue, is the answer that can't wait; it is too important to be left to market forces to accomplish. This, however, is an assertion of faith, not reason. Surely the same line of non-argument is just as valid for other risky forms of energy — e.g., solar and wind. Rather than meet this point head-on and make the case for favoring nuclear power, Senate nuclear proponents unintentionally concede the point by suing for federal subsidy "parity" with renewables. Nuclear power, they plead, should merely get the same federal handouts wind and solar power receive: Three wrongs apparently make a right.

Next, they contend that what we need is actually free. Specifically, they argue that the federal loan guarantees that are critical for nuclear power's future are off-budget and will all be paid back. Again,

this is seductive but it can't be right. If all the loans were sure to be paid back with interest, why would the U.S. government, *vice* private investors, need to offer them to utilities in the first place? Because, as has already been noted, many of the loans will never be paid back.

Indeed, echoing the earlier findings of the Congressional Budget Office, Moody's, which rates private firms' creditworthiness, spotlighted this point. In a special report, Moody's warned the nation's utilities in June that their credit ratings would suffer if they invested in new nuclear construction projects. Given the poor track record of nuclear-plant builders in meeting construction schedules and budgets, and the unpredictability of the federally backed financial schemes, Moody's notified U.S. utilities that it would reduce their credit ratings if they went nuclear even if the utilities secured federal loan guarantees. Recent news that the U.S. Nuclear Regulatory Commission has rejected a revised version of the most popular new reactor design, Westinghouse's AP1000, suggests just how risky this business can be.

Against such facts, though, nuclear-power supporters tend to dig in, insisting that only an immediate, massive expansion of nuclear-power capacity can provide America with the additional power it needs without the carbon emissions that environmentalists fear. But this too is nonsense. Dollar for dollar, the quickest near-term way to add electrical generating power while reducing carbon emissions is through the expanded use of natural gas. This should hardly seem shocking: Many Republicans pleaded for more natural-gas drilling just last year.

Now the U.S. is drowning in the stuff. In fact, following skyrocketing energy prices in early 2008, U.S. natural-gas prospectors discovered so many new reserves that U.S. wellhead prices plummeted from $11 per thousand cubic feet to roughly $3 today. This supply, moreover, is so great that natural gas is projected to stay plentiful for decades. Furthermore, burning natural gas produces roughly half the carbon emissions that burning coal does, and gas can be transported and used directly to produce residential and commercial heat, whereas coal and nuclear power must be converted to electricity in processes where up to two-thirds of their energy content is lost. More important, natural gas can be used to produce electricity in plants that cost one-third to one-tenth as much to build as either nuclear or coal-fired plants, and that can be brought on line sooner. Finally, encouraging broader use of this American resource doesn't require expanding supplies so much as it requires encouraging more private-sector competition by putting an end to monopoly-friendly state energy regulations and practices. In no case should it require squandering billions of dollars on more federal handouts.

Yet another important market-driven step that could make cheaper, cleaner energy more available is to connect the nation's existing regional electrical grids and make it easier to move electricity within and outside of these established markets. This would allow all types of existing electrical generators — nuclear and non-nuclear — many of which are not currently operating at full capacity, to produce much more electricity for many more customers. As noted in the *Wall Street Journal*, this idea makes so much economic sense that private firms are already investing to build expensive, high-technology

interconnectors without waiting for federal handouts. In fact, as a recent Massachusetts Institute of Technology study explained, what is most important for encouraging private investment in such schemes is not more federal handouts, but getting the federal government to adjust current regulations at both the national and the state levels in order to make the movement and sale of electricity easier.

There's more, but even from this short account, you would think Congress would get the message. First, slow down; stop trying to solve the next half-century's energy and environmental challenges in one heroic bill. Second, stop trying to guess which energy idea is best; stop giving federal handouts to economically risky commercialization projects, and instead support basic research and development.

Of course, Republican senators should not just be getting this message; they should be sending it. Certainly, if they did, Congress would be more likely to get right the role of the federal government in promoting cleaner energy, and to do so with a consensus based not on Republican sellouts but on buy-ins to something far more market-based.

*— Henry Sokolski is executive director of the Nonproliferation Policy Education Center and serves on the congressionally mandated Commission on the Prevention of WMD Proliferation and Terrorism.*

National Taxpayers Union

TAXPAYERS FOR COMMONSENSE
MAKING GOVERNMENT WORK

The Nonproliferation Policy Education Center

GEORGE C. Marshall INSTITUTE

The Honorable Peter Visclosky
Chairman
Subcommittee on Energy and Water Development
2362B Rayburn House Office Building
Washington, DC 20515

The Honorable Rodney Frelinghuysen
Ranking Member
Subcommittee on Energy and Water Development
1016 Longworth House Office Building
Washington, DC 20515

March 16, 2010

Dear Chairman Visclosky and Ranking Member Frelinghuysen:

Today we join together to urge you to not provide any addition loan guarantee authority to the Department of Energy (DOE) Loan Guarantee Program in the FY 2011 Energy and Water Development Appropriations Bill. With hundreds of billions in bailouts already on the shoulders of US taxpayers, the country cannot afford to move forward with a program that could easily become a black hole for tens of billions more.

Originally authorized in the 2005 Energy Bill, the DOE loan guarantee program was established to distribute Treasury backed loan guarantees to innovative energy technologies. However, even capital intensive, mature technologies with high default rates and a poor financial track record, like coal-to-liquids and nuclear power, are eligible for loan guarantees under the program.

The DOE program already has more than $50 billion in loan guarantee authority with no time restriction on its use. Now the Administration has proposed a $36 billion increase, earmarked specifically for nuclear reactors which have been found to have a 50% risk of default. Given the existing authority and the high risk to taxpayers this increase is fiscally irresponsible. Regardless of your opinion on the loan guarantee program or the various technologies, providing any additional authority while this funding is available is unnecessary.

A loan guarantee program of this size and structure already puts the federal government at significant economic risk. DOE has minimal experience administering a loan guarantee program and its one test case ended with taxpayers paying a heavy price. In the late 1970s and early 1980s, DOE offered billions in loan guarantees for the development of synthetic fuels. Due in large part to poor administration and market changes, the federal government was forced to pay billions to cover the losses. The current loan guarantees, much like the synthetic fuels loan guarantees, are slated to provide guarantees to financially risky industries, many of which have and continue to receive billions of dollars in federal subsidies.

In administering the current loan guarantee program DOE has already failed to follow OMB safeguards for ensuring that taxpayers are protected. OMB guidance suggests that loan guarantee programs should not guarantee more than 80% of the loan. This ensures that lenders and borrowers in the program have a substantial stake in repayment and that lenders perform due diligence before issuing loans. Despite this, DOE issued a final rule that forces taxpayers to guarantee 100% of the loan.

It is clear the loan guarantee program could easily siphon billions of dollars from the Treasury. Because of the large risk this program places on taxpayers, we urge you to not include any additional budget authority for the program in the Energy and Water Appropriations Bill.

Sincerely,

Ryan Alexander
President
Taxpayers for Common Sense

Henry Sokolski
President
Non-Proliferation Policy Education Center

Jeff Kueter
President
George Marshall Institute

Andrew Moylan
Director, Government Affairs
National Taxpayers Union

Cc Chairman David Obey, House Appropriations Committee
Ranking Member, Jerry Lewis, House Appropriations Committee
Members of the Energy and Water Subcommittee:
Representative Chet Edwards
Representative Ed Pastor
Representative Marion Berry
Representative Chaka Fattah
Representative Steve Israel
Representative Tim Ryan
Representative John Olver
Representative Lincoln Davis
Representative John Salazar
Representative Zach Wamp
Representative Michael Simpson
Representative Dennis Rehberg
Representative Ken Calvert
Representative Rodney Alexander

Mr. KUCINICH. Mr. Caperton, you may proceed.
Mr. CAPERTON. Thank you, Mr. Chairman.
Mr. KUCINICH. Keep that mic close so we can hear you.

**STATEMENT OF RICHARD CAPERTON**

Mr. CAPERTON. Members of the committee, thank you for inviting me to testify before you this afternoon. My name is Richard Caperton. I am a policy analyst on the energy team for the Center for American Progress, a think tank here in Washington, DC.

As you know, nuclear power currently generates about one-fifth of American electricity. Nuclear power is a low-carbon baseload carbon source that will continue to play an important role in America's clean energy future.

It's vitally important that we explore all potential energy sources that reduce our carbon emissions, but this should not force taxpayers to bear inordinate amounts of risk. The President has proposed incentivizing new nuclear construction by issuing $54 billion in new loan guarantees. The terms of these guarantees must include adequate protections for taxpayers. Most important, the credit subsidy fee must be properly calculated.

In my comments today, I will describe what the credit subsidy fee is, how it's calculated, and what an appropriate fee might be.

When the government issues a loan guarantee, they are committing to use taxpayer money to pay back the loan if the borrower defaults. The government must account for the increased risk it now bears, which it does by calculating the credit subsidy cost. In the nuclear loan guarantee program, the credit subsidy cost is paid by the borrower in the form of a credit subsidy fee. If the fee charged is too low, it will increase the risk to taxpayers. At the same time, if the fee charge is too high, it will unnecessarily decrease the number of reactors financed.

Credit subsidy cost is calculated by a proprietary model at the Office of Management and Budget, and although the actual calculation is highly technical, the basis for the calculation is straightforward. Essentially, the credit subsidy cost is the present value of the expected pay-outs that the government will have to make on the loan if the utility should default. First, determine the likelihood the builder of the reactor won't be able to pay the loan at the default rate. Second, determine the percentage of total reactor costs that will be covered by the loan guarantee. In a nuclear program, the guarantee can cover up to 80 percent of the total cost of the project. Third, determine the amount of the total costs that will be recovered in the event that the borrower defaults and the reactor is sold in liquidation, the recovery rate. The first three steps give a total payout that the U.S. Government will have to make. Spread these pay-outs over the lifetime of the loan based on when expected defaults will occur. And finally, discount the pay-outs in the future years to determine a present value of the total pay-outs. This is the credit subsidy fee.

Each of these steps requires an input that can vary widely based on technical details, which makes precise calculations very difficult. Estimates of what this fee should be run the gamut from 1 percent or less to 30 percent or more of the total loan guarantee.

The surveys of these widely divergent estimates have done some simple calculations of their credit subsidy costs given certain inputs. The two most important factors in determining the credit subsidy costs are the default rate and the recovery rate. Of course, every project is different and should be evaluated independently, but widely publicized data from CBO, GAO and Standard & Poor's indicates that the expected default rate for a generic new nuclear reactor is 50 percent. Data from the same sources indicate that the expected recovery rate in liquidation is also 50 percent.

Next slide, please.

Simple calculations indicate that the credit subsidy fee on a nuclear loan guarantee program that has the predicted characteristics, that is 50 percent default and recovery rates, should be about 10 percent of the total value of the guaranteed loan. The appropriate fee goes up as the expected default rate goes up and as the recovery rate goes down.

This table shows what the credit subsidy fee should be, given any combination of expected default and recovery rates. And to put this in perspective, each 1 percent of the entire $54 billion in loan guarantees that the President has proposed represents $540 million. That is, if DOE undercharges loan guarantee recipients by just 1 percent, the President's proposal will cost taxpayers $500 million.

It's impossible to say what the credit subsidy fee on a specific loan guarantee should be without looking at details of specific nuclear projects. The administration must keep in mind, however, that credit subsidy fees should be set at a rate that protects taxpayers not at an artificially low rate as a handout to private businesses. DOE will only be able to protect taxpayers from bearing the risk of new nuclear reactors if the charge is an accurate credit subsidy fee.

Thank you.

Mr. KUCINICH. Thank you for your testimony.

[The prepared statement of Mr. Caperton follows:]

**Written Testimony for the Domestic Policy Subcommittee of the Committee on Oversight and Government Reform**

**Rep. Dennis Kucinich (D – Ohio), Chairman**

**on**

**"Taxpayer Protection and the Nuclear Loan Guarantee Program"**

**by**

**Richard W. Caperton**
**Energy Policy Analyst**
**Center for American Progress Action Fund**

**2 p.m., April 20, 2010**

Mister Chairman, Ranking Member Jordan, and members of the committee, thank you for inviting me to testify before you this morning. I am very pleased to have this time to share my thoughts on the nuclear loan guarantee program, credit subsidy fees, and taxpayer protection.

Nuclear power currently generates about one-fifth of American electricity. At the Center for American Progress Action Fund, we strongly believe that nuclear power will continue as a low-carbon baseload power source that will play an important role in America's clean energy future. It's vitally important that we explore all potential energy sources and encourage the development of sources that reduce our carbon emissions. At the same time, we must keep in mind that every dollar that supports one fuel source is a dollar that can't be used somewhere else. In an era of tight budgets and limited government resources, it's important that every dollar be spent in a way that cost-effectively transitions America toward a clean energy economy.

Perhaps nowhere is this challenge of balancing carbon reductions with low spending more apparent than with nuclear power. Building a nuclear reactor today will involve dealing with tremendous financial uncertainty. Cost projections

for nuclear plants keep rising because of variability in material costs, complex new technology, limited suppliers for key parts, and inevitable delays in construction projects. The projected cost for two new reactors in Canada shot from $7 billion to $26 billion in just two years[i]. A new reactor built by Areva in Finland has run into widely-publicized challenges, with construction costs going up at least 50 percent since construction began three years ago[ii]. And costs for two new reactors at the South Texas Project in the United States have ballooned from $5.4 billion[iii] to an estimated $18.2 billion since 2007[iv]. Neither of these reactors has been built, so there's no way to predict what the final cost will be. But cost overruns are virtually certain in nuclear construction, which greatly increases the risk that the nuclear companies will default on their loans. Private lenders are well aware of the risks involved in building new reactors, which is why they're unwilling to finance the projects without significant government support.

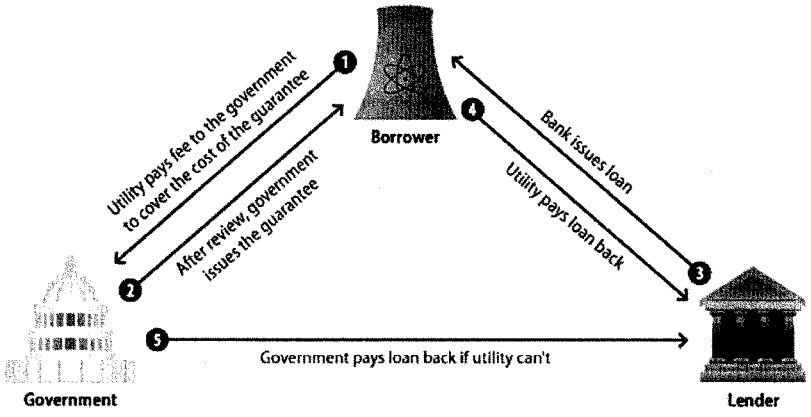
The huge cost of nuclear power means that taxpayers will have to provide nuclear loan guarantees to finance new projects if the president and Congress are serious about building new reactors. The terms of these guarantees must include adequate protections for taxpayers. Most important, they must accurately calculate the so-called "credit subsidy cost." The credit subsidy cost represents the guarantee's price tag to the government for taking on the risk of paying back the entire loan if there is a default. In the case of new reactors, this cost must be paid by the utility company borrowing the money. These funds are then deposited in a Treasury account.

Estimates of what this cost should be run the gamut from 1 percent or less to 30 percent of the total loan guarantee. If the calculated cost is too low, it will increase the risk for taxpayers. If the calculated cost is too high, it will unnecessarily decrease the number of reactors financed because of the huge outlay of funds for the credit subsidy to secure the loan. Surveys of outside estimates and calculations based on publicly available data indicate that the

average cost of a guarantee in a large loan guarantee program could be 10 percent and possibly much more.

When the government issues a loan guarantee, taxpayers are assuming the risk if the borrower is unable to pay back the loan. Most borrowers under the nuclear loan guarantee program will get a loan from the Federal Financing Bank, which will now charge a much lower interest rate and provide more favorable terms to the utility borrower. In exchange for this valuable service, the guarantor (the federal government) has to account for the risk of default. It does this by calculating the "credit subsidy cost."

**The mechanics of a nuclear loan guarantee**




The exact credit subsidy cost is impossible to project because it is determined by an Office of Management and Budget model that is not made public, but it is essentially the present value of the expected payouts that the government will have to make on the loan if the utility should default[v]. This is determined by estimating the likelihood of default, or the "default rate," and the amount that the lender will recover in bankruptcy proceedings from selling equipment, land, building, etc., or the "recovery rate." The government makes up the difference so the lender receives all that it is due. These pay outs are then discounted back to

present dollars, taking account for the time value of money. The total cost is usually quoted as a percentage of the guarantee.

The above description applies to all loan guarantees, but there are three important details that apply specifically to the nuclear loan guarantee program. There were no loan guarantees available for nuclear reactors until 2005. Title XVII of the Energy Policy Act of 2005 provided significantly more protection for lenders, which reduced their risk in lending money for nuclear plants[vi]. The first important detail is that according to the program rules[vii], the government can guarantee up to 80 percent of the cost of the project. The borrower only has to find at least 20 percent elsewhere. This remaining 20 percent can either come from 1) raising equity, most likely from shareholders, but potentially through utility customers who pay higher rates before the reactor is actually built, known as "construction work in progress" or 2) debt financing, potentially via French or Japanese Export-Import Banks that will provide loan guarantees and/or loans for the portion not covered by the U.S. government.

A second important detail has to do with how the government gets paid in the event of a default. Debt holders always get paid first in bankruptcy proceedings, but some debt holders get paid before others if they have a "right of first lien." DOE has changed its loan guarantee rules and no longer requires the U.S. government to hold a "right of first lien," which means that the U.S. government doesn't necessarily get paid before other debt holders. The result is that in the event of a default, taxpayers would have to share proceeds from a liquidation with other creditors, such as the French or Japanese Export-Import Banks.*

The third detail involves who is responsible for paying the credit subsidy cost. Just like under other loan guarantee programs, the government has to have the credit subsidy cost in hand before issuing a loan guarantee. This cash can come from one of two places: an appropriation from Congress or a cash payment from the borrower, known as a "credit subsidy fee." U.S. government rules require the government to have the credit subsidy fee in hand before it can issue the loan

guarantee. And the nuclear loan guarantee program mandates that because there hasn't been a congressional appropriation to cover the credit subsidy cost, the Department of Energy must charge a credit subsidy fee.

Since this fee must be paid upfront, it can add significant costs to the project. Utilities that borrow money obviously want to keep this fee as low as possible, but responsible government management demands that the fee must reflect the *true* likelihood of default. Not surprisingly, some within the nuclear industry want the fee to be 1 percent or less[viii], while the Congressional Budget Office has estimated that it should be 30 percent[ix], which reflects the CBO's 2003 determination of "risk of default on such a loan guarantee to be very high—well above 50 percent." CBO Executive Director Doug Elmendorf declined to refine this estimate to reflect any specific projects in a March 5th blog post[x], but reiterated that, "it would be difficult to set the fee so as to entirely cover the estimated cost to the government."

These two are bookend estimates, but they are hardly the only ones. For example, Standard and Poor's thinks the subsidy cost fee should be at least 4 percent to 6 percent[xi], with the potential to be much higher, depending on the borrower's credit rating. The Government Accountability Office has estimated the loss rate at 25.42 percent[xii]. This loss rate is different from a true estimate of the credit subsidy cost in important ways—primarily, it doesn't involve discounting to present values—but it does give some guidance in calculating the true cost. Unfortunately, none of these estimates is perfect:

- The nuclear industry's 1 percent doesn't seem to be based on any calculation that includes all appropriate risks. If this estimate reflected the true risk, utilities would probably be able to get traditional financing without the guarantee. Indeed, the added benefit of the guarantee probably wouldn't outweigh the transaction costs of getting the guarantee.
- The Congressional Budget Office assumptions on recovery and default rates aren't clear, but appear to be extremely pessimistic. And the

assumption of very low construction costs is extremely optimistic. This estimate was constructed while analyzing a bill that never became law and assumes the guarantee only covers 50 percent of the project—today's program allows for loan guarantees to cover up to 80 percent of the project. Because none of these assumptions fully represent today's financing or regulatory environment, this estimate needs to be updated.

- The Government Accountability Office helpfully estimates the loss rate, but hasn't discounted the payouts or otherwise constructed an estimate of the credit subsidy costs.
- Standard and Poor's assumes lower capital costs than current construction costs and assumes a 70 percent recovery rate on bankrupt plants. This is not only higher than other estimates, but seems especially unrealistic given that some reactors will likely default while under construction and may have no salvageable value.

None of these estimates is the "right" credit subsidy cost, but each gives helpful guidance in calculating a credit subsidy cost that more accurately accounts for the risk of default and the value of any unfinished reactor.

Faced with these widely varying estimates, we undertook an effort to estimate the credit subsidy cost of a nuclear loan guarantee, given certain assumptions. Our spreadsheet-based model performs calculations based on these inputs to estimate the fee. The key steps in estimating a credit subsidy fee are to:

1. Determine the likelihood that the builder of the reactor won't be able to pay back the loan—the "default rate."

2. Determine the percentage of the total reactor cost that will be covered by the loan guarantee.

3. Determine the amount of the total cost that will be recovered in the event that the borrower defaults and the reactor is sold in liquidation—the "recovery rate."

4. The first three steps give a total payout that the U.S. government will have to make. Spread these payouts out over the lifetime of the loan, based on when defaults will occur.

5. Discount payouts in future years to determine a "present value" of the total payouts. This is the credit subsidy fee that the borrower must pay the government.

Each of these steps requires an input that can vary widely, which makes precise estimates very difficult.

CAP's approach employs a simplified framework for estimating the appropriate credit subsidy fee for a nuclear loan guarantee. The calculator doesn't give a precisely correct fee that a borrower should pay, but it provides a ballpark estimate and is extremely useful for showing how the fee is sensitive to changes in major inputs.

The model uses the process described above to calculate the credit subsidy cost, dependent on assumptions about default rate, recovery rate, discount rate, and other inputs. To give an example of what the credit subsidy cost should be, I used these baseline inputs:

- Every project is different and should be evaluated independently, but the generic expected default rate is 50 percent. This serves as a proxy for the credit rating of the borrower, which will vary dramatically from project to project. This is based on CBO and GAO estimates and is implied by Standard and Poor's. (S&P says that the cost should be 4 to 6 percent with a 70 percent recovery rate, which is only possible with a default rate of about 50 percent.)
- The recovery rate in liquidation is 50 percent. This is the GAO estimate, and it is also implied by Standard and Poor's.** But this may be optimistic since DOE no longer requires that the U.S. government have a right of first lien.

- The loan term is 30 years, the maximum term allowed under the law; the discount rate is 4.7 percent, based on current yields on 30-year Treasury notes[xiii]; and the guarantee covers 80 percent of the project, the maximum amount allowed under the law.
- The default risk is spread evenly over the life of the loan, even though it's more likely that a project would default early in the loan rather than later. This has the effect of underestimating the actual credit subsidy cost.

These assumptions indicate that the credit subsidy fee on a nuclear loan guarantee should be at least 10 percent. The fee goes up as the guarantee is for a greater portion of the total project cost, as the default rate goes up, as the recovery rate goes down, as the discount rate goes down, and as the risk of default is concentrated earlier in the loan. For example, just changing the recovery rate to 40 percent leads to a fee of about 13 percent.

The following table illustrates how the credit subsidy fee depends on both the default rate and the recovery rate[xiv]. Estimates in this table assume that the guarantee is for 80 percent of the cost of the reactor, that DOE does maintain a right of first lien, and that the risk of default is spread evenly over 30 years. These last two assumptions have the effect of lowering the credit subsidy cost, so these are low-end estimates.

**Low-end estimates for credit subsidy fees**

| Recovery rate \ Default rate | 0% | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 100% |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0% | 0% | 5% | 11% | 16% | 21% | 27% | 32% | 37% | 42% | 48% | 53% |
| 10% | 0% | 5% | 9% | 14% | 19% | 23% | 28% | 33% | 37% | 42% | 46% |
| 20% | 0% | 4% | 8% | 12% | 16% | 20% | 24% | 28% | 32% | 36% | 40% |
| 30% | 0% | 3% | 7% | 10% | 13% | 17% | 20% | 23% | 27% | 30% | 33% |
| 40% | 0% | 3% | 5% | 8% | 11% | 13% | 16% | 19% | 21% | 24% | 27% |
| 50% | 0% | 2% | 4% | 6% | 8% | 10% | 12% | 14% | 16% | 18% | 20% |
| 60% | 0% | 1% | 3% | 4% | 5% | 7% | 8% | 9% | 11% | 12% | 13% |
| 70% | 0% | 1% | 1% | 2% | 3% | 3% | 4% | 5% | 5% | 6% | 7% |
| 80% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| 90% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| 100% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |

Grey boxes represent represent most likely scenarios

To put this in perspective, if a developer gets a guarantee for 80 percent of the cost of a $10 billion plant, the loan guarantee is for $8 billion. A 10 percent credit subsidy fee means that the utility has to pay an extra $800 million to the government at the start of the project.

The real risk to the taxpayer is not the credit subsidy cost. Rather, taxpayers bear risk in the event that the credit subsidy cost (the projected cost of the guarantee to the government) is greater than the credit subsidy fee (the amount that the nuclear developer pays the government to offset the credit subsidy cost). In a perfect world, the fee would cover 100 percent of the cost and there would be no risk to taxpayers.

However, there are reasons to believe that this will not be the case. CBO expects DOE to collect a fee that is a full 1 percent lower than the true cost. Each 1 percent of the Southern Company loan guarantee represents $80 million. Each 1 percent of the entire $54 billion in loan guarantees that the president has proposed represents $540 million. There are serious political pressures on DOE to issue more loan guarantees, which will likely cause the fees collected to be significantly lower than the true costs. Given the enormous costs to taxpayers if

there is any underassessment of credit subsidy fees, it's important that the credit subsidy cost be accurately calculated and that the fees pay for the entire cost.

There are very serious questions about developers' abilities to pay those sort of fees. If the administration decides to explore financing options for the fee, it must make absolutely certain that the financing doesn't place the guarantee's cost back on taxpayers.

It is impossible to say with 100 percent certainty what the credit subsidy fee on these loan guarantees should be without looking at details of specific nuclear projects. The administration must keep in mind, however, that credit subsidy fees should be set at a rate that protects taxpayers, not at an artificially low rate as a handout to big utilities. DOE will only be able to protect taxpayers from bearing the risk of new nuclear reactors if it charges an accurate credit subsidy fee.

Thank you.

Notes

*If the United States guarantees either the only creditor or a creditor with a right of first lien, taxpayers will not have to pay any money for the defaulted loan if the reactor brings in 80 percent of the value of the reactor in a liquidation sale. Another way to think about this is that even if there's a 100 percent chance of default, the credit subsidy cost would be 0 percent if selling the reactor would generate more money than the value of the loan.

**Standard and Poor's assumes a 70 percent recovery rate on a reactor that costs $6,000 per kilowatt, or a liquidation value of $4,200 per kilowatt. Recent estimates of new nuclear construction are roughly twice that liquidation value,

ranging all the way up to $10,800 on the high end (implying a 40 percent recovery rate).

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Mr. KUCINICH. Mr. Scott.

**STATEMENT OF MICHAEL D. SCOTT**

Mr. SCOTT. Chairman Kucinich, Ranking Member Jordan, members of the committee, thank you for the opportunity to testify here today. My name is Michael Scott, and I head the U.S. Government investment banking business at Miller Buckfire.

In creating Title XVII, Congress recognized that there was a private market failure to finance new clean-energy technologies that reduce greenhouse gas emissions, and that this market failure encompassed a broad range of technologies. Congress also recognized the importance of getting these clean technologies constructed and into operation; however, given the costs of the various eligible technologies, the U.S. Government was unlikely to have the budget dollars necessary to appropriate the Title XVII projects in amounts sufficient to achieve the purposes of the program. So Congress provided a unique path among Federal credit programs to finance enough projects to get a technology into general use, with the private sector paying the full cost of the guarantees.

Prior to the Federal Credit Reform Act, the costs of Federal credit programs were only evaluated and appropriated at the time of default. This approach did not provide legislators or policymakers with the true budget impact of the Federal credit program, and was inconsistent with the budgeting process in the noncredit spending programs of the U.S. Government.

The Federal Credit Reform Act is designed to calculate the net present value of the long-term cost to the U.S. Government of any Federal credit program. Properly and faithfully implemented, the Federal Credit Reform Act considers all the cash-flows over the entire lifetime of the loan, including defaults, fees, recoveries, as well as contractual and structural protections.

With potential tenures of 30 years, the entire lifetime-of-the-loan analysis is very important and substantially different from the scoring of noncredit spending programs of the U.S. Government that do not analyze, measure or otherwise calculate the costs beyond the 10-year budget window.

Each project is subjected to extensive due diligence and statutory and role requirements that protect the taxpayer and fully price the risk assumed in providing a loan guarantee.

The President and Congress have a very powerful policy tool in Title XVII that is unique and important in the current economic environment, especially with the U.S. Government facing the stresses and difficult choices involved with our significant budget deficits. Title XVII can drive economic growth due to the development of clean-energy infrastructure projects that are built and fully paid for by the private sector; provide significant short-term and long-term construction and manufacturing jobs; provide long-term operating jobs; promote the development of new U.S.-based manufacturing, particularly significant in the case of manufacturing that will develop from a robust new nuclear build; develop environmentally clean and secure domestic energy supply capacity, particularly in the case of carbon-free baseload generation from new nuclear; correct the private market failure to finance clean and innovative energy technologies; and, finally, provide well-qualified

project sponsors with the confidence that credible projects can receive a Federal loan guarantee, which is an important signal for private-sector project sponsors to pursue these substantial investments because of the up-front costs that they bear before any application and, significantly, before any closing on a Federal loan guarantee.

Significantly, the President does not need new legislative authority or new appropriations to make Title XVII work, as Title XVII provides for the credit subsidy and the administrative costs to be fully paid for by the borrower, and substitutes the borrower payments for the appropriations. This means that the Federal budget is not affected by the issuance of the loan guarantees under section 1703, and that the level of risk assumed by the U.S. Government is fully compensated for as measured by the Federal Credit Reform Act.

The calculation for this risk is completed in the same manner as if this was a traditional Federal credit program where the U.S. Government paid the credit subsidy cost.

In summary, Title XVII provides a means to achieve the priorities and policies of the President and Congress pertaining to jobs, the economy, clean and secure domestic energy capacity and the environment. It does so through a clean-energy infrastructure bill that is fully funded by the private sector. This bill will also be the engine of growth in the investments that develop our domestic supply chain manufacturing base in supporting industries such as iron and steel.

The key to all of this is operationalizing Title XVII. The President and his administration can accomplish these critical objectives by removing the current improper rule-based impediments, elimination of the arbitrary maximum loan guarantee authority levels, and calculating the credit subsidy in a manner that is faithful to the statute.

I'm pleased to answer any questions you may have. Thank you.

Mr. KUCINICH. Thank you very much, Mr. Scott.

[The prepared statement of Mr. Scott follows:]

**Statement of**
**Michael D. Scott**
**Managing Director**
**Miller Buckfire & Co., LLC**

**Before the**
**House Committee on Oversight and Government Reform**
**Domestic Policy Subcommittee**

**April 20, 2010**

Chairman Kucinich, Ranking Member Jordan, Members of the Committee, thank you for the opportunity to testify today. My name is Michael Scott and I head the U.S. Government investment banking business at Miller Buckfire.

I appear before you today to provide my views on subjects related to the Department of Energy's ("DOE") Title XVII loan guarantee program. In this testimony, I will cover background on the history and operation of Federal loan guarantees, the role of the Federal Financing Bank and how Federal loan guarantees relating to new nuclear power plants compare and contrast with other clean energy projects eligible under §1703 as well as with other Federal loan guarantees. I will also provide my thoughts on the ability of the Federal Credit Reform Act of 1990 to protect the taxpayer from financial loss, the significant implementation obstacles that Title XVII has faced since passage of the Energy Policy Act of 2005, solutions to these obstacles as well as the implications of operationalizing Title XVII for the priorities of President Obama and Congress pertaining to jobs, the economy, clean and secure domestic energy capacity, and the environment.

I served for almost five years as a Senior Advisor at the Department of the Treasury where I was responsible for, among other things, Federal credit policy, the evaluation, negotiation, and execution of Federal loan guarantees and direct loans as well as the management and oversight of the Federal Financing Bank. In my prior role at Treasury, I was one of the principal people who decided how and in what manner the large one-off Federal credit programs (such as the Air Transportation Stabilization Board, the Rural Economic Development Loan and Grant Program in the 2002 Farm Bill, the Alaska Natural Gas Pipeline Loan Guarantee Program and Title XVII of the Energy Policy Act of 2005) were executed during the September 2001 to July 2006 time period. This required me to be deeply involved with OMB on Federal Credit Reform Act issues pertaining to the individual Federal credit programs as well as the Federal Financing Bank. In conjunction with OMB, Treasury plays a significant role in new programs as it has policy interests in Federal credit and debt management and because of the fact that the Federal Financing Bank is often used to finance Federal loan guarantees, including those related to Title XVII. I was as often ensuring that deals got done as ensuring that deals did not. Contrary to the perception that Federal credit is similar to private sector financings and that all that is needed is enabling legislation, new Federal credit programs are complicated, rely on a willing Executive Branch for execution, and face many institutional obstacles from both OMB and Treasury. Most Federal credit is concentrated in long-established and/or entitlement type programs that do not require the proactive input of the agencies' senior policy officials. The new one-off Federal

credit programs are rare enough that very few senior officials ever have the chance or need to understand the full range of applicable statutes or the tools and issues that impact their execution. As we have seen in the implementation of Title XVII since late 2006, the President and his Administration can be ill-served by this asymmetrical knowledge of Federal credit between the institutional organs of government and the elected and appointed officials.

**Background on Federal Loan Guarantees**

The U.S. Government generally establishes Federal credit programs (loan guarantees and direct loans) for one of several reasons. The most common is to correct a private market failure to extend adequate or reasonable access to credit and then to provide a path forward to correct the market failure. This is the fundamental rationale and structure of the Title XVII loan guarantee program. The other reasons include targeted efforts to support national priorities or national emergencies. Setting aside the credit or capital programs provided under the Housing and Economic Recovery Act of 2008, the Emergency Economic Stabilization Act of 2008, or the various programs established under existing Federal Reserve authorities to address the financial market crisis, the vast majority of pre-crisis Federal credit is concentrated in housing, education, rural development and small business. It is typically the case that these programs have been in existence for decades or generations and are generally characterized by a large number of homogeneous transactions involving relatively small dollar amounts per loan. In all of these Federal credit programs, with the sole exception of §1703 projects under Title XVII, the U.S. Government pays for the "credit subsidy costs" by appropriating those amounts required as calculated by the Federal Credit Reform Act of 1990.

Prior to the Federal Credit Reform Act of 1990, the costs of Federal credit programs were only evaluated and appropriated at the time of default. This approach did not provide legislators or policymakers with the true budget impact of a Federal credit program and was inconsistent with the budgeting process in the non-credit spending programs of the U.S. Government. Since enactment of the Federal Credit Reform Act of 1990, the U.S. Government has calculated the net present value of the long-term costs (also known as the "credit subsidy costs") of Federal credit (loan guarantees or direct loans). In addition to the obvious cash flows of a transaction and the timing of those cash flows adjusted for the probability of default and recovery amounts, the credit subsidy calculation also considers the contractual and structural protections of the transaction. These protections may include, among others, parent or third-party guarantees, access to take-or-pay contracts or State PUC rate recovery mechanisms, or subordinated structures.

In those instances where the Federal Financing Bank is providing the financing pursuant to an agencies loan guarantee, the resulting transaction is considered a direct loan. This requires the credit subsidy calculation under the Federal Credit Reform Act of 1990 to be performed under the requirements for a direct loan. The most significant difference between the calculations of the credit subsidy cost of a loan guarantee as compared with that of a direct loan is that the cash flows derived from the interest rate spread above the Federal Financing Bank's costs of funds (which is Treasuries flat) is generally considered an inflow to the U.S. Government. This inflow serves to reduce the overall credit subsidy costs that need to be appropriated. In the case of the Title XVII program where the borrower is paying the full cost of the obligation under

§1702(b)(2), this inflow would lower the credit subsidy amount that the borrower is required to pay to the Department of the Treasury.

**The Role of the Federal Financing Bank**

The Federal Financing Bank Act of 1973 created an instrumentality of the U.S. Government under the general supervision of the Secretary of the Treasury. It was established to coordinate agency borrowings and the Federal credit and debt management policies of the U.S. Government. By statute, it is authorized to purchase or sell any obligation issued, sold or guaranteed by a Federal agency. In practice, the Federal Financing Bank finances agencies such as the U.S. Postal Service, the FDIC, the NCUA, and the guaranteed loans for DOE, the Department of Education's HBCU program and the USDA's Rural Utilities Service. The Federal Financing Bank has often been used as an instrument of Federal credit policy by Treasury and OMB to constrain program agencies and insert additional controls on Federal credit programs. At other times, OMB has objected to the availability of the Federal Financing Bank in Federal credit programs and barred its use by limiting the definition of eligible lender in legislation to "non-Federal" entities.

As mentioned previously, one of the most significant benefits to using the Federal Financing Bank to finance guaranteed loans (whether for the U.S. Government in those Federal credit programs where the taxpayer is funding the appropriation or in the case of §1703 projects where the borrower is paying the full cost of the credit subsidy) is that the credit subsidy amount will be lower as a result of the cash inflow to the U.S. Government from the interest spread that the Federal Financing Bank earns above its cost of funds. Use of the Federal Financing Bank will marginally lower the net credit risk exposure of the U.S. Government because loan guarantees that are financed by the private sector are financed at a higher interest rate than the Federal Financing Bank and therefore the U.S. Government is guaranteeing that higher interest rate.

The Federal Financing Bank also provides certainty of transaction execution in all market conditions, which is an important benefit for both the borrower and the U.S. Government. During the recent financial market crisis, we saw significant periods where entire classes of loans guaranteed by the U.S. Government either could not trade or could not be traded at levels that one would expect of an obligation guaranteed by the U.S. Government. Dislocations in the private markets for U.S. Government guaranteed loans or securities backed by these loans provide counterproductive signals to market participants, can significantly impede the objectives of the underlying Federal credit programs, and can potentially have implications in the markets for Treasury's debt issuances.

**Title XVII History, Congressional Intent and Program Execution (2005-2010)**

It is important to consider the original purposes of Title XVII and how Congress structured the section to achieve these purposes. In Title XVII, Congress recognized that there was a private market failure to finance new clean energy technologies that reduce greenhouse gas emissions and that this market failure encompassed a broad range of technologies. Congress also recognized the importance of getting these clean energy technologies constructed and into operation, however, given the costs of the various technologies, the U.S. Government was

unlikely to have the budget dollars necessary to appropriate to this program in amounts sufficient to achieve the purposes of the program. In Title XVII, Congress provided a path to finance enough projects to get a technology into "general use", at which point the market failure is presumed to be corrected. The definition of "general use" in the Final Rule is three commercial projects of a particular technology in the same general application as the proposed project, each operating for five years.

Congress provided two options to pay for the cost of the loan guarantees under §1702(b) which reads:

> "(b) Specific Appropriation or Contribution.- No guarantee shall be made unless –
> (1) an appropriation for the cost has been made; or
> (2) the Secretary has received from the borrower a payment in full for the cost of the obligation and deposited the payment into the Treasury."

§1702(b)(1) is the traditional approach to Federal credit where the U.S. Government pays for the cost of the loan guarantee through an appropriation with the cost of the loan guarantee being measured in accordance with the Federal Credit Reform Act of 1990.

§1702(b)(2) is the "borrower pay" alternative where the borrower pays the full cost of the loan guarantee with the cost of the loan guarantee being measured in accordance with the Federal Credit Reform Act of 1990.

Given the budget constraints of the U.S. Government, both the Bush and Obama Administration's have opted for the §1702(b)(2) "borrower-pay" option for the credit subsidy costs to fund §1703 projects. In providing the "borrower pay" option in §1702(b)(2) as a substitute for a taxpayer funded appropriation, and requiring that the "cost of the obligation" be measured by the standards in the Federal Credit Reform Act, Congress was structuring a program that would not impact the Federal budget, would fully compensate the U.S. Government for the risks that it was assuming, and would be of sufficient size to get clean energy technologies into general use.

The American Recovery and Reinvestment Act of 2009 amended Title XVII to add a temporary loan guarantee program under §1705 for renewable energy and power transmission projects. These "shovel ready" projects must commence construction by September 30, 2011. The credit subsidy costs for projects under §1705 are paid for by the U.S. Government through appropriations.

Since the passage of the Energy Policy Act of 2005 that provided the Title XVII loan guarantee program, we saw the effects of an unwilling Executive Branch that published a flawed Final Rule in 2007 and that operationally executed the program in a manner that was inconsistent with the relevant statutes as well as the Congressional intent of the program. President Obama and his team are currently burdened with this operational legacy from the prior Administration. While DOE issued five solicitations between August 2006 and October 2008 for §1703 projects that offered $40.5 billion in arbitrary loan guarantee authority, the only loan guarantee that has closed did so under §1705 authority for $535 million. To put the scale of the opportunity into

perspective, the June 2008 solicitation for advanced nuclear power facilities resulted in $122 billion in Phase I applications for new projects pertaining to this technology alone.

**Federal Loan Guarantees for §1703 Projects and Other Federal Loan Guarantee Programs**

§1703 provides ten broad categories of eligible clean energy technology projects that must avoid, reduce, or sequester greenhouse gases and employ new or significantly improved technologies. The variety of technologies and the purposes for which they are used, necessarily result in differing business models, financial requirements, contributions to the statutory objectives, technology risks and financial prospects. However, Title XVII provides the ability to execute the program in a technology neutral manner. This can occur by implementing the program under the borrower pay provisions of §1702(b)(2), where the only limit on loan guarantees is driven by the amount of time that it takes to get a technology into "general use" and the borrowers willingness to pay the credit subsidy and administrative costs. Whereas if Title XVII is executed under the requirements of §1702(b)(1) and the U.S. Government needs to appropriate taxpayer dollars, decisions on the allocation of maximum loan guarantee levels for each technology becomes necessary.

Regardless of the mechanism used to pay for the credit subsidy costs of the program, each project is subjected to statutory and rule requirements that protect the taxpayer and fully price the risk that would be assumed for projects that receive a loan guarantee. For example, the statute requires the project sponsor to have at least 20% "skin in the game" as DOE cannot guarantee more than 80% of the project costs. Each application is subjected to an extensive due diligence process by the U.S. Government, a rating agency as well as by the project sponsor. The terms and conditions of the individual projects are fully reflected in the calculation of the credit subsidy under the Federal Credit Reform Act of 1990. These calculations have been employed for a wide variety of Federal credit programs and when employed on a project basis, as opposed to a portfolio basis, ensure that all relevant factors of the individual projects are considered. On June 22, 2007, then CBO Director Orzag sent Chairman Obey a letter that commented on the ability of the Rural Utilities Service to implement a loan guarantee program that would be designed to result in "no net cost" to the U.S. Government. CBO expressed concerns that programs that utilized a single average rate would be very difficult to manage to the "no net cost" to the U.S. Government and then proceeded to lay out the structure and process of a program that could achieve the objective of "no net cost." The most significant recommendation is to establish the credit subsidy fee based on each individual project.

As a result of the dollar size of the projects and the results of the last nuclear build in America almost thirty years ago, nuclear power projects will receive significant attention relative to other §1703 clean energy technologies. It is important to understand the issues and process that one undergoes with DOE which applies to all technologies but will be explained here in the context of a nuclear technology project. After an extensive review process of the technology and business plan of a project sponsor, that includes an initial project rating by a rating agency as well as a full evaluation by the U.S. Government, DOE decides whether or not to offer a "term sheet" to a prospective project sponsor. Once the "term sheet" is agreed to by both the DOE and the project sponsor, a "conditional commitment" is issued. During this phase of the process, the DOE and OMB will provide the project sponsor with a non-binding estimate of the credit .

subsidy costs that they will be required to pay at closing. The "conditional commitment" will detail the conditions precedent required for closing, which include, in the case of nuclear power projects, Nuclear Regulatory Commission ("NRC") certification of the specific design of the reactor and plant, the issuance by the NRC of a Combined License ("COL"), as well as all other contractual, statutory and regulatory requirements. In addition to these requirements, at a time no later than 30 days prior to the fulfillment of the conditions precedent and scheduled closing, the final project business plan will have been evaluated by a rating agency to determine the actual rating for the project, and the project sponsor will submit all of this to DOE and OMB for evaluation, compliance with the conditional commitment, as well as the calculation of the actual credit subsidy costs. In the case of new nuclear power projects, the satisfaction of all of the conditions precedent in any proposed project will not occur for at least two years, and more likely, three plus years from now.

It is true that the time frame before any financial closing does provide uncertainty for those costs that have not been contractually set. However, these costs will be substantially confirmed prior to closing and the development of the final business plan will ensure that the full costs of the project are used to determine the credit subsidy costs. For the project sponsor and its investors, who will have likely invested somewhere between $750 million and $1.5 billion of their own money before any financial closing on a Federal loan guarantee, the final business plan will either confirm the financial viability of the project or the need to cancel the project and therefore not close on the Federal loan guarantee. As it relates to post-closing cost overruns, prior Title XVII commitments required that any post-closing cost overruns be paid for with new equity from the project sponsor.

For a variety of reasons, the actual closing on the conditional commitment will be a very complicated process. It will be complicated because satisfaction of the conditions precedent are at least two or three years away. However, this interim period will provide better and up-to-date information (that may be neutral, favorable or unfavorable) that will drive the final business plan and rating agency process that will ultimately factor into the calculation of the actual credit subsidy costs. While there are some Final Rule based issues that add ambiguity into the actual closing that are not normal or customary in either the private markets or in Federal credit programs, the broad process adds protections to the taxpayer.

It is also important to recognize that many of the delays and cost overruns that were part of the last nuclear build in America have been substantively addressed by both the U.S. Government and the nuclear industry. Among other items, the solutions include standardized reactor designs, a reactor/plant design certification process that is completed pre-construction, a COL that is issued pre-construction, firm EPC contracts, and for some rate base sponsors, favorable State PUC cost recovery legislation/regulation. Labor also has an important role in the new nuclear build process and has taken proactive steps to provide cost certainty, work quality, and the availability of a highly skilled workforce for these projects.

For example, the Building and Construction Trades Department of the AFL-CIO has entered into Project Labor Agreements with three of the four sponsors selected for due diligence by DOE. These agreements will help project sponsors control the labor and quality costs of the projects

and focus all participants on bringing these projects in on-time and on-budget. This will also materially contribute to reducing the overall risk of the projects to the U.S. Government.

The detailed Project Labor Agreements are designed to supply the highly skilled and trained workforce needed for these complex and crucial clean energy infrastructure projects. They include the establishment of multi-craft training centers located near or on the new sites, rearranging traditional apprenticeship parameters so that apprentices arrive on the job with productive skills from the first day, the development of special training partnerships with vendors and suppliers to certify all workers on the installation of their particular components, and the development of programs to train a local workforce for careers in the construction, operation and maintenance of new facilities in the nuclear industry.

**Protecting the Taxpayer and the Federal Credit Reform Act of 1990**

Historically, the U.S. Government pays for the cost of credit subsidy directly with appropriations of taxpayer funds. The one significant exception to this is in Title XVII where Congress specifically authorized the borrower to pay "in full for the cost of the obligation" in lieu of a taxpayer funded appropriation. As previously discussed, the vast majority of pre-crisis Federal credit is extended in homogeneous transactions characterized by high volumes and relatively low dollar amounts, concentrated in housing, education, rural development and small business. Because the U.S. Government pays for the credit subsidy costs of these transactions, the mechanics of the calculation and the underlying assumptions used by OMB are of less import to the borrower. As a result, OMB makes a number of simplifying assumptions which may be appropriate for the U.S. Government when broadly seeking to implement the purposes of Federal Credit Reform Act. However, this approach can be quite costly to the borrower when the transactions themselves are highly customized and part of a unique self-pay program. As a result, it is very important that in implementing the Federal Credit Reform Act, OMB and DOE do so in a manner that is more literally faithful to the language of the statute and that recognize the highly customized and unique nature of each project.

One concern in executing any Federal credit program is whether or not the Federal Credit Reform Act of 1990 provides an accurate calculation of the net present value of the long-term costs to the U.S. Government of extending the credit. In considering the accuracy of the calculation of credit subsidy across those special one-off Federal credit programs such as Title XVII, experience generally shows that the initial credit subsidy cost, calculated either by OMB or CBO, are more conservative than the actual history of the program. The Air Transportation Stabilization Board ("ATSB"), the $10 billion loan guarantee program for airlines after the September 11th attacks was originally expected to produce a positive credit subsidy in the 30% to 35% range (a positive credit subsidy "costs" the U.S. Government, a negative credit subsidy "makes money" for the U.S. Government.) The ATSB made six loan guarantees, three of which subsequently filed for Chapter 11 bankruptcy protection. Even with one $20 million loss due to the post-loan guarantee bankruptcy of ATA, the ATSB netted approximately $300 million through fees and the exercise of warrants after issuing $1.6 billion in Federal loan guarantees, resulting in a negative credit subsidy of over 18% for the overall program. In considering the credit subsidy costs of the TARP program, Table 4-8 on page 41 of the Analytical Perspectives, Budget of the United States Government, Fiscal Year 2011

(http://www whitehouse.gov/omb/budget/fy2011/assets/econ_analyses.pdf) provides a further example of this. This is not to say that the credit subsidy calculation cannot be wrong, but it is to say that the Federal Credit Reform Act is a very good tool to measure the U.S. Government's risk and exposure, has a good reputation over the 20-years since enactment, and absent extreme carelessness on the part of the program agency and OMB, is going to properly protect the taxpayer.

As it relates to the calculation of the credit subsidy costs, I would offer that single point estimates in either the minimum or maximum forms are not supportable suppositions. To follow such a directed outcome would reject the relevance and reliability of the Federal Credit Reform Act of 1990 in calculating the credit subsidy costs and put the U.S. Government in the untenable position of calculating the credit subsidy costs outside of the statutorily required calculation under §1701(2) of Title XVII.

Properly and faithfully implemented, the Federal Credit Reform Act considers all of the cash flows over the entire lifetime of the loan including fees, defaults, recoveries and contractual and structural protections. This analysis over the entire lifetime of the loan is important as the maximum term of a loan guarantee under §1702(f) is the lesser of 30 years or 90 percent of the useful life of the projects assets. The "entire lifetime of the loan" analysis is substantially different from the scoring of non-credit spending programs of the U.S. Government that do not analyze, measure or otherwise calculate the costs beyond the 10-year budget window. To the extent that the spending program continues beyond the 10-year budget window, the taxpayer is fully exposed to those costs and liabilities.

**The Title XVII Opportunity**

The Administration and Congress have a very powerful policy tool in Title XVII that is unique and important in the current economic environment, especially with the U.S. Government facing the stresses and difficult choices involved with our significant budget deficits. Thoughtful implementation of Title XVII provides the President and Congress with a very powerful tool to:

1. Drive economic growth through the development of clean energy infrastructure projects that are built and fully paid for by the private sector;
2. Provide significant short-term and long-term construction and manufacturing jobs;
3. Provide long-term operating jobs;
4. Promote the development of new U.S. based manufacturing, particularly significant in the case of manufacturing that will develop from a robust new nuclear power build;
5. Develop secure domestic energy supply capacity;
6. Develop environmentally clean energy capacity, particularly in the case of carbon-free base load generation from new nuclear power plants;
7. Correct the private market failure to finance clean, innovative energy technologies; and
8. Provide well qualified project sponsors with confidence that credible projects can receive a Federal loan guarantee, which is an important signal for private sector project sponsors

to pursue these substantial investments because of the upfront costs that they bear before the application process and significantly before any closing on a Federal loan guarantee.

The reason that Title XVII is so powerful lies in the fact that the President does not need new legislative authority or new appropriations to make the program work. The legislation for Title XVII provides all of the authority that the Executive Branch needs to execute the program. Unlike all other Federal credit programs where the U.S. Government pays for the credit subsidy and administrative costs of the programs, Title XVII provides that the credit subsidy (§1702(b)(2)) and the administrative (§1702(h)) costs are fully paid for by the borrower and substitutes the borrower payments for the appropriations. This means that the Federal budget is not affected by the issuance of the loan guarantees under §1703 and that the level of risk assumed by the U.S. Government is fully compensated for as measured by the Federal Credit Reform Act. The calculation for this risk is completed in the same manner as if this was a traditional Federal credit program where the U.S. Government paid the credit subsidy costs.

**Operationalizing Title XVII for all §1703 Clean Energy Technologies**

All of this leads to the question, if Title XVII is so readily available, why hasn't this program worked? The answer revolves around three topics that deal with how the Executive Branch implements Federal credit programs. This first is the Final Rule published in 2007 and amended in December 2009.

The second involves the establishment of arbitrary maximum loan guarantee authority amounts subsequently established in Appropriation Acts. While this approach of establishing maximum loan guarantee authority levels is consistent with OMB Circular A-129 (Appendix A (II)(3)(e)) where the U.S. Government pays for the credit subsidy, it is inconsistent with the "borrower pay" option selected in implementing Title XVII.

Finally, application of Federal Credit Reform Act in ways that are consistent with how OMB implements it for Federal credit programs where the U.S. Government is paying the credit subsidy costs despite the significant differences and implications for a program where the borrower pays the credit subsidy and administrative costs and that should lead to a more faithful following of the Federal Credit Reform Act.

The combinations of these three issues have unnecessarily and arbitrarily limited the program and caused great skepticism among project sponsors about whether Title XVII is real or not. This has resulted in sponsors being unwilling to spend the considerable resources it takes to prepare projects for an application and, as a result, has delayed projects that would be advanced if a credible loan guarantee program was in effect and viewed as reasonable and predictable.

This is not to say that every project will or should be approved, as thoughtful implementation of Title XVII still subjects each application to a rigorous process and those projects that are not credible should be rejected. However, thoughtful implementation that removes improper rule based impediments and arbitrary limits will advance a program that is consistent with the underlying statutes and Congressional intent. It will also enhance Title XVII's credibility with

the private sector and should bring highly qualified project sponsors and their projects to the U.S. Government for reasonable consideration.

**Final Rule Issues**

The first issue for the Administration to correct is the Final Rule which was issued in October 2007. Under Secretary Chu's leadership, DOE reviewed the Bush Administration's Final Rule and issued a Notice of Proposed Rulemaking in August 2009 to correct what it viewed as statutory misinterpretations on several narrow issues. While it was clear that DOE was correct to pursue the proposed changes, there are in fact other areas where the Final Rule is inconsistent with the underlying statute and Congressional intent of Title XVII, inconsistent with other applicable statutes, inconsistent with OMB Circular's pertaining to Federal credit programs and which impede the ability of Title XVII to achieve its purposes.

While the following is not meant to be all encompassing, I will outline some of the more egregious provisions that are designed to stop or significantly impede implementation of Title XVII and that need to be corrected.

***Full Faith and Credit***

In providing for a partial guarantee in the Final Rule (§609.10(d)(4)(ii) and (iii) and in the §609.2 definition of "Guaranteed Obligation"), OMB and DOE have usurped the power that the Constitution gave solely to Congress under Article I, Section 8; the power to pledge the credit of the United States.

Institutionally, both OMB and Treasury have had a preference for partial guarantees and for which OMB provides guidance under OMB Circular A-129 (Appendix A (II) (3) (a)). The principal rationale for this position pertains to the need for the beneficiary of the loan guarantee to have "skin in the game". This particular view fails to recognize that Congress ensured that the project sponsor had "skin in the game" by limiting the guarantee to 80% of the project cost in §1702(c). Regardless of an agencies institutional position, it cannot be imposed in a manner that is inconsistent with the Constitution and the statute, which the current Final Rule is.

Beyond the Constitutional issues, Congress and the Executive should be concerned whenever rules or regulations cast doubt on the meaning of the U.S. Government's pledge of its full faith and credit as it is detrimental to the U.S. Government's interest in the financial markets. It also creates uncertainty with project sponsors, eligible lenders, financial partners and other stakeholders, all of which impede the execution of Federal credit programs and their general purposes, including correcting a private market failure for credit availability.

While this particular issue originated in the 2007 Final Rule, in October 2009, DOE created the Financial Institution Partnership Program to implement a partial guarantee program under §1705. For the reasons discussed above and below, this is

inconsistent with the statutory language of Title XVII and the Executive and Congress should be very concerned about the implications for both Title XVII and future Federal credit programs.

The inclusion of §609.10(d)(4)(ii) and (iii) and the §609.2 definition of "Guaranteed Obligation" are of particular concern. As it relates to the definition, the inclusion of the words "or any part of" is troubling as these words are used by Congress when they seek to provide the Executive with discretion to provide less than a full faith and credit obligation; however these words were not included in Title XVII and are inconsistent with the underlying statutory meaning and congressional intent of the words "Full Faith and Credit" used in Title XVII.

> §1702(j) reads: "FULL FAITH AND CREDIT.—The full faith and credit of the United States is pledged to the payment of all guarantees issued under this section with respect to principal and interest."

The concept of full faith and credit is well established in the Constitution, in statute and in U.S. Attorney General opinions. After a long history of agencies seeking the formal opinion of the Attorney General as to whether the full faith and credit of the United States is pledged to a particular obligation, Attorney General Elliott L. Richardson issued a Memorandum to the Heads of Executive Departments dated October 10, 1973 in which he memorializes the Attorney General's opinion on the meaning of "full faith and credit of the United States". The third sentence reads, "More frequently, however, the pledge of full faith and credit is not in doubt and may well be specified in the statute itself." This is the fact in the instant case.

In 6 U.S. Op. Off. Legal Counsel 233, 1982 WL 170692 (O.L.C.), the Attorney General opinion on a full faith a credit question recalls an earlier Attorney General opinion in which he says "...If there is statutory authority for the guaranties, absent specific language to the contrary such guaranties would constitute obligations of the United States as fully backed by its faith and credit as would be the case were those terms actually used."

In U.S. Op. Off. Legal Counsel 262, 1982 WL 170697 (O.L.C.), the Attorney General says "It has long been the position of the Attorney General that when Congress authorizes a federal agency or officer to incur obligations, those obligations are supported by the full faith and credit of the United States, unless the authorizing statute specifically provides otherwise."

An example of where Congress expressly provided discretion to limit the guarantee can be seen in P.L. 107-42 (Air Transportation Safety and System Stabilization Act).

> Sec. 107 (2) reads "FEDRAL CREDIT INSTRUMENT – The term "Federal credit instrument" means any guarantee or other pledge by the Board issued under section 101(a)(1) to pledge the full faith and credit of the United States

> to pay all **or part of any of** the principal of and interest on a loan or other debt obligation issued by an obligor and funded by a lender."

In establishing the regulations for ATSB, the Board used the discretion that Congress provided under §107 (2) to limit guarantees to less than 100% of the principal and interest (see 14 CFR §1300.14).

There seems to be very little ambiguity in the statutory understanding of "full faith and credit" either by Congress or by the Attorney General. To suggest that the specific statutory language of §1702(j) referencing "full faith and credit" with respect to principal and interest can be further limited beyond the specific limiting statutory language of §1702(c) seems entirely inconsistent with the historical use and understanding of this language. In fact, this would require one to assume that an agency or officer, authorized by Congress to incur an obligation, has the independent authority to determine the quality or quantity of the guarantee different from any specific limiting language. This presumption has been rejected by the Attorney General and was cited in U.S. Op. Off. Legal Counsel 262, 1982 WL 170697 (O.L.C).

***Conditional Commitment***

The Final Rule definition of "Conditional Commitment" (§609.2) contains the provision that "Provided that the Secretary may terminate a Conditional Commitment for any reason at any time prior to the execution of the Loan Guarantee Agreement; and Provided further that the Secretary may not delegate this authority to terminate a Conditional Commitment."

In Federal credit programs, and in the private financial markets for debt and equity, fulfillment of agreed upon conditions precedent is the legal standard for removing any conditionality to an agreement. §502(4) of the Federal Credit Reform Act reads:

> "The term "loan guarantee commitment" means a binding agreement by a Federal agency to make a loan guarantee when specified conditions are fulfilled by the borrower, the lender, or any other party to the guarantee agreement."

While it might be argued that absent language providing the Secretary with the unilateral right to terminate the conditional commitment, the borrower would be required to pay the full amount of the credit subsidy upon the issuance of the conditional commitment, this fails to distinguish between implementing the program under §1702(b)(1) and §1702(b)(2) where the guarantee is also conditioned on the borrower paying the full cost of the obligation at closing. Further, the idea that the borrower should pay the credit subsidy at the time of the conditional commitment in order to remove Secretary's unilateral right to terminate conditional commitment exposes the taxpayer to unnecessary risk that they should not face given the time lag between conditional commitment and the satisfaction of the conditions precedent.

Providing the Secretary with the unconditional right to terminate a commitment after fulfillment of the conditions precedent introduces a very high level of uncertainty that is detrimental to the interests of the U.S. Government. This negatively impacts the perception of Federal guarantees in the financial markets not only for Title XVII, but in other programs as well. It also provides project sponsors with a unhelpful signal that despite fulfilling the conditions precedent, they may never close on the loan guarantee. This type of language discourages project sponsors from advancing eligible projects. The Executive and Congress should each be concerned about setting new standards and precedents that adversely impact their ability to execute statutes and their priorities.

***Solicitation Requirement / Competitive Evaluation / Project Limitations***

The solicitation approach creates a greater likelihood of suboptimal applications as applicants/sponsors are forced into submitting an application at the time and choosing of DOE as opposed to when they, their partners and the financial markets are in the best position to do so. A new "as-ready" approach for applicants/sponsors to submit applications should replace the current solicitation process. Applications should then be subject to a simple approval or denial consistent with the statute, rules, regulations, and policies. The achievement of commercial technology in general use should serve as the programs definitive end-date for a given technology as opposed to the current arbitrary restrictions placed on loan guarantee authority levels.

§609.3 of the Final Rule requires DOE to issue a solicitation before moving forward with other parts of the loan guarantee process, including application, evaluation and issuance. This section also limits a project sponsor to one project per technology. §609.7 subjects each application to a competitive evaluation process. These requirements are inconsistent with the statute and Congressional intent of Title XVII, the "borrower pay" option selected under §1702(b)(2), and the intent to get technologies into "general use."

It is helpful to frame these issues in the context of all other Federal credit programs, where the U.S. Government is directly paying for the appropriation of the credit subsidy with taxpayer funds. Under the traditional approach, there is a finite amount of monies available to support the credit subsidy and administrative expenses of the program and therefore a finite amount of loan guarantee authority. In this traditional approach to Federal credit programs, where the appropriations are made with U.S. Government funds and specifically limited, it is entirely appropriate to establish the solicitation and competitive evaluation process as a way of allocating scarce resources.

However, in Title XVII, Congress recognized that the statutory purposes for establishing the loan guarantee program, the array of clean energy technologies that the legislation seeks to commercialize, and the considerable amount of project dollars necessary to successfully implement Title XVII across these technologies, likely

represented appropriation requirements beyond the available resources of the U.S. Government given the legitimately competing budget priorities. Faced with this, Congress chose an appropriation mechanism that is unprecedented in Federal credit programs through §1702(b)(2), which provided that the appropriation required could be met by a contribution from the borrower, with the borrower paying the full cost of the obligation as measured by the Federal Credit Reform Act. The "borrower pay" mechanisms in §1702(b)(2) and §1702(h) statutorily provide the appropriations necessary for both the credit subsidy and the administrative expenses required to evaluate and execute the program subject to the time limitation that a technology is considered in "general use" and the project sponsor's willingness to pay for the credit subsidy.

The limitation on a sponsor to one project per technology is also inconsistent with the statutory purposes of Title XVII which are to commercialize clean energy technologies that reduce greenhouse gas emissions. Title XVII recognizes that the private sector will not fund the targeted technologies on its own and therefore it is in the U.S. Government's interest to participate in its funding until the market failure is corrected. Some of the technologies supported by Title XVII require very large capital commitments for carbon free base load capacity and involve a limited number of uniquely and highly qualified operators that are subject to a high degree of regulation. The current prohibition is inconsistent with the statutory and congressional intent of Title XVII, impedes a technology from becoming a commercial technology in general use, and may result in the highest quality sponsors limited to one project with a given technology or proposing multiple technologies for their generation fleet that add complexity and costs unnecessarily and in ways that are reminiscent of acknowledged mistakes from the 1970's and 1980's.

***Applicant***

The Final Rule definition of "Applicant" (§609.2) limited applicants to non-Federal entities. There is at least one Federal corporation that is a significant provider of existing nuclear and hydroelectric generation capacity and for whom the credit policies of the U.S. Government have been to direct their borrowings to the private sector subject to a statutory debt ceiling. As an existing high quality operator with potential projects that meet the statutory intent and purposes of Title XVII, and given that statute was not written in such a way to specifically exclude them, it would seem that the Final Rule should not be written in such a way to do so either.

***Credit Subsidy Cost***

As a result of the Final Rule requirement to use the Federal Financing Bank where DOE is guaranteeing 100% of the guaranteed obligation, the definition of "Credit Subsidy Cost" (§609.2) should be amended to include the "cost of a direct loan" in those cases where the Federal Financing Bank is the lender. In accordance with §505(c) of the Federal Credit Reform Act and OMB Circular A-11 §185.3(d) and (m), guaranteed loans financed by the Federal Financing Bank are treated as direct

loans. The meaning of the "credit subsidy cost" in the case of a direct loan is covered under §502(5)(B) of the Federal Credit Reform Act and OMB Circular A-11 §185.3(f).

**Loan Guarantee Authorization Level Issues**

Under the "borrower pay" provision of §1702(b)(2), there is no specific ceiling on the level of loan guarantee authority because the borrower is paying the full cost of the obligation as calculated by the Federal Credit Reform Act. The insertion of maximum limits on loan guarantee authority in Appropriation Acts is a product of two factors. The first is that it represents standard operating procedure for OMB in the traditional Federal credit programs that rely on the U.S. Government to pay for the credit subsidy costs under their guidance provided in OMB Circular A-129 (Appendix A (II)(3)(e)) which reads:

> "Maximum amounts of direct loan obligations and loan guarantee commitments should be specifically authorized in advance in annual appropriations acts, except for mandatory programs exempt from the appropriations requirements under Section 504(c) of the Federal Credit Reform Act of 1990."

The above guidance under OMB Circular A-129 is often referred to as longstanding Federal credit policy and the intent clearly makes sense within the context of the Federal Credit Reform Act where the U.S. Government and the taxpayer are funding the credit subsidy for a given program and that level of credit subsidy will, by definition, only support a maximum amount of loan guarantees. However, in the only Federal credit program where Congress clearly gave an alternative to a taxpayer funded appropriation for credit subsidy, implementation of this guidance in the "borrower pay" model is inconsistent with the statute and Congressional intent and impedes the goals of Title XVII.

The second factor is that by inserting maximum loan guarantee limits in Appropriation Acts, OMB achieves direct control over a critical component to a successful Title XVII program that Congress uniquely provided in the "borrower pay" model.

DOE and OMB should eliminate the current approach of establishing arbitrary dollar limits for loan guarantees on different technologies. The current approach is not only inconsistent with the "borrower pay" appropriation model and the standard for commercial technologies in "general use", it harms the U.S. Government's ability to incent sponsors and third-party providers of capital to invest in new technologies when they consider the cost of each technology, the number of projects needed for a given technology to become a commercial technology as defined, and the amount of loan guarantee authority arbitrarily allocated in the current approach.

The U.S. Government should acknowledge that under the "borrower pay" appropriation mechanism authorized in Title XVII and implemented for the loan guarantee program, the total amount of potential loan guarantees will be dependent on:

1. the amount of time before a technology becomes a commercial technology in "general use";
2. the number and quality of applications/applicants and their willingness to pay the required credit subsidy and application fees;
3. the ability of the applicants to meet the statutory requirements and rules established under Title XVII; and,
4. the success of the program in achieving the policy objectives of the U.S. Government.

This approach is consistent with the statute and Congressional intent of Title XVII. It also provides applicants, sponsors, financiers, contractors, third parties that provide other financial or risk support, and other stakeholders with clarity that does not exist today and which will assist in advancing credible projects.

**Federal Credit Reform Act of 1990 Implementation**

Historically, the U.S. Government pays for the cost of credit subsidy directly with taxpayer funds. The one significant exception to this is in Title XVII where Congress specifically authorized the borrower to pay "in full for the cost of the obligation". The vast majority of pre-crisis Federal credit is extended in homogeneous transactions characterized by high volumes and relatively low dollar amounts, concentrated in housing, education, rural development and small business. Because the U.S. Government pays for the credit subsidy costs of these transactions, the mechanics of the calculation and the underlying assumptions used by OMB are of less import to the borrower. As a result, OMB makes a number of simplifying assumptions which may be appropriate for the U.S. Government when broadly seeking to implement the purposes of Federal Credit Reform Act. However, this approach can be quite costly to the borrower when the transactions themselves are highly customized and part of a unique self-pay program. As a result, it is very important that in implementing the Federal Credit Reform Act, OMB and DOE do so in a manner that is more literally faithful to the language of the statute and that recognize the highly customized and unique nature of each project.

**Summary**

In summary, Title XVII is a very powerful policy tool that provides a means to achieve the priorities and policies of the President and Congress pertaining to jobs, the economy, clean and secure domestic energy capacity, and the environment. It does so through a clean energy infrastructure build that is fully funded by the private sector. This build will also be the engine of growth in the investments that develop our domestic supply chain manufacturing base in supporting industries such as iron and steel. The key to all of this is operationalizing Title XVII. The President and his Administration can accomplish these critical objectives by exercising their discretion to amend the Final Rule and to provide direction to OMB, DOE and Treasury on the operational execution of this Federal credit program as well as his policies and priorities. I am pleased to answer any questions that you may have.

Mr. KUCINICH. Mr. Guith, please proceed.

**STATEMENT OF CHRISTOPHER GUITH**

Mr. GUITH. Thank you, Chairman Kucinich, Ranking Member Jordan, and thank you for the opportunity to contribute to this discussion today. I serve as the vice president for policy and the managing director at the Institute for 21st Century Energy, an affiliate of the U.S. Chamber of Commerce. The Chamber is the world's largest business federation, representing the interests of more than 3 million businesses and organizations of every size, sector and region.

The underlying issue presented at this hearing is a valid one: Is the Federal Government properly balancing the protection of the American taxpayers with its joint responsibility to improve our Nation's energy security?

I think it is important to remember how this program came to exist over the past 4 years. The idea of a loan guarantee program originated in Congress with the intent to accelerate private investment into new and clean energy technologies. It was a unanimous, bipartisan and bicameral voice of the floor conference managers that ensured inclusion of the loan guarantee program in EPAct, the Energy Policy Act of 2005, fully acknowledging the importance of this program to the building of new nuclear facilities.

This program initially elicited skepticism from senior leaders of the Bush administration. Frankly, many had doubts about whether the government possessed the necessary experts or understanding of the capital markets to sufficiently protect the taxpayer. However, building on the Federal Credit Reform Act and OMB guidance, DOE sought to create a program centered around a rigorous review of proposed projects that would utilize every possible resource to minimize taxpayer exposure.

DOE spent the next 3 years at the loan guarantee office, staffing it with esteemed subject matter experts who had spent entire careers in project finance, risk mitigation and lending. They utilized the expertise of credit agencies, commercial lenders, engineering contractors and legal consultants, to name a few, also producing the final rule this past December. Spanning two administrations, DOE, the Department of Treasury and OMB all exerted significant input and oversight into the evolution of the final rule.

Additionally, Congress has played, as this hearing demonstrates, and continues to play a significant role by way of authorization and oversight. In fact, many senior congressional leaders have taken issue with the amount of time it has taken to begin issuing guarantees, which I think is a testament to the careful and deliberate nature underpinning the implementation of this program.

In measuring taxpayer risk, I think it is very important to acknowledge and understand the magnitude of risk a company accepts when it decides to build a new reactor. Even with a Federal guarantee, each company understands that if a new project were to actually default, it would likely be the demise of that business. When a company does make a decision to build a new reactor, it will not be until it has completed an exhaustive review of its own risk, which by rule is greater than the government's, and has de-

termined that risk to sufficiently minimize to effectively, as has been stated before, bet the company on the project.

The Federal Government has a greater responsibility to Americans than just to minimize their exposure to risk. It must also craft and implement broader policies that further the taxpayers' interest, while also mitigating risk.

Energy touches on every single business and household every day, and fostering the deployment of clean-energy technologies is a major component of fulfilling the government's obligation. And the loan guarantees are an integral tool in doing this.

To date, the Nuclear Regulatory Commission has received a net of 26 license applications to build new nuclear units. While the first license is not expected to be issued until next year, industry has already invested in excess of $5 billion in preparation of building new reactors and generated more than 15,000 new jobs. If all 26 of these proposed reactors are built, we estimate that as many as 240,000 direct and indirect jobs will be created by 2030, jobs paying about 36 percent above the local average.

Nuclear plants each purchase $430 million in goods and services from the surrounding community and provide $40 million in salaries and nearly $100 million in tax revenues. That is each unit or each plant. This is one of the primary reasons for nuclear power—for nuclear—why nuclear power polls highest in communities that already host nuclear facilities. And it is worth mentioning that the Nation's support for nuclear power has climbed to 62 percent in Gallup's annual survey, the highest mark since it began asking the question in 1994.

While the legislative and regulatory focus in Washington continues to be on greenhouse gases, it is important to acknowledge that nuclear power not only emits no greenhouse gases, it emits no hazardous air emissions at all. Other countries are well aware of the economic and environmental benefits of nuclear power; 55 reactors today are currently under construction around the world in 13 countries with another 140 planned in the very near future.

The International Atomic Energy Agency estimates that there could be up to 25 nations with operating reactors by 2030 that do not currently have a nuclear program, yet this country hasn't licensed the operation of a new reactor in over 30 years. Many opponents of nuclear power seize on announcements of other countries making investments in renewable power generation, but usually fail to note that these investments are but a fraction of what the world community is making in new nuclear generation.

So what is it that makes—so what is it that these countries know that the United States seems to be missing? These countries realize that nuclear power must play an increasing role in meeting projected increases in the demand for power and reducing greenhouse gas and hazardous air emissions, and doing so in an efficient, economical and reliable manner.

While the governments in many of these countries directly finance the construction of the reactors, we rely predominantly on investor-owned utilities as well as municipal and cooperative ventures to do it. However, without a Federal loan guarantee program to help secure financing for the first bunch of these new reactors,

we will likely not see enough nuclear generation to even make up for the lost generation of retiring reactors in the next 30 years.

It has become fashionable to argue that the United States is missing the proverbial boat on the clean energy revolution around the world. While it is almost never this speaker's intention to include nuclear power in this mix, they are correct that every year that goes by, where we debate whether to support new nuclear builds, we are missing out on the largest component of the global clean energy market.

Thank you.

[The prepared statement of Mr. Guith follows:]

Statement for the Record of
Christopher Guith
Vice President for Policy & Managing Director
Institute for 21st Century Energy
U.S. Chamber of Commerce

United States House of Representatives
Committee on Oversight & Government Reform
Subcommittee on Domestic Policy

Tuesday, April 20, 2009

Chairman Kucinich, Ranking Member Jordan, and members of the Subcommittee, thank you for the opportunity to contribute to this discussion on federal loan guarantees for new nuclear power facilities, a crucial component of existing federal energy policy.

I am Christopher Guith, the Vice President for Policy & Managing Director of the Institute for 21st Century Energy (Institute), an affiliate of the U.S. Chamber of Commerce. The U.S. Chamber of Commerce is the world's largest business federation, representing the interests of more than three million businesses and organizations of every size, sector and region.

The mission of the Institute is to unify policymakers, regulators, business leaders, and the American public behind common sense energy strategy to help keep America secure, prosperous, and clean. In that regard we hope to be of service to this Committee, this Congress as a whole, and the administration.

The underlying issue presented at this hearing is a valid one: Is the federal government properly balancing the protection of American taxpayers with its responsibility to improve our nation's energy security? I think it is crucial that Congress ensure the tax dollars coming from America's businesses and citizens are spent wisely and invested in a cogent and responsible manner that furthers the common economic and security interests of our Country.

For many years, there has been consensus in Congress, and across the nation, that a comprehensive U.S. energy strategy would increase our competitiveness, grow our economy and create jobs, and promote greater energy security through reliable, affordable, and diverse sources of energy. While Congress may not always agree on the methods to achieve this consensus goal, the topic of this hearing, federal loan guarantees for new nuclear projects, is an instance where overwhelming bipartisan leadership and support have been generated.

History of the Loan Guarantee Program for Innovative Energy Technologies

It is important to remember how this program came to exist over 4 years ago. I had the unique experience of first serving as one of the Department of Energy's (DOE) lead representatives

during negotiations of the Energy Policy Act of 2005 (EPAct), which created this loan guarantee program. After enactment I then had the privilege of serving as a senior appointee in DOE's Office of Nuclear Energy. Through my years of service in the Bush administration, I was a first hand participant throughout the Congressional creation of the loan guarantee program and then played a role in its implementation.

The loan guarantee program originated in Congress. The intent was to create a policy mechanism that would significantly accelerate private sector investment into new and clean energy technologies. The Bush administration was silent on the proposal throughout the debate of EPAct. It was the unanimous, bipartisan, bicameral voice of the four Conference Managers that ensured inclusion of the loan guarantee program in EPAct. While Title 17 of EPAct created a loan guarantee program for all new technologies that met the requisite qualifications, those Conference Managers fully understood the importance of this program to begin building new nuclear facilities.

I would also note that this program initially elicited skepticism, or even reluctance, from senior leaders in multiple agencies of the administration. Frankly, many had doubts about whether the federal government possessed the necessary experts or understanding of capital markets to sufficiently protect the taxpayer. DOE had overseen the default of a large loan guarantee more than two decades before and there were concerns about whether it could implement a program on this scale while adequately protecting the taxpayer's interest.

However, much had changed since the default of the Great Plains Synthetic Fuel plant in 1984. Congress passed the Federal Credit Reform Act of 1990 (FCRA) that created a series of protections to minimize potential taxpayer liability when federal loan guarantees were issued. Building on FCRA, and Office of Management and Budget (OMB) guidance under FCRA, DOE sought to create a program centered around a rigorous review of proposed projects that would utilize every possible resource to minimize taxpayer exposure.

Following EPAct's enactment in August 2005, DOE spent the next three years overseeing the standing up of the loan guarantee office, staffing it with esteemed subject matter experts who had spent entire careers in project finance, risk mitigation, and lending. Most of the initial employees had spent significant time at other agencies that finance energy projects using loan guarantees. This accomplished staff began utilizing the expertise of credit agencies, commercial lenders, engineering contractors, and legal consultants to name a few. These experts, along with legal counsel, worked together to produce the final rule that was issued last December.

Spanning two administrations, DOE, the Department of Treasury, and OMB all exerted significant input and oversight into the evolution of the final rule. Additionally, Congress has played, and as this hearing demonstrates, continues to play, a significant role by way of its authorization and oversight roles. Many senior Congressional leaders have taken issue with the amount of time it has taken to begin issuing guarantees, which is a testament to the careful and deliberate nature underpinning the implementation of this program.

The federal government manages a loan guarantee portfolio totaling $1.2 trillion exposing the taxpayer to relatively little risk. In fact, these programs collectively generate revenue for the

government because they so effectively minimize risk exposure, requiring significantly less expenditure to cover defaults than revenue received by way of credit subsidy costs and other fees. DOE's loan guarantee program is designed with the same risk mitigation measures. U.S. taxpayers can have great confidence this program will improve our energy security while adequately protecting taxpayer liability.

It is important to acknowledge and understand the magnitude of risk a company accepts when it decides to build a new reactor. Even with a federal loan guarantee, each company understands that if a new project were to default, it would likely be the demise of that business. It is possible that the government may not be able to recoup the entire cost of guaranteeing a loan that ultimately defaults, but the business will recoup nothing unless and until the government is made whole. This is precisely why these companies are approaching the new build decision so cautiously. When a company does make a decision to build a new reactor, it will not be until it has completed an exhaustive review of its own risk, which is by rule greater than the government's, and has determined that risk is sufficiently minimized to effectively bet the company on the project.

Balancing the Federal Government's Roles

It is true that issuing any loan guarantee exposes the taxpayer to greater risk than if none was issued. However, the federal government has a greater responsibility to Americans than to just minimize their exposure to risk. It must also craft and implement broader policies that further the taxpayer's interest, while also mitigating risk. The pervasiveness of energy touches every single business and household every day. The country looks to the federal government to develop and implement a national energy strategy that ensures we do not repeat the mistakes of the past and can look forward to a brighter, more secure energy future. Fostering the deployment of clean energy technologies is a major component of fulfilling the government's obligation and the DOE loan guarantees are an integral tool in doing this in a technology neutral fashion.

Businesses have a wide choice of technologies that are eligible for a DOE loan guarantee. Each power provider, working with its public utility commission, shareholders, and other stakeholders, makes specific decisions as to how it will meet future demand for electricity based on the environmental and economic conditions each faces. In light of those considerations, more than 20 power companies have suggested they are considering new nuclear power to meet these obligations. When one considers the economic benefit that a new reactor creates, this should be no surprise.

Benefits to the Economy

The Nuclear Regulatory Commission has received 26 license applications to build new nuclear units. While the first license is not expected to be issued until next year, industry has already invested more than $4 billion in preparation of building new reactors. Moreover, these activities have already generated more than 15,000 new career opportunities within the industry.

If all 26 of those proposed reactors are built, it is estimated that 240,000 direct and indirect jobs would be created by 2030. On average these jobs pay about 36% above the local average. As

Congress continues to focus on job creation, it should be noted the nuclear industry is already creating jobs, and with a functioning loan guarantee program in place, it will continue to do so. This is especially true up front during the construction phase of a new unit when as many of 4,000 construction jobs will be created at each site.

Nuclear plants are also staples of local and regional economies, purchasing $430 million in goods and services from the surrounding community. The majority of this goes to small businesses, which in turn employ even more of the local population. Additionally, a single plant provides approximately $40 million in salaries, benefiting the local economy even more. On average, a plant also provides nearly $100 million in tax revenues to the federal, state, and local governments. These significant economic contributions are one of the primary reasons support for nuclear power polls highest in communities that already host nuclear facilities. It is worth mentioning that national support for nuclear power has climbed to 62% in Gallup's annual survey, the highest mark since it began asking the question in 1994.

Environmental Benefits

While the economic benefits nuclear power provides are tremendous, they are rivaled by the environmental benefits nuclear power provides to its surrounding communities, the nation, and the world. The production of electricity with a nuclear reactor produces zero greenhouse gas emission. Nuclear power is by far the largest source of emissions-free electricity in the United States, accounting for 72% of all clean generation. In 2008, the 104 reactors in the United States prevented nearly 700 million metric tons of carbon dioxide emissions—an amount equivalent to that of nearly all passenger cars. While the legislative and regulatory focus in Washington continues to be on greenhouse gases, and it is important to acknowledge that nuclear power not only emits no greenhouse gas emissions, it emits no hazardous air emissions at all.

In announcing the first conditional nuclear power loan guarantee, President Obama stated, "[I]n order to truly harness our potential in clean energy…we're going to have to build a new generation of safe, clean nuclear power plants in America."

Global Competitiveness

Other countries are well aware of the economic and environmental benefits of nuclear power. These are two of the primary reasons 54 reactors are currently under construction around the world in 13 countries, with another 142 planned in the near future according to the World Nuclear Association. The Director of the International Atomic Energy Agency recently estimated that by 2030, there will be between 10-25 nations with operating reactors that do not currently have a nuclear program. Yet in this country we haven't licensed the operation of a new nuclear reactor in over 30 years. Many opponents of nuclear power seize on announcements of other countries making new investments in renewable power generation, but usually fail to note that these investments are but a fraction of what the world community is making in new nuclear generation.

What is it that these countries know that the United States seems to be missing?

I would suggest these countries realize that nuclear power must play an increasing role in meeting projected increases in demand for power, in reducing greenhouse gas and hazardous air emissions, and doing so in an efficient, economical, and reliable manner. While the federal governments in many of these countries directly finance the construction of new reactors, in the United States we rely predominantly on investor-owned utilities, as well as municipal and cooperative ventures to do it. However, without a federal loan guarantee program to help secure financing for the first bunch of these new reactors, we will likely not see enough new nuclear generation to even make up for lost generation of retiring reactors over the next thirty years.

Countless studies over the past five years from places like MIT, the National Academies, the Electric Power Research Institute, the General Accounting Office, and the Energy Information Agency have all demonstrated that the United States cannot meet projected increases in demand for power in a carbon constrained universe without a significant increase in nuclear generation. Nuclear generation is already competitive in the current environment, and as these entities have shown, it will be even more competitive as countries take increasing steps to reduce emissions.

It has become fashionable to argue that the United States is missing the proverbial boat on the clean energy revolution around the world. While it is almost never the speaker's intention to include nuclear power in this mix, they are correct that every year that goes by while we debate whether to support new nuclear builds, we are missing out on the largest component of the global clean energy market.

The global nuclear market is robust and growing. As demand for reactor components and skilled labor increases, more and more countries are making the long-term investments to support this market. They are making these investments because they know the momentum is more likely to grow than diminish and by supporting this global market they are realizing the economic benefits of exporting goods, the environmental benefits of reduced emissions, and the energy security benefits of being more self-reliant for their electricity production. They are investing tens of billions of dollars in the United States betting that the country that first harnessed the power of the atom for electricity will soon see the proverbial light again. For the sake of the nation's future, I hope their bets pay off.

Mr. KUCINICH. I thank the gentleman and each member of the panel. It is much appreciated, your presence here. Having had the chance to review your testimony, I have to say it is greatly valued, and I think it will be very helpful for members of this subcommittee to read and review carefully the testimony of each and every individual here.

I would like to go to the members of the panel now and ask what is your opinion of a credit subsidy fee that is secret, not disclosed to the taxpayers?

Mr. Cooper.

Mr. COOPER. Well, it is quite remarkable that this administration, which had prided itself on transparency and open government, would come forward and suggest that something as important as the liability to which taxpayers are being exposed will be a trade secret between the Department of Energy and those utilities. As Mr. Bradford pointed out in theory, the Public Service Commission might get a chance to look at that or might not. And that will influence the rates people pay. But it would seem to be a desire to hide the truth, which is that the taxpayer is being hosed in these transactions.

Mr. KUCINICH. Mr. Sokolski.

Mr. SOKOLSKI. I don't know. I would ask for my money back. I wouldn't make the loan. You have to know that. You are the executors of this effort as it is. I mean, we have—we are not talking about doing this or not doing this. We are asking do we do more of this. We are in the business now of doing it. I would say you need to really get the facts and figures on what we are doing before you pile on more.

Mr. KUCINICH. Mr. Caperton.

Mr. CAPERTON. There are three things that are secret now, the model that is used to calculate the credit subsidy fee, the inputs to it for each loan guarantee, and the results of the model, what that fee actually is. I can certainly see that the first of those, the model, should be made public, and the fee should likely be made public. There would certainly be trade secrets involved in what goes into the model. So I could see elements of that being kept proprietary.

Mr. KUCINICH. I studied your testimony, and you actually did a kind of reverse engineering of the Office of Budget and Management model by saying it is essentially the present-day value of the expected payouts that the government will have to make on the loan if the utility should default?

Mr. CAPERTON. That's correct.

Mr. KUCINICH. Mr. Scott.

Mr. SCOTT. It is actually unnecessary for them not to disclose it, because the applicant will end up disclosing it in SEC filings anyway. So it is going to become public, assuming that they are an SEC applicant. And if you're doing that, you might as well do it for all of the projects.

Mr. KUCINICH. It is an interesting point that you raise, and that is if OMB says it is proprietary, does the SEC give the applicant a waiver on that?

Mr. SCOTT. I doubt that they would, and I don't think that any of the companies would——

Mr. KUCINICH. It is an interesting question.

Mr. Guith.

Mr. GUITH. I think it is important to note that Congress does have access to this. The appropriators who create the authorization for this have asked for annual reports, and they are fully informed as to what this is. And I'm sure that—I won't speak on behalf of the Department, but when I was there, we never would not disclose that information to the Congress.

Second, I think the model itself should definitely be disclosed. I think that created much consternation over the last 2 years that nobody in any industry could figure out what OMB was doing. And frankly, those of us who worked in other agencies couldn't figure out what OMB was doing, and Congress certainly couldn't figure out what OMB was doing.

Mr. KUCINICH. Let me ask you. Bondholders and shareholders, is there a legitimate reason for keeping the credit subsidy cost from them?

Mr. GUITH. The ultimate cost itself?

Mr. KUCINICH. The credit subsidy cost. Should bondholders and shareholders have a right to that information?

Mr. GUITH. This is one of those "when did you stop beating your wife" questions, because—absolutely not. Everything should be transparent. But the question is, is what does a specific number in addition to other information actually lead you to? I mean, this issue has come up more in the nonnuclear loan guarantees than it has in the nuclear loan guarantees because as other competing power generation sponsors or applicants have gone through this process, they don't want to necessarily have their information disclosed to other competitors.

Mr. KUCINICH. Surely you recognize that this Congress has had brought before it in the last year many issues where shareholders were not adequately informed of the transactions that were being undertaken by the management of their companies. That is why I raise the issue.

Mr. GUITH. And as I said, on its face everything should be transparent. It is in what context and what other information is disclosed. And certainly in this case, Congress is fully informed as to what the number, the process is certainly as well as anyone.

Mr. KUCINICH. I can hope so.

Now, it reminds me of an old story about how we have a system of checks and balances. The administration writes the checks, and Congress doesn't know what the balance is. Now, for the panel, does the Department of Energy's track record justify public confidence in its ability to fairly and accurately price the value of the credit subsidy of loan guarantees to the nuclear industry in order to protect taxpayers from a large bailout of the nuclear power industry, and is the Department of Energy more likely to overestimate the cost of the credit subsidy, or are they likely to underestimate it?

Mr. Cooper.

Mr. COOPER. I don't think the Department of Energy has much of a record. I have been around long enough to remember the synfuels program, and we were adamantly opposed to that, the notion that the Department of Energy is substituting its judgment for the

judgment of Wall Street—it may be hiring some consultants, there are a lot of them out of work these days—to help them work through some of these numbers.

From my point of view, the program was a small program. They should have left bad enough alone. The administration has thrown a lot more money into the pot. We hear rumors of unlimited loan guarantees. In the end, this could make the synfuels program look like a walk in the park.

Mr. KUCINICH. Mr. Sokolski, do you want to respond to that?

Mr. SOKOLSKI. Synfuels, the breeder reactor, the mandates for ethanol where they miscalculated suggests someone needs to come up with the alternative record where they have done well.

I think the other thing is my understanding is the number of analysts working due diligence within DOE is a pale reflection of the numbers you would find in a competent, reputable large bank. Now, I don't think a reputable large bank has been doing so well. So I just wonder.

Final point. There could be a conflict of interest. The DOE was intimately involved in not just promoting, but helping to pay for the design of the reactors we are talking about seeing built in the case of Westinghouse. So I don't think that is the place you want to have your analysis done.

Mr. KUCINICH. Thank you.

I would like to just get brief answers from the rest of the panel, and then we are going to go to Mr. Jordan.

Mr. CAPERTON. This is a unique program. So I don't know how much previous DOE experience is going to be effective in judging their ability on this one. But the Congressional Budget Office has clearly stated that they think DOE will underestimate the cost of these loans by at least 1 percent for a variety of reasons, including that utilities who are borrowing this money, who are applying for the guarantees, if they think it is a bad deal, they won't take the guarantee. So only borrowers who think it is a good deal will take the guarantee.

Mr. KUCINICH. Thank you.

Mr. Scott.

Mr. SCOTT. In this particular program today, we don't have much of a record, and we won't for a number of years, with respect to any closing on a nuclear because the loan guarantee actually won't close for 2 to 3 years before they fulfill the conditions precedent. And it is actually at that point that OMB calculates the credit subsidy.

Historically, if you go back to other programs that are targeted toward corporate America, the ATSB after—the airline program after 9/11, OMB had estimated and CBO had estimated between a 30—or a 30 and 35 percent credit subsidy rate at the—we ended up making six loan guarantees. At the end of the program, we netted about $300 billion in fees after three technical defaults and one $20 million compromise. So that brings the credit subsidy down to a negative 18 percent.

So the track record under the Federal Credit Reform Act is fairly good at predicting the costs. I'm actually less concerned about OMB's ability to accurately measure the cost in some of the other participants.

Mr. KUCINICH. Finally, Mr. Guith.

Mr. GUITH. I agree that since most of the examples that have been cited on this panel have been prior to the passage of FCRA, which was 1990, which has completely reshaped the loan guarantee process agency—or governmentwide, whether it is USDA, whether it is Eximbank, whether it is DOE.

Mr. KUCINICH. I recognize Mr. Jordan.

Mr. JORDAN. Thank you, Mr. Chairman.

I'm just interested in the panel, particularly our first three—you know, I think it is kind of interesting that the Chamber supports the program, but the academic and the two think tanks are opposed to it. Not something you always see. And the Bush administration individual, I believe, is somewhat supportive based on what I gathered. And I understand various reasons and things associated with all of that, but for our first three in particular who talked about how bad this program was and shouldn't be in it, and market forces should be at work, and etc., where are you at on taxpayer assistance subsidies, loan guarantees, whatever, for other areas of energy, other resources? I think Mr. Sokolski's statement was—you said that they misdirect resources. So do you support subsidies for ethanol, biodiesel, solar panel?

We will start with Mr. Cooper, and we will just go down the whole panel.

Mr. COOPER. If I could get a subsidy-free energy environment, I would take it. I would prefer to live there than in the mess I have here. But since I can't—and the interesting thing in the previous panel, people missed the biggest subsidy of all, which is the Price-Anderson limit on liability to the industry. And so you have the existing—you have the Federal commitment to waste, which was pointed out as a subsidy to the industry. And so you have embedded subsidies all over the place.

So I would rather talk about the principles by which subsidies should be awarded to various sectors, and the principles ought to apply to all the technologies. So, one, the public policy should target an identifiable market failure. If you can't show me the market failure, then you shouldn't—the government shouldn't be in the policy business. Let the market do it.

Two, we should have a level playing field, and we haven't had one in the energy sector for an awfully long time.

Three, the policy outcome should be very clear. And as a consumer advocate, I like least costs, I like the biggest bang for the buck. Diversity also is a good proposition. You've heard people speak to that.

Fourth, there has to be fiscal responsibility. And as I see the loan guarantee programming being rolled out, it would appear to be that the sky is the limit, especially when I have secrets about the cost.

And fifth, there has to be administrative accountability. Given that I have to live in an environment that is riddled with subsidies, I have to start making sure that they work for the public interest.

Mr. SOKOLSKI. My grandma had an expression for answering questions like that. She would say, "Enough already." We are up to our gills in this. This country is becoming a little broke. I think we need to stop. We need to stop this. We made a lot of mistakes,

in my opinion, in bailing out companies we knew were failing, and they should have maybe used a little money to let them fail gracefully, but not save them.

Two more comments.

Mr. JORDAN. No disagreement from the chairman and the ranking member on that.

Mr. SOKOLSKI. Say again?

Mr. JORDAN. No disagreement from the chairman and the ranking member on that.

Mr. SOKOLSKI. Well, there oughtn't to be amongst Americans on that. We are in trouble, sir.

Mr. JORDAN. I agree.

Mr. SOKOLSKI. Now, it seems to me—two other comments might add some value. First, when I get principled environmentalists in a room who are economists, they say things like you heard, but even further. They join with fiscal conservatives in saying subsidies, even for wind, solar, etc., will hurt their cause. And the reason why is when you put the subsidies out there, the biggest pigs, coal, nuclear, are going to not only eat the most, but they are going to set the rules in that playpen for a long time. You need to experiment. So that's the last thing you want.

The last comment. The only role for government, and it is why we have the Department of Energy—and it is a problem, because it is not a great actor, in my opinion—is that State regulations don't allow people to capture the rents associated with fuel efficiencies. And so to do R&D, you have to be out of your mind, and that is the reason the government does it. We don't do a great job of it. I think regulatory reform would go a long, long way in solving that problem.

I suppose I should close on one point. I served on a congressional commission that you put me on to prevent WMD proliferation and terrorism, and one of the things we unanimously, bipartisan, supported was we should discourage the use of financial incentives to promote nuclear power. And the reason why isn't because of problems here, but because you lose your moral authority to talk to countries like Iran, who, after all, point to us and say, "we will do the same." You want to subsidize; so do we. Who cares if it is economic? I think we should care.

Mr. CAPERTON. To clarify, we are not opposed to these loan guarantees. We are supportive of a fully functioning Title XVII loan guarantee program. Now, I think there is some characteristics that we should look at to judge whether or not a loan guarantee is effective. First, does it address a market failure? In that case we can look further. Then we want to look at exploring technologies and promoting technologies that provide clean, cost-efficient, safe energy to American consumers. There are potentially some instances where nuclear programs meet those criteria. There are certainly instances where wind and solar meet those criteria and other technologies meet those criteria.

Mr. SCOTT. Title XVII has 10 very broad categories of technologies that are eligible. If you implement the program under 1702(b)(2), which is the borrower pay provision, it is actually technology-neutral in the sense that you don't have to allocate Federal—scarce Federal dollars to any particular technology. And it is

more a function of how long does it take the technology to get into general use, which is then the——

Mr. JORDAN. But we have other subsidies that—we have the tax credit available for the ethanol industry. We have other ways that taxpayers finance other forms of energy.

Mr. CAPERTON. Sure, sure.

Mr. JORDAN. And you are supportive of—do you disagree with that, or are you opposed to that?

Mr. CAPERTON. I am here to talk about Title XVII.

Mr. JORDAN. Fine.

Mr. GUITH. We had the privilege of testifying, my boss, in front of your colleagues, in front of the Ways and Means Committee last week on fiscal policy as to—I think it was the green economy expansion. And while we certainly support fiscal policy as one of the tools, I mean, we do have to take into account where we are in the entire economic perspective, which is right now we are running record deficits and projected use over some time. And there are things, much like concessionary financing, like loan guarantees, as well as perhaps the CEDA proposal that both the House and the Senate have looked at, in addition to, as was mentioned in the previous panel, regulatory reform that can be done without any taxpayer dollars. And I think that is, especially in this resource-constrained environment, where Congress should be looking.

Mr. JORDAN. Thank you.

Thank you, Mr. Chairman.

I want to thank the panel.

Mr. KUCINICH. We are just going to go for a few more questions.

Mr. JORDAN. Fire away.

Mr. KUCINICH. OK. Thank you, Mr. Jordan, for participating.

Mr. Caperton and Mr. Scott, hypothetical. If there is a default in one of the loan guarantees relating to the construction of a nuclear power plant, such as may be caused by weak natural gas prices, the market falls apart. Could that indicate a greater likelihood that a default will occur in one of—more of the others? In other words, possible defaults may not be independent results; instead they may be interdependent on the overall—on energy markets?

Mr. CAPERTON. I'm not quite sure I follow you.

Mr. KUCINICH. We have established in the last panel that the Energy Information Agency says there is going to be weak natural gas prices for decades, relatively weak. That is—do fluctuations in the larger energy environment create consequences for these investments in nuclear power plants that actually establish a relationship between the investment in those plants and a larger energy market? Is this something that people should take heed of?

Mr. CAPERTON. I think that—I want to make sure I answer your question. The two nuclear reactors aren't necessarily connected, and a default in one shouldn't necessarily affect a default risk in another one. The underlying economics of energy markets—in this case, low natural gas prices—could certainly affect all sorts of nuclear reactors. So I would think that what causes a default in one could very well be indicative of what might cause a default in another. But the defaults themselves likely don't cause each other.

Mr. COOPER. Mr. Kucinich, let me try that, because I actually looked at that in the case of Florida at the Public Utility Commis-

sion, and if you looked at the moment when they made the decision to issue a certificate of need, there are a key series of assumptions the utility made to justify the economics of the plant. In the ensuing 2 years, three of the most fundamental assumptions changed dramatically. The cost of the plant went up, the cost of natural gas went down, and the phenomenal low growth projection evaporated.

The utility now sitting there, having committed the plant to spending hundreds of millions of dollars, now is faced with a whole new set of economic conditions, and in order to justify continuing with this project, they begin to change their 10-year plan. They start pulling out natural gas plants, because they don't need them anymore, to make room for the nuclear plant, whose economics have been undermined. They launch a campaign to oppose energy efficiency and reduce it in the integrated resource plan to make room for the nuclear reactor.

So in a 2-year period, the economics changes dramatically. And, of course, some people will say we are doing this for 20 or 30 years, but in a time of uncertainty, the one thing you want in your investment portfolio is flexibility.

Mr. KUCINICH. But in terms of energy flexibility, I just want—we have to—do we also of necessity have to factor in the time it takes to put an energy facility on line so that it melds into the overall energy supply?

Mr. COOPER. If you look at the case of Florida, the projected date when they thought they would need the reactor was 2017. When you bring in the change in demand, if you actually look at climate legislation, that same peak would not have occurred for 20 years. That means that you—what you want to do is wait before you commit to this massive project, a prudent decision that says wait; I can wait for 5 years, I can wait for 10 years. And as a prudent investor, you want things in your portfolio that give you that opportunity. And so the inherent nature of these projects with their long lead time raises their cost of capital, raises their risk, and has exactly the effect—and natural gas has exactly the effect that you suggest.

Mr. KUCINICH. I'm looking at independent variables here. For example, new technologies come in. I mean, last year the wind—the American Wind Energy Association has said that they have added about 10,000 megawatts of new wind-generating capacity in a year. Some say, "well, that is the equivalent of 10 nuclear power plants." That is an independent variable that changes markets, OK?

In the meantime, if you can move a new technology in, then you have other technologies that won't move as quickly in because of their capital-intensive nature and the time it takes to build a plant let alone repair a plant that might have a problem. So I just wondered in terms of the totality of energy markets and the variables that you have to consider, does that start to drive the risk factors of some technologies as opposed to others? In this case we are talking nuclear.

Anybody else want to try?

Mr. GUITH. Mr. Chairman, yes, it certainly does, which is why you don't see any utilities right now rushing out to build a reactor. It is still very uncertain. I think it cannot be overstated that at the end of the day, the risk that is placed upon these individual companies is so significant that they are not going to rush into it has ef-

fectively been implied willy-nilly , unless they know the demand is going to be there.

Obviously, the economic situation over the last 2 years has changed the entire energy landscape for the near term, but we still have significant projections in electricity demand in this country and certainly around the world.

And just to make one point about your—the EIA natural gas projections. I think it is important to understand what EIA does and what EIA does not do. EIA does not model based on any assumptions that are currently not in law, which is to say they are limited by rule, by congressional rule, as to what they can assume. Therefore they are going to assume that every single tax credit that exists is going to grandfather out because the law says so; that every single subsidy is going to grandfather out, which is to say that—I think you look at where Wall Street is going right now and where investment money, it is going into natural gas. It is not not going into natural gas, and it is going in there because they expect prices to increase.

Mr. KUCINICH. You raise a question about why Wall Street is not rushing in right now. And it gets into this potential of the moral hazard discussion that we had on bailouts. Now, Mr. Jordan and I both voted against the bailout. And if Wall Street looks at the risk factors here and just says, "we don't really want to go there right now"—I mean, I will tell you, from the Cleveland area we had a company by the name of the Cleveland Electric Illuminating Co., which was a top-rated company, blue chip stock. They brought in the nuclear power, and it wasn't too long, you know, within a decade or so, they started to run into serious financial trouble. Wall Street isn't taking the risk.

So what we are doing, the risk factors that are laid out here today are essentially being taken up by the taxpayers. Whether you're for nuclear power or not, we are just talking economics here, they are being taken by the taxpayers. In a constantly changing energy environment—new technology is being brought on, old ones are starting to either get renewed, energy drilling policy or the energy bill that passed. That is why this issue of transparency, the issue of trying to figure out what the government's exposure might be is not a small matter in a climate where everyone wants to know how much something is going to cost, can we make some reasonable projections, what is our exposure here.

Anybody else want to comment on that before I move on?

Mr. Scott.

Mr. SCOTT. Mr. Chairman, all of the factors that you raised, whether it is natural gas prices or other competing technologies, end up being evaluated both by the project sponsors, by DOE, by OMB, by the ratings agencies. And, you know, practically speaking, the agency may have views on assumptions about electricity prices or gas prices that are different than our project sponsors' that ultimately gets reflected in the underwriting of the project. Now, they may or may not be right. The companies may not be right. The government may not be right. But you fast-forward when—in particular around nuclear, if you think about when a loan guarantee would actually close, because they have to meet the conditions precedent, you remain 2 to 3 years away before you're going to see

an actual closing, and it is the assumptions at that closing time that are going to be relevant to the evaluation of the business plan both by the rating agency as well as by OMB on the credit subsidy side. So at the end of the day, you end up with the best information that you have when you need to make that decision and when you're actually exposing the taxpayer on the Federal loan guarantees.

Mr. KUCINICH. It is interesting because, you know, there are the familiar anchor points which we have to try to come to a level of analysis that would say, "this is our best estimate." We have started to see in the last couple of years some changes in the status. You mentioned credit rating agencies, OK? You look at the credit default swaps and some of the information that the credit rating agencies really had a responsibility to disclose, but there was a conflict. We see the latest Abacus case involving Goldman Sachs. Credit-rating agencies again come into play with raising questions about the information they are providing to the public. We see that shareholders are not being given information they were entitled to, they didn't get it, lack of transparency. We see even in this environment Congress having trouble fighting for a bill that would bring about financial reform and bring in a new measure of transparency.

So in that kind of an environment—you will have to forgive this chairman for being a little bit cautious about how much more of an exposure in a risk—highly risk-filled environment we want to provide for the taxpayers. That is why this is a very important discussion. Because I looked at your resume, Mr. Scott. You have been, as much as anybody, over all of these issues related to credit availability, credit guarantees. You know, I happen to believe that there are some cases in which it is an appropriate role. I think that R&D in particular is a great place to—that we can incentivize all kinds of possibilities for the government to start things happening. But when we—instead of buying a few implements, we buy the farm, it starts to become a little bit more problematic.

And I want to thank each of you for being here today. We have had a—excuse me.

Mr. Cummings, thanks for joining us. Do you have any questions?

Mr. CUMMINGS. Mr. Chairman, I thank you for calling the hearing, and I will submit my questions for the record.

Mr. KUCINICH. I appreciate that. The members of the committee have 5 legislative days in which to submit questions. And I would ask the members of the panel and the previous panel to please be available to respond in writing to any questions that Members may have.

Again, very impressive panel. You have really given all of us in Congress a lot to think about. And we will make sure you testimony gets widely distributed. This is the Domestic Policy Subcommittee of Government Oversight and Reform. This committee has been about nuclear loan guarantees. We will probably have one or two more hearings on this.

This committee stands adjourned. Thank you.

[Whereupon, at 4:46 p.m., the subcommittee was adjourned.]

[Additional information submitted for the hearing record follows:]

04/20/10
Spoke about by Dennis Lucred

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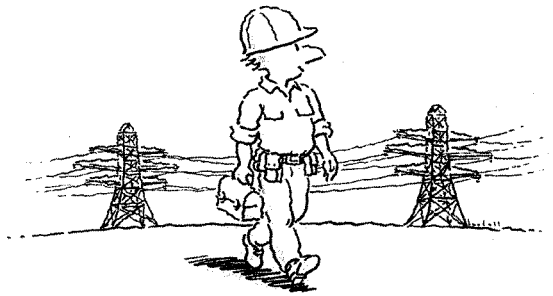

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Moody's Global

Infrastructure Finance

Special Comment

June 2009

# New Nuclear Generation: Ratings Pressure Increasing

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## Summary


- Moody's is considering taking a more negative view for those issuers seeking to build new nuclear power plants
- Rationale is premised on a material increase in business and operating risk
- Longer-term value proposition appears intact, and, once operating, nuclear plants are viewed favorably due to their economics and no-carbon emission footprint
- Historically, most nuclear-building utilities suffered ratings downgrades—and sometimes several—while building these facilities

# Nuclear Power, Energy Markets, and Proliferation

By

Henry Sokolski

When security and arms control analysts list what has helped keep nuclear weapons technologies from spreading further than they already have, energy economics is rarely, if ever, mentioned. Yet, large civilian nuclear energy programs can -- and have -- brought states quite a way towards developing nuclear weapons;[1] and it has been market economics, more than any other force, that has kept most states from starting or completing these programs. Since the early 1950s, every major government in the Western Hemisphere, Asia, the Middle East and Europe has been drawn to atomic power's allure only to have market realities prevent most of their nuclear investment plans from being fully realized.

With any luck, this past will be our future. Certainly, if nuclear power programs continue to be as difficult and expensive to complete as they have been compared to their nonnuclear alternatives, only additional government support and public spending will be able to save them. In this case, one needs to ask why governments would bother, especially in light of the security risks that would inevitably arise with nuclear power's further proliferation.. On the other hand, if nuclear power evolves into the quickest and least expensive way to produce electricity while abating carbon emissions, little short of a nuclear explosion traceable to a "peaceful" nuclear facility would stem this technology's further spread -- no matter what its security risks might be.

Adam Smith's Invisible Hand, then, could well determine just how far civilian nuclear energy expands, and how much attention its attendant security risks deserve. Certainly, if

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1. See, e.g., Albert Wohlstetter, et. al., *Swords from Plowshares: The Military Potential of Civilian Nuclear Energy* (Chicago, IL: University of Chicago Press, 1979), pp. vii-32; Matthew Fuhrman, "Spreading Temptation: Proliferation and Peaceful Nuclear Cooperation Agreements," *International Security*, Summer 2009, pp. 7-41, available at http://belfercenter.ksg.harvard.edu/files/IS3401_pp007-041_Fuhrmann.pdf; and Victor Gilinsky, et al., "A Fresh Examination f the Proliferation Dangers of Light Water Reactors," in Henry Sokolski, editor, *Taming the Next Set of Strategic Weapons Threats* (Carlisle, PA: US Army War College, Strategic Studies Institute, 2005), available at http://www.npec-web.org/Essays/20041022-GilinskyEtAl-lwr.pdf.

nuclear power's economics remain negative, diplomats and policy makers could leverage this point, work to limit legitimate nuclear commerce to what is economically competitive, and so gain a powerful tool to help limit nuclear proliferation. If nuclear power finally breaks from its past and becomes the cheapest of clean technologies, though, it is unlikely that diplomats and policy makers will be anywhere near as able or willing to prevent insecure or hostile states from developing nuclear energy programs to help them make atomic weapons.

**Nuclear Power's Past, Present, and Projected Future**

Consider nuclear power's performance over the last half century. In the early 1950s, U.S. Atomic Energy Commission Chairman Lewis Strauss trumpeted the prospect of nuclear electricity "too cheap to meter."[2] An international competition, orchestrated under President Dwight D. Eisenhower's Atoms for Peace Program, ensued between the U.S. Russia, India, Japan and much of Western Europe to develop commercial reactors. Several reactor and nuclear fuel plants were designed and built, endless amounts of technology declassified and shared world-wide with thousands of technicians, and numerous research reactors exported in the 1950s. Yet, ultimately relatively cheap, abundant oil and coal assured that only a handful of large power plants were actually built.[3]

The next drive for nuclear power came in the late 1960s just before the energy "crisis" of the early 1970s. President Richard Nixon, in announcing his "Project Independence," insisted that expanding commercial nuclear energy was crucial to reducing U.S. and allied dependence on Middle Eastern oil.[4] France, Japan, and Germany, meanwhile, expanded their nuclear power construction programs in a similar push to establish energy independence. The U.S., Russia, Germany and France also promoted nuclear power exports at the same time. Four thousand nuclear power plants were to be brought on line world-wide by the year 2000.

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2. Lewis L. Strauss, Chairman of the U.S. Atomic Energy Commission, Speech to the national Association of Science Writers, New York City, September 16, 1954.

3. On this history, see Joseph F. Pilat, editor, *Atoms for Peace: An Analysis after Thirty Years* (Boulder CO: Westview Press, 1985); Richard Hewlett and Jack Holl, *Atoms for Peace and War, 1953-1961: Eisenhower and the Atomic Energy Commission* (Berkley CA: University of California Press, 1989);

4. President Richard Nixon, "Special Message to the Congress Proposing Emergency Energy Legislation," November 8, 1973, available at http://www.presidency.ucsb.edu/ws/index.php?pid=4035.

But, market forces -- coupled with adverse nuclear power plant operating experience -- pushed back. As nuclear power plant operations went awry (e.g., fuel cladding failures, cracking pipes, fires and ultimately Three Mile Island), spiraling nuclear construction costs and delays, as well as the disastrous accident at Chernobyl, killed the dream. More than half the nuclear plant orders in the U.S. were cancelled and almost ninety percent of the projected plants globally – including a surprisingly large number of proposed projects in the Middle East -- were never built.[5]

Today, a third wave of nuclear power promotion is underway buoyed by international interest in reducing greenhouse gas emissions and national concerns in enhancing energy security at least as measured in terms of reliance on oil. The nuclear industry in the U.S. has been lobbying Congress to finance the construction of more than $100 billion in reactors with federal loan guarantees.[6] President Obama has responded by proposing $36 billion dollars in new federal loan guarantees for nuclear power.[7] Other governments in Asia, the Middle East, and Latin America have renewed their plans for reactor construction as well. Even Europe is reconsidering its post-Chernobyl ambivalence with nuclear power: Finland, France, Italy, and Eastern Europe are again either building or planning to build power reactor projects of their own. Germany and Sweden, meanwhile, are reconsidering their planned shutdown of existing reactors.

In all this, the hands of government are evident. Certainly, if nuclear power were ever truly too cheap to meter, could assure energy security, or eliminate greenhouse gas emissions economically, private investors would be clamoring to bid on nuclear power projects without governmental financial incentives. So far, though, private investors have kept from putting any of their own capital at risk. Why? They fear nuclear energy's future will rhyme with its past. In the 1970s and 1980s, new nuclear power projects ran so far behind schedule and over budget, most of the ordered plants had to be cancelled. Even those that reached completion were financial losers for their original utility and outside investors, and the banking sector became wary.

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5. See, Yves Marignac, *Nuclear Power, the Great Illusion: Promises, Setbacks and Threats*, October 2008, p. 42, available at http://www.global-chance.org/spip.php?article89 and the Testimony of Thomas B. Cochran before the Senate Committee on Energy and Natural Resources, Subcommittee on Energy Research and Development, June 8, 1977, available at http://docs.nrdc.org/nuclear/files/nuc_77060801a_23.pdf.

6. See Simon Lomax, "Nuclear Industry 'Restart' Means More Loan Guarantees," *Bloomberg.com*, October 27, 2009, available at http://www.bloomberg.com/apps/news?pid=20601072&sid=aR1MVERYEgAs.

7. See U.S. Office of Management and Budget, "The Federal Budget Fiscal Year 2011: Creating the Clean Energy Economy of Tomorrow," The President's Budget: Fact Sheet, available at http://www.whitehouse.gov/omb/factsheet_key_clean_energy/

In this regard, little has changed. In Finland, a turnkey reactor project has been led by the French manufacturer AREVA, in part as a way to demonstrate just how inexpensively and quickly new nuclear plants could be built. The project is now more than three years behind schedule and at least 80 percent over budget. Finland says AREVA is to blame for the cost overruns and construction delays. AREVA blames Finland and has threatened to suspend construction entirely in hopes of securing a more favorable rate of return.[8]

Meanwhile, in Canada, the government of Ontario chose to avoid this fate. It put its nuclear plans to build two large power plants on hold after receiving a $26 billion bid that was nearly four times higher than the $7 billion the government originally set aside for the project only two years before.[9]

In the U.S., the estimated cost of two reactors that Toshiba was planning to build for NRG Energy and the city of San Antonio recently jumped from $14 billion to $17 billion. Consequently, the city board delayed its approval of $400 million in financing for the project, sued NRG, and reduced its share of the project from roughly 50 percent to less than 8 percent.[10] [High-end estimates of the full costs to bring a new nuclear plant on line reflect this pattern of cost escalation, as San Antonio's experience has been replicated in many other places. Estimated construction costs (exclusive of financing) for an installed kilowatt have jumped from a little over 1,000 dollars in 2002 to well over $7,000 in 2009 (see the range of rising estimates over the last decade in Figure 1 below):

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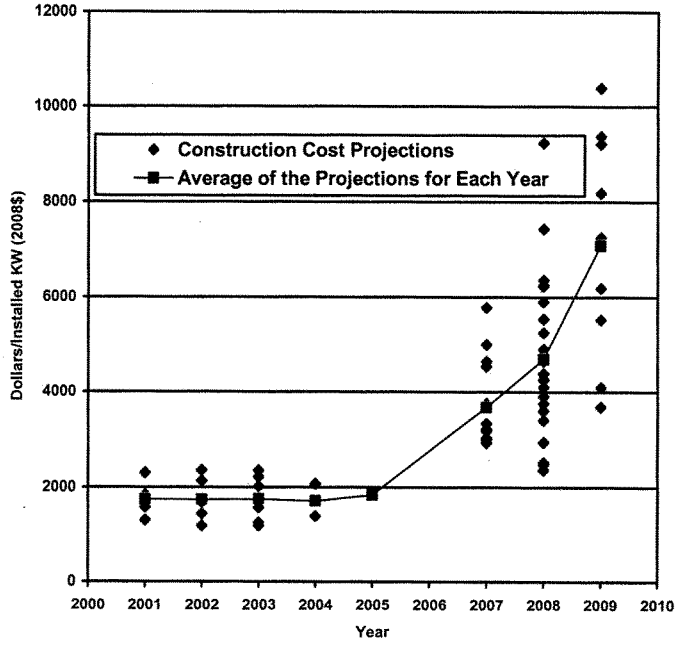
8. *Nucleonics Week*, "Financial crisis nips nuclear revival in the bud, WNA told," September 17, 2009, available at http://www.carnegieendowment.org/static/npp/pdf/NW_Sep2009_reprint.pdf and *Reuters*, "Analysis-Delays, hitches hamper Areva's reactor export plan, December 10, 2009, available at http://in.news.yahoo.com/137/20091210/371/tbs-analysis-delays-hitches-hamper-areva.html.

9. See, Tyler Hamilton, "$26B Cost Killed Nuclear Bid: Ontario Ditched Plan over High Price Tag that Would Wipe Out 20-Year Budget," *The Star*, July 14, 2009, available at http://www.thestar.com/article/665644.

10. See, Rebecca Smith, "Costs Cloud Texas Nuclear Plan," *The Wall Street Journal*, December 5, 2009, available at http://online.wsj.com/article/SB125997132402577475.html; Dow Jones, "CPS Energy, NRG Energy Complete Nuclear Power Project Settlement," March 1, 2010, available at http://www.nasdaq.com/aspx/stock-market-news story.aspx?storyid=201003011204dowjonesdjonline000515&title=cps-energynrg-energy-complete-nuclear-power-project-settlement; and Anton Caputo, "Nuclear Could Still Edge Out Gas," My SA News, December 15, 2009 available at http://www.mysanantonio.com/news/local_news/79283092.html.

Figure 1:

**Overnight Capital Costs Projections for New Power Reactors (2008 $s/installed KW) -- High and Rising**[11]




11. This graph, which reflects some the most recent nuclear cost projections, is based on a chart originally generated by Mark Cooper and spotlighted by Sharon Squassoni. See, Mark Cooper, *The Economics of Nuclear Reactors: Renaissance or Relapse?* Vermont University, Institute for Energy and the Environment, June 2009. available at http://www.vermontlaw.edu/Documents/Cooper%20Report%20on%20Nuclear%20Economics%20FINAL%5B1%5D.pdf and Sharon Squassoni, *The U.S. Nuclear Industry: Current Status and Prospects under the Obama Administration*, Nuclear Energy Futures Paper No. 7, The Centre for International Governance Innovation, November 2009, available at http://www.carnegieendowment.org/files/Nuclear_Energy_7_0.pdf.

To address these concerns, the U.S. nuclear industry has succeeded in getting Congress to implement a growing number of subsidies, including nuclear energy-production tax credits and very large federal loan guarantees. Industry estimates indicate that proposed loan guarantees alone would save an American utility at least $13 billion over 30 years in the financing a modern nuclear reactor.[12] Granting these and additional government incentives, though, may not be sufficient. First, in 2003, the Congressional Budget Office estimated that the nuclear industry would probably be forced to default on nearly 50 percent these loans.[13] Second, most recently, Moody's warned that barring a dramatic positive change in utility-industry balance sheets, the ratings firm would downgrade any power provider that invested in new nuclear reactor construction on the basis that these projects were "bet the farm" gambles. Moody's threat to reduce credit ratings included utilities that might secure federal loan guarantees, which Moody's described as too "conditional" to be relied on.[14]

Meanwhile, the president of America's largest fleet of nuclear power plants who now serves as the World Nuclear Association's Vice Chairman, publicly cautioned that investing in new nuclear generating capacity would not make sense until both natural gas prices rise and stay above $8 dollars per 1,000 cubic feet (mcf) *and* carbon prices or taxes rise and stay above 25 dollars a ton.[15] Yet industry officials believe that neither

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12. See the discussion of Constellation's calculations regarding its planned reactor build at Calvert Cliffs, Maryland in Doug Koplow, "Nuclear Power as Taxpayer Patronage: A Case Study of Subsidies to Calvert Cliffs Unit 3" (Washington DC: NPEC, 7 July 2009), available at http://www.npec-web.org/Essays/Koplow%20-%20CalvertCliffs3.pdf.

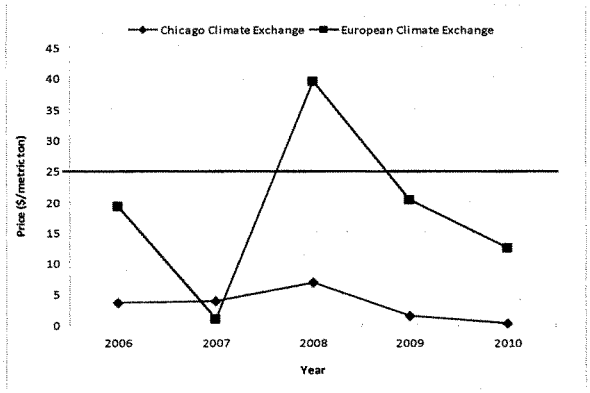
13. U.S. Congressional Budget Office, "Cost Estimate of S.14 Energy Policy Act of 2003," May 7, 2003, available at http://www.cbo.gov/ftpdocs/42xx/doc4206/s14.pdf. The Congressional Budget office optimistically assumed that about half of the value of the projects that defaulted would be recovered in bankruptcy, for a net loss of around 25 percent of guaranteed principle. The Department of Energy (DoE) has tried to discredit even these figures, claiming that the real figures will be much lower but recently said it would not publicly disclose its own calculations of how much of an upfront loan fee to charge to cover for potential defaults on nuclear projects. Industry officials, meanwhile, have made it clear that if the DoE charges them much more than 1 or 2 percent of the amount borrowed to cover these risks, they will not take the loans. See, Kate Sheppard," Energy Sec Unaware that Nuclear Loans Have 50 Percent Risk of Default, February 16, 2010, available at http://motherjones.com/blue-marble/2010/02/chu-not-aware-nuclear-default-rates and *Etopia News*, "DoE Spokesperson Says that Credit Subsidy number is 'Proprietary and Will Remain Confidential'", available at http://etopianews.blogspot.com/2010/03/doe-spokesperson-says-that-credit.html.

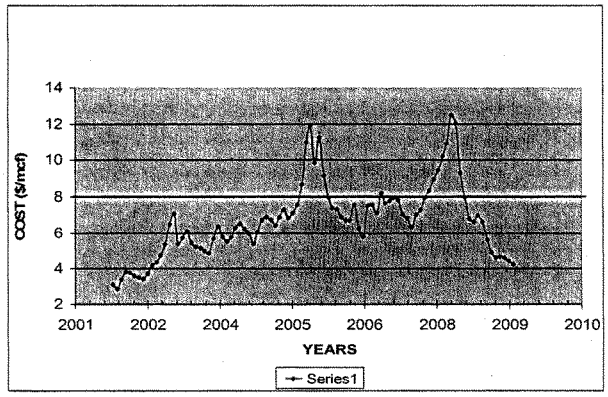
14. See Moody's Global, "New Nuclear Generation: Ratings Pressure Increasing," June 2009 available at http://www.nukefreetexas.org/downloads/Moodys_June_2009.pdf.

15. See *Nucleonics Week*, "Financial Crisis Nips Nuclear," note 8 above.

condition, much less both, are likely to be met any time soon. Past price history suggests why (see Figure 2 below):

**Figure 2: Natural Gas and Carbon Prices -- Hardly Steady or High Enough to Underwrite Private Nuclear Investments[16]**




16. Data for these charts were drawn from Chicago Climate Exchange, "Closing Prices", December 2009. http://www.chicagoclimatex.com/market/data/summary.jsf
European Climate Exchange, "Prices, Volume & Open Interest: EXC EUA Futures Contract", December 2009. http://www.ecx.eu/EUA-Futures
http://www.bloomberg.com/apps/news?pid=20601109&sid=aNykpTP9hnIo
and the United States Energy Information Administration, "U.S. Natural Gas Electric Power Price", October 30, 2009. http://tonto.eia.doe.gov/dnav/ng/hist/n3045us3m.htm

Recent developments suggest their skepticism is warranted. After the latest international conference to control carbon emissions held in December 2009 in Copenhagen, carbon prices in the European carbon market hit a near all-time low. U.S. natural gas prices, meanwhile, driven by reduced demand and massive increases in supplies and newly discovered reserves have also dropped precipitously. There is good reason to believe that they are unlikely to rise significantly any time soon.[17] Conclusion: Without significant additional government financial incentives, private investments in new nuclear electricity are unlikely to be made.

**Energy Security and Global Warming**

Many decision makers in the energy sector understand this. This, in turn, has given rise to public focus on another, less measurable but possible nuclear power benefit: Energy security. The case here, though, is also yet to be demonstrated. In most large industrial countries, oil is only rarely used to produce electricity, but rather is being consumed at increasing rates to fuel a growing fleet of cars and trucks. This makes the link between oil imports and nuclear power quite tenuous at present. The argument put forth by some experts is future-oriented: that some day nuclear power could supply the electricity and hydrogen to power the world's transport fleets. For both electric and hydrogen vehicles, much is unknown about the costs, rate of market penetration, and even whether nuclear will prove to be the most economical way to produce the needed energy resources.

Unfortunately, few of these central issues are given serious attention in popular news media. Instead, France, which made a massive investment in nuclear power in the 1970s, and now produces about 80 percent of its electricity from nuclear energy, is held up as an energy-independence model for the U.S. and the world to follow.[18] This nuclear example, however, cost plenty and hasn't really saved France from its oil kick. France covered much of the startup and operating cost of its civilian nuclear program by initially integrating the sector with its military nuclear-weapons-production program. It also used massive amounts of cheap French government financing to pay for the program's capital construction. As a result, it is unclear how much the French program cost overall, or how much plant costs escalated over the life of the French program – although they clearly

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17. See, e.g., Rebecca Smith and Ben Casselman, "Lower Natural-Gas Price Leaves Coal Out in Cold," The Wall Street Journal, June 15, 2009, available at http://online.wsj.com/article/SB124502125590313729.html and Edward L. Morse, "Low and Behold: Making the Most of Cheap Oil," *Foreign Affairs*, September/October 2009, available at http://www.foreignaffairs.com/articles/65242/edward-l-morse/low-and-behold.

18. See, e.g., Steve Kroft, "France: Vive Les Nukes: How France is Becoming the Mode3l for Nuclear Energy Generation, *60 Minutes*, April 6, 2007 available at http://www.cbsnews.com/stories/2007/04/06/60minutes/main2655782.shtml.

did.[19] What is undisputed, however, is that from the 1970s to the present, France's per-capita rate of oil consumption never declined; and that the country has needed to import increasing amounts of expensive peak-load electricity from its immediate neighbors due to the supply inflexibility of base-load nuclear.[20] Despite these facts, the story of French nuclear energy independence persists.

Another assertion nuclear power supporters frequently make is that the need to abate carbon emissions will make nuclear energy economically competitive through rising carbon prices. Once carbon is no longer free, nuclear proponents believe that their zero carbon emission power plants will be the clear, clean-energy victor over coal with carbon capture systems, natural gas, and renewables. Yet, by industry's own projections, nuclear power may already have priced itself out of the running in any carbon abatement competition. Factoring industry construction, operation and decommissioning costs, the total cost of abating one ton of carbon by substituting a new nuclear power plant for a modern coal-fired generator has been pegged at least $120. This figure, which includes the costs of public subsidies, assumes fairly low capital construction costs (roughly one-half of the industry's latest high-end cost projections). If one uses industry's high-end projections, the cost for each ton of carbon abated approaches $200. This is expensive. Certainly, there currently are much cheaper and quicker ways to reduce carbon emissions (see Figure 4 below):

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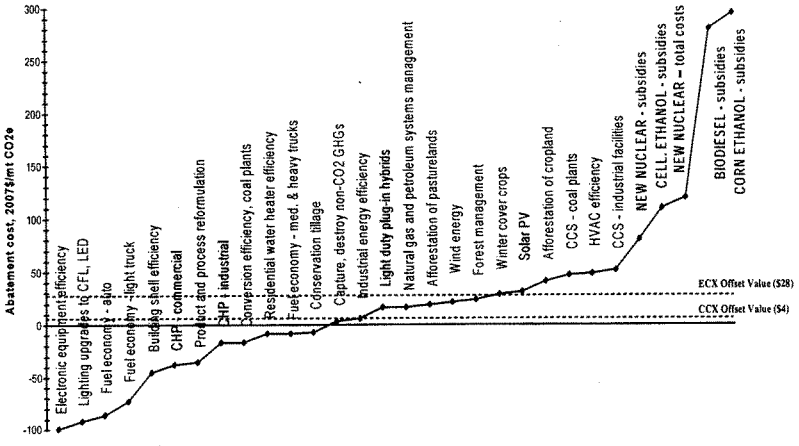
19. For the most recent and thorough attempts, see Arnulf Grubler, *An Assessment of the Costs of the French Nuclear Program, and 1970-2000*, available at http://www.iiasa.ac.at/Admin/PUB/Documents/IR-09-036.pdf and Charles Komanoff, "Cost Escalation in France's Nuclear Reactors: A Statistical Examination," January 2010, available at http://www.slideshare.net/myatom/nuclear-reactor-cost-escalationin-france-komanoff.

20. The French civilian nuclear industry and power utility system, unlike the American one, is almost entirely nationalized. As a result, France still produces incredibly opaque financial statements regarding its civilian nuclear program. What is not in dispute, however, is that because of its over investments in base-load nuclear generators, France must export much of its production and import expensive peak load capacity, which it still lacks. For an explanation of base-load and peak load electricity, see note 47. See, Mycle Schneider, "Nuclear Power in France: Beyond the Myth," (Washington, DC: NPEC, 2009), available at http://www.npec-web.org/Reports/20081200-Schneider-NuclearPowerInFrance.pdf.

**Figure 4**

**New Nuclear Power: An Expensive Way to Abate Carbon**




*Abatement technologies*: McKinsey & Company (2007), mid-range case.
*Offset prices*: Average of contract values from CCX (2008-10) and ECX (2008-12), *Public Subsidy Values* Koplow (2009).

Just how rapidly a nuclear approach can begin abating carbon emissions (compared to its alternatives) is also a significant issue. Certainly, if one is interested in abating carbon in the quickest, least expensive fashion, building expensive nuclear plants that take up to a decade to bring on line will have difficulty abating carbon competitively no matter how much carbon is taxed. That's why in North and South America and the Middle East, building natural gas burning generators is currently an attractive, near-term option. Advanced gas-fired power plants can halve carbon emissions as compared to coal fired plants, can serve as base or peak power generators, and be brought on line in 18 to 30 months rather than the 5 to 10 years need to build large reactors. Advanced gas-fired generator construction costs, meanwhile, are a fraction of those projected for nuclear power.[21]

21. For a detailed description of natural gas fired electrical generating technologies, their cost and performance, see International Energy Agency, OECD, Energy Technology System Analysis Program, "Gas-Fired Power," available at http://www.etsap.org/E-techDS/EB/EB_E02_Gas_fired%20power_gs-gct.pdf.

Where natural gas is plentiful, as it clearly already is in the Middle East and the U.S., these economic facts should matter.[22] The benefits of gas become even more evident once one factors in the nuclear-specific burdens for nations with no current capacity to create proper regulatory agencies and prepare the grid for large base load generator.[23]

**A Future Unlike Our Past?**

The counter argument to this, of course, is that fossil fuel resources are finite and, in time, will run out. This is irrefutable in principle, but in practice when and how one runs out matters. Backers of renewables,[24] for example, insist that renewables' costs are coming down significantly. Proponents of wind power argue that their costs have declined by more than 80 percent over the last 20 years.[25] Solar photovoltaic generated electricity has also been falling (see, for example, the costs of delivered solar electricity in Figure 3 below).

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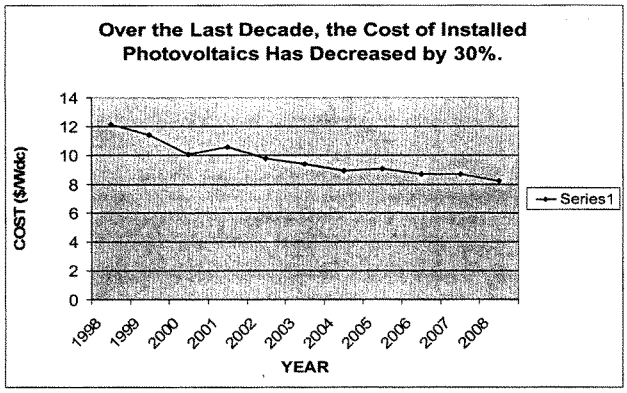
22. On the growing availability of natural gas in the Western Hemisphere, Europe and Asia, see "An Unconventional Glut," The Economist, pp. 72-74, available at http://www.economist.com/business-finance/displaystory.cfm?story_id=15661889; Ben Casselman, " U.S. Gas Fields Go from Bust to Boom, April 30, 2009 and "U.S. Natural-Gas Supplies Surge," *The Wall Street Journal,* April 30, 2009 and June 18, 2009, available at http://online.wsj.com/article/SB124104549891270585.html and http://online.wsj.com/article/SB124527293718124619.html and Gary Schmitt, "Europe's Road to Energy Security: Unconventional Gas Could Free the EU from Dependence on Russian Gas Supplies," *The European Wall Street Journal*, March 11, 2010, available at http://online.wsj.com/article/SB10001424052748704187204575101344074618882.html

23. For an analysis relevant to the Middle East, see Peter Tynan and John Stephenson, "Nuclear Power in Saudi Arabia, Egypt and Turkey: How Cost Effective?" (Washington, DC: NPEC) available at http://www.npec-web.org/Frameset.asp?PageType=Single&PDFFile=Dalberg-MiddleEast-carbon&PDFFolder=Essays and Wyn Bowen and James Acton, "Atoms for Peace in the Middle East: The Technical and Regulatory Requirement," (Washington, DC: NPEC), available at http://www.npec-web.org/Frameset.asp?PageType=Projects..

24. See Amory B. Lovins, Imran Sheikh, and Alex Markevich, " Nuclear Power: Climate Fix or Folly?" updated by Amory B. Lovins December 31, 2008 for NPEC, available at http://www.npec-web.org/Frameset.asp?PageType=Single&PDFFile=Lovins-NuclearPowerClimateFixorFolly&PDFFolder=Essays.

25. See the analysis of the American Wind Association, available at http://www.awea.org/faq/cost.html

**Figure 3**




Many energy experts contend that significant changes would have to be made in how electricity is currently distributed and stored before intermittent generators like renewables could compete in addressing base load demand. Yet, as renewables' costs continue to decline, the incentives needed to prompt these changes are likely to increase.[26] Meanwhile, nuclear power's costs are high and rising. Finally, with new sources of oil and gas now projected to come on line, it is unclear when or how much fossil fuel prices might increase. All of this presents significant uncertainty and risk for nuclear power investors.

In the mid-term, -- i.e., the next two decades, when nuclear supporters see their power source reemerging -- a number of energy developments could easily destroy whatever value might be credited to investments made in commercial nuclear energy today. As noted, new electrical grid concepts could be employed incrementally to make the transmission of intermittent wind and solar much more practical; as could the development of practical electrical storage and of viable distributed electrical systems.[27] Economical

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26. For an analysis that renewables are already more economical than nuclear or coal base load generations, though, see Amory Lovins, "Mighty Mice," *Nuclear Engineering International*, December 21, 2004, available at http://www.neimagazine.com/story.asp?storyCode=2033302.

27. See, e.g., Mason Willrich, "Electricity Transmission for America: Enabling a Smart Grid, End-to-End," *Energy Innovation Working Paper Series*, Massachusetts Institute of Technology, July 2009, available at http://web.mit.edu/ipc/research/energy/pdf/EIP_09-003.pdf; Sharon Gauin, "Bloom Fuel Cell: Individual Power in a Box," *Business Week*,

sequestration of carbon from coal-fired plants also may emerge along with increased efficient use of electricity and smart metering that could change and reduce demand patterns.

Although none of these developments are guaranteed, any one of them could have a dramatic impact on the long-term economic viability of investing now in nuclear systems that would operate for 60 years or more after coming on line in 2020 and beyond. In fact, the uncertainties surrounding what the costs for electricity generation, distribution, transmission, storage and consumption and what form each is likely to take over the next two decades are all very much in play for the first time in over a century. This very flexible and uncertain situation not only argues for great caution in the allocation of public funds on any energy commercialization project, but also underscores the importance in ensuring neutral markets in which multiple solutions are forced to compete against each other.

**Government Nuclear Power**

Governments, on the other hand, view matters differently. The energy market uncertainties noted above have only encouraged them to invest more in clean energy commercialization options. In practice, this has meant they have invested most heavily in the most capital intensive options. Thus, the current carbon and energy security challenges have been addressed by Japan, South Korea, India, Russia, France, and the U.S. not only by initiating investments in carbon sequestration and renewables, but by continuing and significantly increasing massive subsidies -- e.g., loan guarantees, commercial export loans, energy production credits, accident liability caps and indemnification, and construction delay insurance programs -- for the construction of new, large nuclear power plants.

In addition, two other factors fortify many governments' instinct to support nuclear commercialization.

First, in several important cases -- e.g., in France, Russia, India, South Korea, and Japan -- the nuclear industry's payrolls have long been large and are essentially public: Commercial nuclear activities in these states are run through entities that are primarily government-owned. Exposing these industries to the full force of market realities could result in significant layoffs – dislocations large enough to produce negative political results. Continuing to subsidize them, on the other hand, is politically astute.

Second and less immediate, commercial nuclear power's historical links to national security continues to make government support a natural. Within the oldest and most

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February 24, 2010, available at http://www.businessweek.com/idg/2010-02-24/bloom-fuel-cell-individual-power-plant-in-a-box.html.

significant nuclear states – the U.S., the U.K., France, Russia, and India – government-run, dual-use reactors were long connected to electrical grids to produce nuclear weapons fuels and electricity. In the U.S., this includes the Hanford dual-purpose reactor in Washington State (which is no longer), and the Tennessee Valley Authority's tritium-producing light water reactors (whose operations are about to be expanded). It includes Russia's RMBK reactors, which made plutonium for Russia's arsenal until the 1990s; France's gas cooled natural uranium and breeder reactors, which did the same for France through the 1980s; India's heavy water reactors and planned breeder reactors, which currently provide tritium and plutonium for India's nuclear weapons program; and Britain's Magnox plants, which provided the bulk of the plutonium for the United Kingdom's nuclear arsenal. As for the most popular of nuclear power systems, pressurized light-water reactors (versions of which Germany, France, Russia, Japan, South Korea all now export and operate), these were originally developed in the U.S. for nuclear submarine and naval propulsion.

This strong history of government involvement has made the new government financial incentives to promote the construction of additional nuclear power and fuel making plants seem normal. Yet, pushing such government support of energy commercialization projects, both nuclear *and* non-nuclear, actually flies in the face of what market forces would otherwise recommend. More important, it hides the full costs and risks associated of each energy option. This, in turn, is undesirable for several reasons.

**Commercial Energy Innovation**

Conventional wisdom holds that government subsidies to commercialize technology optimize and catalyze commercial energy modernization. In reality, subsidy policies are politically challenging to implement. Not surprisingly, those that do make it into law most often support the more established and powerful players in the market independent of technical merit. As such, government imposition of energy commercialization subsidies makes it *more* difficult for winning ideas to emerge or prevail against large scale losers, and this difficulty can increase over time. The reason is simple: Once government officials make a financial commitment to a commercially significant project, it becomes politically difficult for them to admit it might be losing money, or that it was ever a mistake to have supported it -- even when such conclusions are economically clear. A "lock-in" effect begins to take hold: Not only won't governments terminate funding to clear losers; they may actually shore up such projects with additional funding or legal mandates to force the public to buy the project's commercial production even when cheaper alternatives clearly exist.[28]

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28. For a detailed case study of such effects in the case of bio-fuel commercialization programs, see David Victor, *The Politics of Fossil Fuel Subsidies* (Geneva, Switzerland: The Global Subsides Initiative, October 2009), available at http://www.globalsubsidies.org/files/assets/politics_ffs.pdf.

Thus, it was evident to most that the U.S. government's commercial synfuels and breeder reactor projects were economically untenable years before Congress finally decided to kill both projects. The delay in terminating these projects cost taxpayers billions of dollars. These projects, though, at least died. With government mandated energy commercialization programs, such as corn ethanol, the U.S. government has essentially mandated that the product be produced and bought by the public in increasing amounts in the face of little or no market demand. Besides costing U.S. consumers billions of dollars annually, this program is becoming institutionalized in such a manner as to make it more difficult to phase-out or end it in the future. In France, Japan, Russia, Korea, and India, where the power of the government in commercial matters is even stronger, this tendency is even more pronounced.

**Nuclear Safety and Off-site Damage**

With nuclear-specific energy commercialization subsidies, such as low priced nuclear accident liability insurance, private sector incentives that would otherwise improve operational and design safety also take a hit. Under U.S. law, U.S. commercial nuclear reactor operators (about 100 in number) must secure private insurance sufficient to cover roughly the first $300 million of damages any nuclear accident might inflict on third parties off site. After any accident, the law provides that each nuclear utility should also pay up to approximately $96 million per reactor in annual installments of $15 million each (plus a bit more earmarked for legal fees) should the first tier policy be exceeded. This requirement, however, can be delayed or waived entirely by the Secretary of Energy if, in his judgment, it would threaten the financial stability of the firm paying it. These retrospective premiums are paid in a nondiscriminatory fashion: They are virtually identical for both the safest and worst run utilities.[29]

By most accounts, such pooling lessens the cost of nuclear insurance significantly to the nuclear industry as a whole.[30] A key argument for such pooling is that it is unreasonable to ask the nuclear industry to assume the full costs of insuring against nuclear accidents

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29. On this point see the testimony of David Lochbaum, before a hearing of the Subcommittee on Energy and Resources of the House Committee on Government Reform, "Next Generation of Nuclear Power," June 29, 2005, available at http://ftp.resource.org/gpo.gov/hearings/109h/23408.txt'.

30. Estimates of how much Price-Anderson nuclear accident liability limits on third party damages are worth range widely between .5 and 2.5 cents per kilowatt hour. For details see Anthony Heyes, ,"Determining the Price of Price Anderson", *Regulation,* Winter 2002 – 2003, pp. 26-30, available at http://www.cato.org/pubs/regulation/regv25n4/v25n4-8.pdf and Koplow, "Nuclear Power as Taxpayer Patronage,": available at http://www.npec-web.org/Essays/Koplow%20-%20CalvertCliffs3.pdf'

and nuclear terrorism; that these risks are simply too large.[31] This certainly has been the logic behind the passage of the U.S. Terrorism Risk Insurance Act of 2002 and its repeated extension.[32] Yet, these acts are claimed by their backers only to be "temporary", i.e., designed to allow private insurers the time to adjust to a new risk market.

As both the U.S. Congressional Budget Office and the U.S. Treasury Department have argued, capping private firms' need to insure against catastrophic losses only make sense if the risks of such losses are very low and unlikely to persist. In such cases, federal subsidies for insurance "could be justified as a means of avoiding expensive and unnecessary effort to reduce losses." If, as is more likely, in the case of nuclear safety and vulnerability to terrorist attacks, the long term risks are either long-lived or -- after 911 and the aging of the existing reactor fleet -- likely to increase,[33] such federal "assistance" "could be costly to the economy because it could further delay owners of assets from making adjustments to mitigate their risk and reduce potential loses."[34] Here, it is worth

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31. Cf. however, Peter A. Bradford, former U.S. Nuclear Regulatory Commissioner, Testimony before the United States Senate Committee on Environment and Public Works Subcommittee on Nuclear Regulation, "Renewal of Price Anderson Act", January 23, 2002 available at http://epw.senate.gov/107th/Bradford_01-23-02.htm

32. See Public Law 107-297-Nov. 26, 2002 available at http://www.treas.gov/officies/enforcement/ofac/legal/statutes/pl107_297.pdf and The Terrorism Risk Insurance Extension Act of 2005 available at http://www.cbo.gov/ftpdocs/69xx/docs6978/s467.pdf.

33. For post 9/11 overviews of the growing number of civilian nuclear-related terrorism concerns, see U.S. Congressional Research Service, Carl Behrens and Mark Holt, "Nuclear Power Plants: Vulnerability to Terrorist Attack" (Report for Congress, RS21131, August 9, 2005), available at http://www.fas.org/sgp/crs/terror/RS21131.pdf; National Research Council of the National Academies, San Luis Obispo Mothers for Peace v. Nuclear Regulator Commission, No. 03-74628, 2006 WL 151889 (9th Cir. June 2, 2006; "Safety and Security of Commercial Spent Fuel Storage", Public Report (April 6, 2005); and Henry Sokolski, "Too Speculative? Getting Serious about Nuclear Terrorism," *The New Atlantis,* Fall 2006, pp. 119-124, available at http://www.thenewatlantis.com/publications/too-speculative.

34. See U.S. Congressional Budget Office, "Federal Terrorism Reinsurance: An Update," January 2005 section three of six, "Long-term Effects" available at http://www.cbo.gov/showdoc.cfm?index=6049&sequence=2#pt3 and The U.S. Department of the Treasury, Report to Congress, *Assessment: The Terrorism Risk Insurance Act of 2002* (Washington, DC: The U.S. Department of the Treasury, Office of Economic Policy, June 30, 2005), pp. 10-12, 111-113, and 125-140. Yet another shortcoming with the current cap on nuclear accident insurance liability for third parties in the US is the lack of commonsense differentiation between the safest and least safe and the most remotely located reactors and those located near high value urban real estate. This too discourages industry from engaging in best practices. See notes 26 and 34.

noting that neither General Electric nor Westinghouse has yet succeeded in producing a reactor design that can meet the Nuclear Regulatory Commission's latest requirement that the plant be able to sustain a large, direct airplane hit. Westinghouse's latest submission to meet this requirement was actually found to be wanting and was rejected because it created unintended vulnerabilities to natural disasters, such as earthquakes.[35]

Unfortunately, on this point, the U.S. nuclear industry has been increasingly schizophrenic. Originally, in 1957 when the nuclear industry first secured legislation capping its nuclear accident liability for damages suffered by third parties, it claimed that it only needed the protection until utilities had a chance to demonstrate nuclear power's safety record – i.e., until 1967. A half century later, though, industry officials pleaded with Congress that without another 20-year extension, commercial nuclear power would die. They also insisted that they were still unwilling to export US nuclear goods to foreign states that have not yet explicitly absolved nuclear vendors from liability for damages parties located off site might suffer in the case of an accident.[36]

The future, however, is supposed to be better. Industry backers of the latest reactor designs claim that their new machines will be dramatically safer than those currently operating and, for this reason government accident insurance caps could be phased out.[37] Certainly, industry arguments against even higher coverage requirements under their Price-Anderson coverage seem implausible. The nuclear industry in the US is already is more than willing to pay for insurance to cover damages to their own nuclear assets. In fact, for a single power plant location, most nuclear utilities are buying over ten times the amount of insurance to protect against on-site accident damage and forced outages than Price-Anderson requires them to carry for against off-site property and health damages for the entire U.S. At a minimum, this suggests that the insurers and utilities are able to provide substantially more than the $300 million in primary coverage for off-site accidents that they currently purchase voluntarily. Finally, several U.S. nuclear reactor vendors rely heavily upon taxpayer appropriations to help pay for their advanced "safer" commercial reactor designs. These "accident-resistant" reactors are precisely the ones that industry

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35. U.S. Nuclear Regulatory Commission, "NRC Informs Westinghouse of Safety Issues with AP1000 Shield Building," Press Release 09-173, October 15, 2009, available at http://www.nrc.gov/reading-rm/doc-collections/news/2009/09-173.html.

36. See Letter from Omer F. Brown III to Deputy Secretary of State Richard Armitage, Re: Nuclear Liability, December 18, 2003 available at http://foreignaffairs.house.gov/110/sok061208.pdf.

37. See, e.g., the testimony of David Baldwin, senior Vice President of General Atomics before a hearing of the Subcommittee on Energy and Resources of the House Committee on Government Reform, "Next Generation of Nuclear Power," June 29, 2005, available at http://ftp.resource.org/gpo.gov/hearings/109h/23408.txt.

says will come on line by 2025 – the date the current nuclear insurance liability limits under Price-Anderson legislation will run out.

Though nuclear liability coverage in the U.S. seems quite inadequate, it is regrettably even worse abroad. For example, within Europe, the second largest nuclear powered region in the world, nuclear accident insurance requirements are not just inadequate, but also egregiously inconsistent. Thus, nuclear accident insurance requirements that are much lower in Eastern Europe than in the EU currently are encouraging reactor construction in states with the least stringent liability requirements and some of the weakest nuclear safety regulatory standards. Because of this worry, some experts are now arguing that the EU should adopt a nuclear insurance pooling scheme at least as tough as that in the United States. To avoid the problems that allowing the pool to charge too little would incur, they argue that the pool should require higher payments than in the U.S. Yet, they note, any uniform insurance requirement would be better than none. [38]

**Proliferation**

Finally, with commercial nuclear energy projects, especially those exported overseas, there is a major additional worry -- nuclear energy's link to nuclear weapons proliferation. Here, the security risks are real. In the Middle East, Israel, the U.S., Iran, and Iraq have launched aerial bombing or missile strikes against International Atomic Energy Agency (IAEA) safeguarded reactors – Osirak and Bushehr -- even though the owners of these plants – Iran and Iraq -- were active members of the International Atomic Energy Agency were members of the NPT. If one includes the 2007 Israeli attack against Syria's reactor and Iraq's failed missile strike against Dimona during the first Gulf War, there have been no fewer than 13 acts of war directed against nuclear reactors

Such facts should put a security premium on efforts to subsidize the construction of such projects both here and abroad. Certainly, the more the US and other advanced economies go out of their way to use government financial incentives to promote the expansion of nuclear power programs domestically or overseas, the more difficult it is to dissuade developing nations from making similar investments. This dynamic will exist even if the nuclear projects in question are clearly uncompetitive with nonnuclear alternatives; and the

38. See Antony Frogget, "Nuclear Third Party Insurance, the Nuclear Sector's Silent Subsidy, and the State of Play in and Opportunities in Europe" (Washington, DC: November 5, 2007), available at http://www.npec-web.org/Essays/DRAFT-20071105-Froggatt-NuclearThirdPartyInsurancePaper.pdf and Simon Carroll, "European Challenges to Promoting International Pooling and Compensation for Nuclear Reactor Accidents (Washington, DC: NPEC, January 2, 2009), available at http://www.npec-web.org/Essays/20090201-Carroll-DRAFT-EuroNuclearAccidentPooling_.pdf.

subsidies will substantially assist these states to move closer to developing nuclear weapons options.

Consider Iran. The United States, perhaps more than any other country, was responsible for encouraging the Shah to develop nuclear power in the 1970s. Because we saw the Shah as a close ally, too little thought was given to the potential security implications of our sharing advanced nuclear technology with Iran. When Iran's revolutionary government began to rebuild its Bushehr power station with Russian help, though, the U.S. rightly became concerned about the proliferation risks.

Presidents Clinton and Bush warned that Bushehr could be used as a cover for illicit nuclear weapons related activities. This problem is only likely to increase over time: Once the reactor comes on line, it produces scores of bombs' worth of weapons-usable plutonium annually, which can be diverted to make bombs.[39] The fresh fuel, meanwhile, could be used to accelerate a uranium enrichment program.[40] It was because of these facts that during the first term of the Bush 43 Administration, the State Department went to great lengths to challenge the economic viability of the Iranian nuclear program as compared to burning plentiful natural gas. President Bush also insisted publicly that no new nuclear power state needed to make nuclear fuel to enjoy the benefits of nuclear power.[41]

In its second term, however, the Bush Administration decided domestically to add significant new nuclear subsidies to promote nuclear power plant construction in the U.S. under the Energy Policy Act of 2005 and to encourage an expansion of nuclear fuel making with new technologies where it was already commercially underway. It was roughly during this period that the U.S. also decided to "grandfather" Bushehr and offered Iran power reactor assistance if it would only suspend its nuclear fuel making program.

With this, the U.S. essentially let go of its economic critique of Iran's power program. In July of 2007, President Bush and Russian President Putin publicly recommended that

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39. On these points, see House Permanent Select Committee on Intelligence, Subcommittee on Intelligence, *Recognizing Iran as a Strategic Threat: An Intelligence Challenge for the United States*, staff report, August 23,2006, p. 11, at http://intelligence.house.gov/Media/PDFS/IranReport082206v2.pdf.

40. Thus, when it became clear that North Korea had reneged on its promise not attempt to enrich uranium for weapons, the Bush Administration stopped construction of two light water reactors it had promised Pyongyang because in the words of Secretary of State Rice, North Korea could not be "trusted" with them.

41. See Remarks by the President on Weapons of Mass Destruction Proliferation, Fort Leslie J. McNair, National Defense University, February 11, 2004, available at http://www.acronym.org.uk/dd/dd75/75news06.htm.

international and regional development banks make cheap loans for civilian nuclear power programs.[42] The White House also began encouraging the development of nuclear power throughout the Middle East as a way to put the lie to Iran's claim that the U.S. and its partners were trying to deny all Muslim's the "peaceful atom."[43] The economic merits of the last move, as has already been noted, are dubious. Yet, Russia, France, South Korea, the U.S., China and India are nonetheless openly competing to secure contracts in the Middle East and beyond using a variety of government supported subsidies to drive down nuclear bidding prices.

**Linking Security with Economy and the NPT**

For observers and officials worried about the nuclear power's proliferation risks, merely arguing for governments to be more consistent and neutral economically in their selection of different power generation systems might seem cynically inattentive to the substantial security dangers nuclear power's expansion poses. Certainly, the US and other states have oversold how well international nuclear inspections can prevent military diversions from civilian nuclear programs. Even today, the IAEA cannot yet keep reliable track of spent or fresh fuel for roughly two-thirds of the sites it monitors. Worse, diversions of this material, which can be used as feed for nuclear weapons fuel making plants, could be made without the IAEA necessarily detecting them.[44] As for large fuel making plants, the IAEA acknowledges that it cannot reliably spot hidden facilities and annually loses track of many bombs' worth of material at declared plants. With new money and authority, the IAEA could perhaps track fresh and spent fuel better; however, the laws of physics are unfriendly to the agency ever being able to reliably detect diversions from nuclear fuel making plants.[45]

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42. White House Press Release, "Text of Declaration on Nuclear Energy and Nonproliferation Joint Actions (July 03, 2007)," available at http://moscow.usembassy.gov/st_07032007.html.

43. See Jay Solomon and Margret Coker, "Oil-Rich Arab State Pushes Nuclear Bid with U.S. Help," *The Wall Street Journal*, April 2, 2009, available at http://online.wsj.com/article/SB123862439816779973.html and Dan Murphy, "Middle East Racing to Nuclear Power," November 1,2007, *The Christian Science Monitor*, http://www.csmonitor.com/2007/1101/p01s03-wome.html.

44 See, "In Pursuit of the Undoable, Troubling Flaws in the World's Nuclear Safeguards," *The Economist*, August, 23, 2007, available at http://www.economist.com/world/international/displaystory.cfm?story_id=9687869.

45. On these points, see Henry D. Sokolski, editor, *Falling Behind: International Scrutiny of the Peaceful Atom* (Carlisle, PA: US Army War College, Strategic Studies Institute, 2008), available online at http://www.npec-web.org/Books/20080327-FallingBehind.pdf.

If international nuclear inspections cannot protect us against possible nuclear proliferation, though, what can? It would help if there were more candor about the limits of what nuclear inspections can reliably detect or prevent. But just as critical is more frankness about how little economic sense most new nuclear power programs make. It is governments and their publics, after all, which determine whether or not more large civilian energy plants will be built. If government officials and the public believe backing nuclear power is a good investment, public monies will be spent to build more plants in more countries no matter how dangerous or unsafeguardable they might be.

In this regard, it is useful to note that the Nuclear Nonproliferation Treaty (NPT) is dedicated to sharing the "benefits" of peaceful nuclear energy. These benefits presumably must be measurably "beneficial". At the very least, what nuclear activities and materials the NPT protects as being peaceful and beneficial ought not to be clearly dangerous and unprofitable. That, after all, is why under Articles I and V, the NPT bans the transfer of civilian nuclear explosives to nonweapons states and their development by nonweapons states. It is also is why the NPT's original 1968 offer of providing nuclear explosive services has never been acted upon and is dead letter now: Not only was it determined that it was too costly to use nuclear explosives for civil engineering projects (the cost of clean up was off the charts), but some states (e.g., Russia and India) claimed they were developing peaceful nuclear explosives when, in fact, they were conducting nuclear weapons tests.[46]

What, then, should be protected under the Nuclear Nonproliferation Treaty (NPT) as being "peaceful" today? Are large nuclear programs economically competitive, i.e., "beneficial" in places like the Middle East when compared to making power with readily available natural gas? What of making enriched uranium fuel for one or a small number of reactors? Would it not be far cheaper simply to buy fresh fuel from other producers? Does reprocessing make economic sense anywhere? Can nuclear fuel making be reliably safeguarded to detect military diversions in a timely fashion? Aren't such activities dangerously close to bomb making? Should these activities be allowed to be expanded in nonweapons states and to new locales or, like "peaceful" nuclear explosives, are the benefits of these program so negative and the activities in question so close to bomb making or testing to put them outside of the bounds of NPT protection? What of large reactors, which are fueled with large amounts of fresh enriched uranium or that produce large amounts of plutonium-laden spent fuel? Should these be viewed as being safeguardable in hostile or questionable states, such as Iran or North Korea, that have a record of breaking IAEA inspection rules?

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46. On these points, see Eldon Greenberg, "The NPT and Plutonium," (Washington, DC: NCI, 1993), available at http://npec.xykon-llc.com/files/Article930507%20Greenberg%20-%20The%20NPT%20and%20Plutonium%20-%20May%207%20%201993.pdf and Robert Zarate, "The NPT, IAEA Safeguards, and Peaceful Nuclear Energy," in *Falling Behind*, pp. 252 ff, available at http://www.npec-web.org/Books/20080327-FallingBehind.pdf.

Again, getting all of the world's nations to agree on the answers to these questions will be difficult if nuclear power is truly the least expensive way to produce low or no carbon emission power. In this case, it may be impossible to prevent nuclear technology useful to making bombs from spreading world-wide. But if civilian nuclear energy projects are not economically competitive against their nonnuclear alternatives, just the opposite would ensue and the case against states spending extra to promote the commercial expansion of potentially dangerous commercial nuclear projects would be far stronger.

**Uncertainties**

The only thing certain about nuclear power's future ability to compete against other commercial energy alternatives in the future is its uncertainty. This is so for several reasons.

First, 20 years out, we do not know if our car will plug into our house (outlets) or if our houses will plug into our car (batteries): It is uncertain how much future power will be distributed off a centralized grid and how much will come from more distributed systems (e.g., local grids, cogeneration plants, storage batteries, and the like). This is important since two-thirds of the cost of electricity at the house or business outlet is unrelated to the cost of generating the electricity: Instead, it pertains to the cost of transporting the electricity over the grid and balancing and conditioning the power inputs and outputs on that grid to assure that it does not fail.

Second, it is unclear how many base load generators will be needed 10 to 20 years out since so much of the current demand for electrical generating capacity in advanced economies is driven by the need to have spinning follow on load capacity that frequently remains idle.[47] If one can figure out how to store electricity economically (and a number of schemes are now being tried out), the current premium placed on having significant reserves of additional base load follow on capacity generators -- typically supplied by large coal fired plants, large hydro, or nuclear reactors -- could be reduced significantly.

Third, there is much uncertainty with respect to carbon charges on which nuclear economics heavily depend. Will carbon be taxed and, if so, at what rate? What sectors

47. Because large amounts of electricity cannot currently be stored, electrical companies must estimate how much electricity their customers will use and secure the electrical generating capacity to supply this demand. The difference between these estimates and real demand produces temporary imbalances in the electrical grid that the electrical transmission system operator must correct for by either reducing the amount of electricity being put on the grid or by bringing more electricity on to the grid. The later is done by accessing electrical generators that are on the ready or "spinning" to supply follow on load capacity electricity. For a more detailed slide tutorial on these points, see, "Spinning Reserves, Balancing the Net", *Leonardo Energy Minute Lectures,* available at http://www.slideshare.net/sustenergy/spinning-reserve.

will be grandfathered; which will benefit the most from the constraints? The EU has a cap and trade system that the U.S. Congress is thinking of emulating. Under this system, government authorities allocate carbon allowances to different industrial concerns and sectors. Initial grants of credits follow patterns of most subsidies, with some sectors -- often the most politically powerful -- benefiting far more than others. "Winners" under the new system shift from economic and technical performance to political.

All of this seems an odd way to promote cost competitive clean energy. Instead, it would make more sense simply to focus on cost comparisons for future plants that incorporated the full value of government subsidies and reflected a standardized carbon cost (e.g., a price on the carbon content of different fuels). To foster the proper use of such information, though, we will need to rely more, not less on market mechanisms to help guide our way.

**Policy Implications**

Again, the general take away is that governments should spend less time trying to determine what energy technologies should be commercialized and focus instead on how market mechanisms might best be employed to make these determinations possible. This, in turn, suggests six specific steps governments might consider:

*1.* ***Encouraging more complete, routine comparisons of civilian nuclear energy's costs with its nonnuclear alternatives.*** The starting point for any rational commercial energy investment decision is a proper evaluation of the costs of selecting one option over another. Here, as already detailed, governments have a weak track record.

*Account for Nuclear Power's Full Costs*: One way they could improve their performance is to take what few economic energy assessments they must do more seriously and conduct them routinely. The U.S. Congressional Budget Office (CBO), for example, must score the public costs of guaranteeing commercial energy loans, including the nuclear industry in the U.S. The CBO has been asked to do this by Congress several times in the last decade. Yet, the last time the CBO made the assessment for proposed loan guarantees in 2008, it failed to give a figure for the probable rate of default on nuclear projects. The CBO's director claims that without proprietary information, the CBO has no way to make such estimates. The last time CBO attempted such projections was in 2003, when it pegged the likely default rate under proposed loan guarantee legislation at the time at 50 percent.[48] The Department of Energy, meanwhile, announced that essentially it viewed such

48. On these points, see The Congressional Budget Office, "Congressional Budget Office Cost Estimate: S. 14 Energy Policy Act of 2003," May 7, 2003, available at http://www.cbo.gov/ftpdocs/42xx/doc4206/s14.pdf; Congressional Budget Office, Director's Blog, "Department of Energy's Loan Guarantees for Nuclear Power Plants," March 4, 2010, available at http://cboblog.cbo.gov/?p=478.

information to be proprietary. It would be useful for the CBO to get the information it needs to update and qualify such projections. At a minimum, the CBO should tackle this question every time it estimates what any commercial energy loan guarantees will cost. Congress, meanwhile, should demand that DoE make all of its own estimates relating to these issue public. Also, every time the CBO or DoE make such projections they should be reviewed in public hearings before Congress.

*Compare Nuclear with Nonnuclear:* Yet another way the U.S. government could improve its commercial energy cost comparisons is by finally implementing Title V of the Nuclear Nonproliferation Act of 1978, which calls on the Executive Branch to conduct energy assessments in cooperation with, and on behalf of, key developing states. The focus of this cooperation was to be on nonnuclear, nonfossil-fueled alternative sources of energy. Yet, for these cost assessments to have any currency, they would have to be compared with the full life-cycle costs of nuclear power and traditional energy sources estimates. This work also should be supported by the United Nations' newly proposed International Renewable Energy Agency (IRENA).[49] Finally, in order for any of these efforts to produce sound cost comparisons, though, more accurate tallies of what government energy subsidies are worth for each energy type will be required.

*Increase the Number of Energy Subsidy Economists*: The number of full-time energy subsidy economists is currently measured in the scores rather than in the hundreds. Government and privately funded fellowships, full-time positions and the like may be called for to increase these numbers.

2. ***Increasing compliance with existing international energy understandings that call for internalizing the full costs of large energy projects and for competing them in open international bidding.*** The Global Energy Charter for Sustainable Development, which the US and many other states support, already calls on states to internalize as many of external costs (e.g., those associated with government subsidies and quantifiable environmental costs such as the probable taxes on carbon) in the pricing large energy projects. Meanwhile, the Energy Charter Treaty, which is backed by the EU, calls on states to compete any large energy project or transaction in open international bidding.[50] Since these agreements were drafted, international interest in abating carbon emissions in the quickest, cheapest fashion has increased significantly. The only way to assure this is to include all the relevant government subsidies in the price of competing energy sources and technologies, assign a range of probable prices to carbon, and use these figures to determine what the lowest cost energy source or technology might be in relation to a specific time line. This suggests that any follow-on to the Kyoto understandings should

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49. The International Renewable Energy Agency (IREA) was created in 2009. For more on its mandate, go to http://www.irena.org/.

50. For more on each of these agreements, go to http://www.encharter.org/ and http://www.emdc.net/echarter.html.

require international enforcement of such energy comparisons by at least referencing the principles laid out in the Energy Charter Treaty and the Global Energy Charter for Sustainable Development. Enforcing international adherence to these principles will be challenging. A good place to start would be to work with G-20 to agree to a modest follow-on action plan to Copenhagen that would include establishing common energy project cost accounting and international bidding rules that track these agreements. Beyond this, it would be useful to call on the G-20 to give the IAEA notice of any state decisions they believe might violate these principles to favoring nuclear power over cheaper alternatives. The aim here would be to encourage the IAEA to ascertain the true purpose of such nuclear projects.

*3.* ***Discouraging the use of government financial incentives to promote commercial nuclear power.*** This was recommendation was made by the Congressional Commission on the Prevention of Weapons of Mass Destruction Proliferation and Terrorism.[51] It would clearly include discouraging new, additional federal loan guarantees for nuclear fuel or power plant construction of the type now being proposed by President Obama and the nuclear industry. Although this stricture should also be applied against other types of energy (e.g., coal, renewables, natural gas, etc.) as well, the security risks associated with the further spread of civilian nuclear energy make it especially salient in the case of nuclear. This same prohibition should also be applied against U.S. support for developmental bank loans (i.e., subsidized loans) for commercial nuclear development and against other states' (e.g., France, Japan, Germany, Russia, China, and South Korea) use of subsidized government financing to secure civilian nuclear exports. In some cases, these foreign export loan credits are being used in the US in conjunction with US federal loan guarantees and local state tax incentives to all but eliminate the risks of investing in new nuclear power plant construction. This should be discouraged. In the case of every large civilian nuclear project, domestic or foreign, every effort should be made to place as much private capital at risk as possible in order to assure due diligence in these projects' execution. Even under the existing U.S. federal loan guarantee program, 20 percent of each nuclear project must be financed without federal protection. For purposes of implementing this law, this nominal figure should be covered entirely with private investment; not by resort to rate hikes for ratepayers.[52]

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51. See, The Commission on the Prevention of Weapons of Mass Destruction Proliferation and Terrorism, *The World At Risk: The Report of the Commission on the Prevention of WMD Proliferation and Terrorism* (New York, NY: Vintage Books December 2008), pp. 55-56 available at http://documents.scribd.com/docs/15bq1nrl9aerfu0yu9qd.pdf.

52. On this point see, e.g., Steven Mufson, "Nuclear Projects Face Financial Obstacles: *The Washington Post*, March 2, 2010, p. 1, available at http://www.washingtonpost.com/wp-dyn/content/article/2010/03/01/AR2010030103975.html.

4. ***Employing more market mechanisms to guide national and international nuclear fuel cycle and waste management decisions.*** One of the clear advantages of civilian nuclear power plants over other conventional fossil fueled plants is that nuclear power is much cheaper to fuel. Governments, however, can undermine this advantage by taking steps to increase nuclear fuel cycle costs that are unrelated to the need to assure safety or international security. In this regard, states that use public money to close the fuel cycle by commercializing any form of spent fuel recycling will actually make nuclear power less competitive with its nonnuclear alternatives.

*Managing Nuclear Waste:* Today, the lowest cost interim solution to storing spent fuel (good for 50 to several hundred years) is dry cask storage above ground at reactor sites. Recycling spent fuel, on the other hand, is not only more expensive, but runs much greater proliferation, terrorism and nuclear theft risks. For these reasons, President Bush in 2004, the IAEA in 2005, and the bipartisan U.S. Congressional Commission on the Prevention of Weapons of Mass Destruction Proliferation and Terrorism in 2008 all called for the imposition of a moratorium on commercial reprocessing.[53] This reflects economic commonsense. Unfortunately, in many advanced states that operate nuclear power reactors, the governments own and operate the power plants. As a result, full employment, development of nuclear weapons options, and other political or military concerns often override straightforward cost benefit analysis.[54] In the U.S., this tendency can be avoided by having the nuclear utilities themselves assume a significant portion of the costs of nuclear waste management and reactor site decommissioning. This would require changing the law in the US, which stipulates that all of the costs of final spent fuel storage are to be paid for by off budget federal user fees.

*Making Nuclear Fuel:* As for the front end of the nuclear fuel cycle, firm nuclear fuel contracts in hand, rather than government funding or loan guarantees secured should dictate any new construction of nuclear fuel making facilities or their expansion. With such contracts in hand, it should be possible to secure private financing for such projects. There currently is substantial interest in creating international fuel banks to assure reliable supply of fresh nuclear fuel and of reprocessing services to states that foreswear making their own nuclear fuel. If any such banks are created, though, they should charge whatever the prevailing market price might be for the nuclear products and services they provide. The rationale for this is simple: Subsidizing the price risks creating a false demand for risky near weapons usable fuels, such as mixed oxide and other plutonium-based fuels. Currently, states can satisfy their demand for fresh fuel without having to resort to any

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53. See *World at Risk*, p. 51 and Mohamed ElBaradei, Nobel Lecture, December 10, 2005, available at http://nobelprize.org/nobel_prizes/peace/laureates/2005/elbaradei-lecture-en.html.

54. See Frank Von Hippel, Why Reprocessing Persists in Some Countries and Not in Others: The Costs and Benefits of Reprocessing (Washington, DC: NPEC, April 9, 2009), available at http://www.npec-web.org/Essays/vonhippel%20-%20TheCostsandBenefits.pdf.

international bank and no state has a need to reprocess for any reason. Subsidizing these fuel services has been proposed as a way to induce states to eschew making their own nuclear fuels. This proposal however, seems unsound. .First, it is unclear who the customers are. India and Canada, already make their own natural uranium fuels, which require no enrichment. Several others – France, Russia, Japan, Brazil, and China -- enrich their own fuel and the remaining nuclear fuel consuming states seem content to buy their fuels from U.S. providers, Russia, URENCO, or Eurodif. Second, it is unlikely that nuclear fuel subsidies would be sufficient to block determined proliferators: After all, only a small percent of any nuclear power plant's life cycle costs are associated with its fueling requirements. Again, given the dangers of propping up dangerous reprocessing activities and the dubious requirement to provide enriched fuel, the world can well afford to depend more on market mechanisms to determine when and how these services are provided.

*Use of Weapons Grade Uranium Fuels:* Finally, the use of nuclear weapons usable highly enriched uranium is a nuclear fuel cycle option that is no longer necessary in the production of power or isotopes. There are fewer and fewer research reactors that use highly enriched uranium (HEU) but what few operators there are, are more than willing to pay to continue to use this fuel rather than to pay the costs of converting to low enriched uranium alternatives. Given the direct usability of HEU to make nuclear weapons, however, the elimination and blending down of these fuels are imperative to avoid nuclear proliferation and terrorism risks. In the U.S., the handful of remaining HEU-fueled plants receive government funding. This should end by establishing a date certain for these few remaining reactors to be converted to use LEU-based fuels.[55]

5. ***Increasing and further privatizing nuclear insurance liability coverage to encourage best construction and operations practices.*** Officials within the nuclear industry frequently note that a nuclear industry accident anywhere would impact nuclear operators negatively everywhere. Yet, the potential financial and political fall out following a major nuclear accident would be even more significant if there was a lack of adequate nuclear accident liability insurance. For this reason alone, efforts should be made to increase the minimum amounts of liability insurance coverage currently required of any civilian nuclear plant operators and to make those requirements less subject to over-ride or forgiveness by officials of the state. Here, amounts required by the international Convention on Supplementary Compensation for Nuclear Damage (CSC)[56] should be considered to be the minimum. For the EU, which is currently struggling to set a standard for its members, the coverage requirements set by CSC should be considered to be the

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55. For more detail on these points, see NRDC's Petition to the U.S. Nuclear Regulatory Commission For Rulemaking to Ban Future Civil Use of Highly Enriched Uranium, March 24, 2008, available at http://docs.nrdc.org/nuclear/files/nuc_08032501a.pdf.

54. See Information Circular 367 , 22 July 1998, Convention on Supplementary Compensation for Nuclear Damage, available at http://www.iaea.org/Publications/Documents/Infcircs/1998/infcirc567.shtml

floor from which any specific EU standard is created. Far preferable would be for the EU to adopt insurance levels that the US currently requires under its domestic Price-Anderson legislation. The US, meanwhile, needs to raise international nuclear insurance standards by first announcing its intention to back out of underwriting insurance against terrorist incidents as it currently does and instead require private insurance firms to assume this requirement as they did before 9/11. Second, Washington needs to make good on its original objective under the 1957 Price-Anderson legislation eventually to stop underwriting coverage for damages a nuclear operator might inflict on off-site third parties. Washington would do best by going about this early and incrementally by announcing that starting in 2025, federal Price-Anderson coverage will no longer apply to any civilian nuclear facility operating in the US. This announcement should be made now so that the nuclear utility and vendor industry can develop their own alternative private system of insurance to cover offsite damages. At a minimum, the requisite amounts of capital to fund such a system should be amassed well in advance of the need to bring the new insurance system into force. Under any new system, each nuclear utility, service provider, and vending firm should be free to buy as much or as little third-party liability insurance for themselves as each sees fit from private insurance firms so long as the amount was at least as much as Price-Anderson currently requires to cover any one accident (roughly $10 billion for each accident). The rates for this coverage would be set for each firm by private insurers based on each firm's safety performance, the age of the plant, and the experience of the firm's staff, etc. Of course, each nuclear firm should be free to work with other nuclear utilities and companies to create private insurance pools. Even in this case, though, rates for each firm should be set in a manner that would reward the best nuclear operators and vendors. By doing this, the government would finally be able get industry to internalize the full costs of off-site nuclear accident liability insurance. Given that some US nuclear firms already believe that their products are safe enough for them to soon forgo Price Anderson subsidies and that the nuclear industry generally is arguing that their safety record has improved and will only get better, this transition over the next 15 years should go relatively smoothly.

6. ***Increasing experimentation in the commercial distribution of and the tapping of alternative sources of energy through federal government-led regulatory reform.*** To foster energy experimentation and competition, the federal government should promote regulatory reforms that would, among other things (1) set standard rules for selling electricity through the grid; (2) remove conflicts of interest for existing grid or pipeline operations to block new entrants; (3) ensure regulated utilities have similar incentives to invest in efficiencies as they do in expanding generation plants and energy supplies; (4) encourage key market constraints, be they carbon limits or liability coverage, through the market pricing systems rather than through government subsidies; and (5) increase pricing visibility for power to final customers.


http://energy.nationaljournal.com/2010/01/should-taxpayers-back-new-nucl.php?print=true&printcomment=1404976

## More Nuclear Aid Would Bomb Economics

January 12, 2010 3:19 PM
By Henry D. Sokolski

Late last year, the bipartisan congressionally mandated Commission on the Prevention of Weapons of Mass Destruction Proliferation and Terrorism, upon which I serve, made several nuclear-related recommendations. Perhaps the most important of these is that the U.S. should work to strengthen the nonproliferation regime by discouraging the use of government financial incentives in the promotion of nuclear power. For all the fiscal and energy policy reasons already detailed on this blog, this recommendation rightly ought to be applied to all energy commercialization projects -- nuclear or nonnuclear -- across the board. Yet, the WMD commission determined that this recommendation was particularly salient in the case of nuclear power because of the serious nuclear weapons proliferation implications of failing to do so.

Large nuclear reactors do not just boil water. They also produce scores of bombs worth of nuclear weapons-usable plutonium annually that can be chemically stripped out from the spent fuel in a relatively short amount of time. In addition, these reactors ar...

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Large nuclear reactors do not just boil water. They also produce scores of bombs worth of nuclear weapons-usable plutonium annually that can be chemically stripped out from the spent fuel in a relatively short amount of time. In addition, these reactors are fueled with low enriched uranium that can be diverted and enriched into weapons grade uranium. It is no accident, therefore, that every major weapons state first mastered the operation of a large reactor before acquiring its first bomb. France, the U.S., Russia, the U.K. and India all made most of their first plutonium bombs from plutonium produced in reactors tied to the electrical grid. Even the vaunted "proliferation-resistant" light water reactor used by the U.S. produces not just power, but the tritium the U.S. needs for its thermonuclear

guarantees, it was for a single synfuels project, which, after years of mismanagement and technical difficulties, finally tanked, leaving the public with a bill for $13 billion. More recently, Washington's darling has been corn ethanol, supported with tax credits and direct subsidies. This has produced an even larger financial black hole. The most recent estimates have the U.S. losing roughly $10 billion on this bet for the year of 2008 alone. In fact, corn ethanol is now so uncompetitive, the only way to keep its production viable is by the federal government's dictating that gasoline producers and consumers buy and use it.

Unfortunately, none of this history has deterred enthusiasts for wind, solar power, "clean" coal, or nuclear power from demanding similar federal handouts. It ought, however, to deter Congress, which has already bailed out failed banks and automakers with well over $1 trillion in Treasury funds. After such an orgy of spending, the last thing we need is for Congress to spend more taxpayer money to support yet more multi-billion-dollar commercial ventures, many of which are sure to fail and will have to be bailed out in turn.

More important, fiscal conservatives, energy experts, the best of the environmental community, and pro-nuclear nonprofits understand that when the federal government tries to pick commercial-energy winners and losers, it not only gets things wrong, but also jacks up the cost of energy for everyone and makes it harder for the real winners and losers to emerge. Ultimately, it's not just wasteful, it's a super-regressive tax on energy innovation.

That such incentives would be used as a sweetener for cap-and-trade legislation, which itself is a massive tax on the U.S. economy, at the very time that the U.S. is suffering its worst recession since World War II, gives political cynicism a bad name. Most fiscal conservatives, no matter what they think about global warming, know that spending and taxing to reduce carbon emissions is something that can and should wait until we have gotten our economy rolling again. The best also have demonstrated that using a cap-and-trade market is far less efficient and sensible than simply imposing a tax on the carbon content of different fuels.

How, then, could Senate Republicans be seduced into supporting all of this? Simple: self-deception. Expanding nuclear power, they argue, is the answer that can't wait; it is too important to be left to market forces to accomplish. This, however, is an assertion of faith, not reason. Surely the same line of non-argument is just as valid for other risky forms of energy — e.g., solar and wind. Rather than meet this point head-on and make the case for favoring nuclear power, Senate nuclear proponents unintentionally concede the point by suing for federal subsidy "parity" with renewables. Nuclear power, they plead, should merely get the same federal handouts wind and solar power receive: Three wrongs apparently make a right.

Next, they contend that what we need is actually free. Specifically, they argue that the federal loan guarantees that are critical for nuclear power's future are off-budget and will all be paid back. Again,

this is seductive but it can't be right. If all the loans were sure to be paid back with interest, why would the U.S. government, *vice* private investors, need to offer them to utilities in the first place? Because, as has already been noted, many of the loans will never be paid back.

Indeed, echoing the earlier findings of the Congressional Budget Office, Moody's, which rates private firms' creditworthiness, spotlighted this point. In a special report, Moody's warned the nation's utilities in June that their credit ratings would suffer if they invested in new nuclear construction projects. Given the poor track record of nuclear-plant builders in meeting construction schedules and budgets, and the unpredictability of the federally backed financial schemes, Moody's notified U.S. utilities that it would reduce their credit ratings if they went nuclear even if the utilities secured federal loan guarantees. Recent news that the U.S. Nuclear Regulatory Commission has rejected a revised version of the most popular new reactor design, Westinghouse's AP1000, suggests just how risky this business can be.

Against such facts, though, nuclear-power supporters tend to dig in, insisting that only an immediate, massive expansion of nuclear-power capacity can provide America with the additional power it needs without the carbon emissions that environmentalists fear. But this too is nonsense. Dollar for dollar, the quickest near-term way to add electrical generating power while reducing carbon emissions is through the expanded use of natural gas. This should hardly seem shocking: Many Republicans pleaded for more natural-gas drilling just last year.

Now the U.S. is drowning in the stuff. In fact, following skyrocketing energy prices in early 2008, U.S. natural-gas prospectors discovered so many new reserves that U.S. wellhead prices plummeted from $11 per thousand cubic feet to roughly $3 today. This supply, moreover, is so great that natural gas is projected to stay plentiful for decades. Furthermore, burning natural gas produces roughly half the carbon emissions that burning coal does, and gas can be transported and used directly to produce residential and commercial heat, whereas coal and nuclear power must be converted to electricity in processes where up to two-thirds of their energy content is lost. More important, natural gas can be used to produce electricity in plants that cost one-third to one-tenth as much to build as either nuclear or coal-fired plants, and that can be brought on line sooner. Finally, encouraging broader use of this American resource doesn't require expanding supplies so much as it requires encouraging more private-sector competition by putting an end to monopoly-friendly state energy regulations and practices. In no case should it require squandering billions of dollars on more federal handouts.

Yet another important market-driven step that could make cheaper, cleaner energy more available is to connect the nation's existing regional electrical grids and make it easier to move electricity within and outside of these established markets. This would allow all types of existing electrical generators — nuclear and non-nuclear — many of which are not currently operating at full capacity, to produce much more electricity for many more customers. As noted in the *Wall Street Journal*, this idea makes so much economic sense that private firms are already investing to build expensive, high-technology

technology even though chemical reprocessing is less complicated than nuclear power production?

As it is, Adam Smith's "invisible hand" clearly favors nuclear nonproliferation and sound energy policies. Creating a biased competition with more nuclear-specific federal subsidies for commercial power reactor projects, though, does not. Indeed, it is a bad business, which is best not done at all.

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