Pure Risk: Federal Loan Guarantees for New Nuclear Plants

Testimony by Henry Sokolski
Before Domestic Policy Subcommittee of the Oversight and Government Reform Committee

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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 U.S., 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 U.S.. 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 U.S.. 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 U.S. 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 U.S. 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 U.S., 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 U.S. 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 will change when AREVA and URENCO complete enrichment plants in the U.S.. When they do, though, the key parts of the plants built in the U.S. will be almost entirely manufactured overseas by these foreign firms. AREVA also hopes to secure federal loan guarantees for its U.S. enrichment project as well.

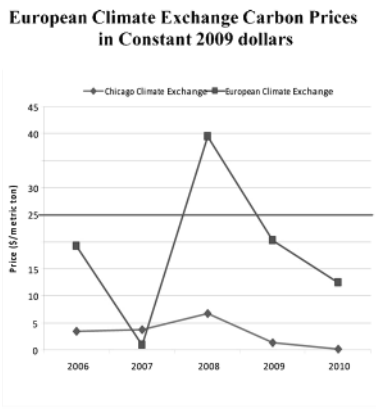
Conclusion: What Should Guide Investments in Commercial Nuclear Power?

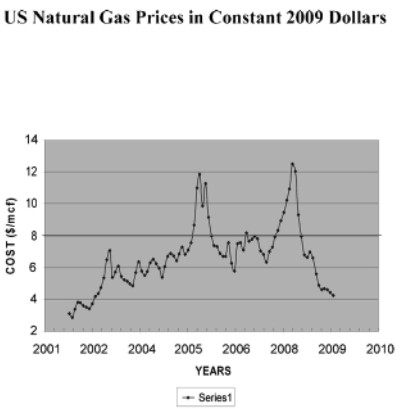
Last September, Chris Crane, president of Exelon, America's largest owner and operator of nuclear power plants, and the World Nuclear Association's Vice Chairman, publicly cautioned other utility executives against investing in new nuclear generating capacity until both natural gas prices rose and stayed 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):

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

Figure 1

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





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.