THE BRAVE NEW WORLD OF NUCLEAR POWER ECONOMICS

On the shores of the Chesapeake Bay in Maryland, next to two existing atomic power reactors and just down the road from a Liquified Natural Gas terminal, a company called UniStar Nuclear Energy LLC wants to build what would be the country's largest—and probably most expensive ever—nuclear power plant. Calvert Cliffs 3 would be a 1600 Megawatt behemoth, nearly the size of the two existing reactors combined. Its technology is French: a design by Areva called the Evolutionary Power Reactor (EPR). UniStar itself is half-French; the company is 50% owned by Constellation Energy, based in Baltimore, and 50% owned by Electricite de France (EdF, which also owns several percent of Constellation itself). A growing player in the nuclear power field, UniStar isn't content with just one huge new nuclear project—its ambitions are to build, with various partners, at least four new EPR reactors in the U.S. over the next several years.

Taken together, these projects easily could cost more than $40 Billion (with a capital B). Yet UniStar itself has few assets: EdF kicked in an initial $350 million and promises another $275 million, while Constellation put up an initial $49 million in assets.[1] That's it so far. UniStar doesn't own or operate any power plants of any kind. And, apparently reflecting UniStar's self-proclaimed "innovative business model,"[2] for Calvert Cliffs UniStar has set up a new company, Calvert Cliffs 3 Nuclear Project LLC, with no assets at all, to build and operate this proposed reactor. How does a company with no assets think it can build a multi-billion dollar nuclear reactor? Welcome to the brave new world of nuclear power economics….

Costs of Nuclear Power

Back in the 1950s, nuclear proponents famously promised that atomic power would provide electricity "too cheap to meter."[3] That promise vanished with the reality of soaring reactor construction costs in the 1970s and 1980s. A Department of Energy study of 75 reactors (nearly ¾ of those now existing), found that the average cost overrun from initial cost estimate to reactor startup, was 207%.[4] By the mid-1980s, reactors averaged more than $4,000/kw to build (or about

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[1] Constellation Energy Form 10-K, Fiscal year ending December 31, 2007; filed with U.S. Securities & Exchange Commission, February 27, 2008

[2] About UniStar Nuclear Energy, LLC, www.unistarnuclear.com/about.htm

[3] Lewis L. Strauss, Atomic Energy Commission Chairman
Speech to the National Association of Science Writers, New York City, September 16th, 1954
[New York Times, September 17, 1954

[4] *Nuclear Power's Role in Generating Electricity,* report from the Congressional Budget Office, May 2008 at page 17.

$4 billion for a typical 1,000 MW reactor), making the term "rate shock" relevant to millions of people.

Although nuclear power has been the most subsidized energy source—through the Price-Anderson Act, as well as federal support for reactor designs, emergency planning and other costs—the construction costs of the reactors themselves built in the U.S. in the first nuclear era were paid for with private money, not taxpayer handouts as was the case in France, Russia and many other countries. But the enormous cost overruns were more than many utilities, and their Wall Street backers, could handle. Public Service of New Hampshire went bankrupt; the Washington Public Power Supply System defaulted on billions of dollars of bonds, and several utilities received cost disallowances from their public utility commission that cost them hundreds of millions of dollars. Dozens of reactors that had been ordered were cancelled, some after billions of dollars had spent on partial construction.

Reducing both construction costs and uncertainty in cost estimates has been a primary goal of the nuclear industry over the past several years, and indeed has been seen as a prerequisite for new reactor construction. And, as utilities began considering new reactors in mid-decade, the industry's Nuclear Energy Institute (NEI) confidently predicted that new reactors would be reasonable and easily competitive with other generation sources. An article posted on the NEI website in March 2006 (and since removed) predicted that the first new reactors would cost on the order of $1500-$2,000/kw, or less than half the average cost of reactors built in the 1980s. NEI argued that costs would actually drop from those levels as more experience with new reactor construction was gained.[5]

It appears that NEI was off by 300 percent or more. Current utility cost estimates for new reactors range from about $4,000 to $6,000/kw, and independent analysts like Moody's Investor Service have predicted even higher costs of $7,000 or more per kilowatt. [6]

UniStar has been noticeably reluctant to provide any public cost estimates for construction of the proposed Calvert Cliffs-3 reactor, but in August 2008 hearings before the Maryland Public Service Commission, CEO George Vanderheyden acknowledged that the company's estimates are on the "upper end" of the $4,000-$6,000/kw level. For a 1600 MW reactor like Calvert

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[5] Nuclear Energy Institute Wall Street Briefing, "A Solid Business Platform for Future Growth," February 2, 2006, http://www.nei.org/documents/Wall_Street_Briefing_2-2-06.pdf "To be conservative, the NEI financial analysis assumes a capital cost of approximately $2,000 per kilowatt for the first few plants built, declining to approximately $1,500 per kilowatt for the later plants."

[6] *New Nuclear Generating Capacity: Potential Credit Implications for U.S. Investor Owned Utilities*, Moody's Corporate Finance, May 2008

Cliffs-3 (CC3), that would mean construction costs of about $9.6 Billion—almost certainly the largest private project ever undertaken in the state of Maryland. If Moody's estimates turn out to be closer to reality—and there are lots of reasons to think that will be the case given the nuclear industry's near complete lack of infrastructure like manufacturing facilities and trained workforce, and spiraling costs for basic materials like steel and concrete---then the plant easily could cost more than $11 billion. And if past cost overrun history is a harbinger for the future, all cost estimates can be thrown out the window….

Some indication of the cost trend may be found in Finland, where Areva is building the first of its EPR reactors. Construction began on Olikuoto-3, the world's first EPR, in March 2005. As of August 2008, the reactor is 50% behind schedule and 50% over budget. Areva is building the plant on a fixed-price contract of 3.2 Billion Euros; current estimates are about 4.9 Billion Euros, or about $7 Billion, and that estimate includes highly favorable interest rates subsidized by the French government that actually have reduced the cost of the project—such interest rates won't be available in the U.S. With more than three years of work left on the reactor, few are attempting to predict a final cost. Areva's second EPR, being built on the Normandy coast in France, at Flamanville, has encountered similar construction problems to the Finnish project. Construction began there in the late Fall of 2007 and was temporarily suspended in the Spring of 2008 because of defects in laying the foundation for the reactor.

Financing nuclear reactors in the 21st century

With both Wall Street financiers and utility shareholders making clear that no new reactors will be built using the old methods because of the high costs and high risks involved, the industry and its Congressional backers have sought alternatives, especially in the form of direct taxpayer support for reactor construction costs. As a first step, Congress in 2005 authorized several direct subsidies for new reactors, including federal loan guarantees, production tax credits on electricity produced by the first few reactors, and other federal funding mechanisms. In 2007, Congress expanded on this by offering $18.5 billion in taxpayer backed loan guarantees.

How this is intended to work can be seen in the Calvert Cliffs case. UniStar officials have repeatedly made clear that they will only build Calvert Cliffs-3 with the help of taxpayer backed loan guarantees. Since UniStar has few assets, and the Calvert Cliffs 3 Nuclear Project LLC has essentially no assets, traditional loans wouldn't be available to those companies anyway.

In the hearings before the Maryland Public Service Commission, UniStar officials essentially explained how they want it to work. 80% of the money needed to build Calvert Cliffs-3 would come from taxpayer loan guarantees. But the rules of the loan guarantee program require that loans of that amount would not only be guaranteed by taxpayers—meaning that if the company can't complete the project for any reason, or defaults on the loans, then taxpayers would have to pay the money back—but the loans can come from only one source, the Federal Financing Bank,

whose source of funds is the U.S. Treasury. Thus, taxpayers will be lending the money for the project, and then guaranteeing the loans to themselves. Private banks wouldn't be involved at all.

The other 20% of the money, in UniStar's scheme, will come from COFAS—the French equivalent of the U.S. Export-Import Bank, and thus, indirectly, from French taxpayers. Thus, UniStar is not only a company that is half-French, but substantial funds would be expected from the French public. In this case, that could run to $2 Billion or more (about the cost the NEI predicted an entire reactor could be built for less than three years ago!).

All of these loans—potentially $10 Billion or more—would flow into the Calvert Cliffs 3 Nuclear Project LLC, a company with basically no assets. As a Limited Liability Corporation, if CC3NP defaulted on these loans, the assets of the parent company, UniStar, wouldn't be touched. But UniStar's "innovative business model" provides another layer of protection for its parent companies. UniStar itself, which also has few assets, is a Limited Liability Corporation, meaning that if it fails for any reasons, the assets of UniStar's parents—Constellation Energy and Electricite de France, also would be protected—those companies are two levels away from the potential financial disaster of Calvert Cliffs.

How this could become a gigantic taxpayer rip-off isn't hard to imagine. Even if it all works as UniStar and its Congressional backers envision, it is difficult to discern a cost-benefit advantage to taxpayers. At best, taxpayers would put up many billions of dollars to a private company to allow it to build a nuclear reactor that would service a limited area. If the reactor is completed, someone—i.e. ratepayers, who are also taxpayers, would have to pay for the inflated costs of the electricity CC3 would provide. After all, UniStar and its allies are not in this to lose money; taking a loss on the electricity sales is not part of their "innovative business model." So even if the loans get paid back, the main result for the public is high electricity prices. The main result for UniStar is potentially huge profits, all enabled by the federal treasury backed by taxpayer loans guarantees.

But what if it doesn't all work as planned? For example, given the history of nuclear plant construction costs, it isn't difficult to conjure up a scenario where loans are secured from taxpayers, and CC3 construction begins. But, just as in Finland and France, construction deficiencies are found and the construction schedule becomes delayed while costs increase above the level of secured loans. What could the CC3 Nuclear Project LLC do then? Without assets (except, in this case, a partially complete and failing nuclear power plant project), it can't borrow more money from the private sector. And it already has tapped out its federal loan guarantee funds. Would the project fail, and taxpayers have to pay back billions of dollars in loans for a reactor that is never completed? Or would Congress step in and authorize still more money for a failing project, adding to the overall risk to taxpayers? Neither option would make Congress—or taxpayers—very happy.

Or imagine another scenario, where the reactor is completed more or less on time and on budget and begins operating. The operating revenues are used to pay back the huge loans, leaving minimal amounts for maintenance and upgrades. Not long after beginning operation, the reactor experiences a major, though not catastrophic accident, that permanently closes the plant. That has happened before—the Three Mile Island accident took place at a reactor that had operated only three months. Because CC3 Nuclear Project LLC has no assets of its own, it would default on both the remainder of its loans as well as its decommissioning fund, leaving taxpayers to pick up the tab for both. UniStar probably would be safe, though it has few assets that could be used anyway. UniStar's parents, Constellation Energy and Electricite de France, likely would walk away unscathed, owing nothing.

Or consider a third scenario, in which the reactor is built and operates, but not very well. After all, no EPR ever has been built yet; perhaps it will simply be a nuclear lemon. So the reactor could be completed and put into operation, but never operate at a high enough capacity factor to generate enough revenues to pay back its loans. History shows that is possible too: Colorado's Fort St. Vrain reactor was hailed for its innovative high-temperature gas-cooled design when it began operation in the 1970s. When it closed permanently a few years later, with a lifetime capacity factor of only 14%, it was seen as an example of a praised technology not working in practice.

In the past, all of these possible scenarios added to the risk of a nuclear project—a risk that the nuclear utilities and their bankers willingly took, but won't take anymore, because the risk is simply too great. Now, the nuclear companies want us taxpayers to take the risk, and themselves to take the rewards if things work as they hope they will. It's a concept that turns capitalism on its head--forcing people with essentially no voice to take all the risks, and those taking none of the risks to avail themselves of all the potential profits—having protected themselves against any possible losses. UniStar calls that an "innovative business model." But perhaps a better phrase would be "robber baron capitalism."

This is the future UniStar also wants to bring to Missouri (where it is partnering with the local utility Ameren), Pennsylvania (where it is partnering with PPL Generation, and New York (where its own Constellation Energy would be involved). Corporate structures and financing arrangements similar to those set up for Calvert Cliffs can be expected at each of those locations. If UniStar is successful, U.S. taxpayers could be on the hook for $40 Billion or so to this one corporation, whose business model assures that UniStar, at least, won't be taking any financial risk at all.

Note: UniStar's comments to the Maryland Public Service Commission are not footnoted—we can't afford the transcripts. However, I was at the hearings and witnessed the comments personally.

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