

www.baltimoresun.com/business/bal-te.bz.nuclear04sep04,0,2384711.story?coll=bal_tab01_layout

baltimoresun.com

Economics of nuclear power are rethought

Loan guarantees could transform energy industry

By Paul Adams

Sun reporter

September 4, 2007

A year ago, the leaders of Baltimore-based Constellation Energy Group and PPL Corp., its utility neighbor in Pennsylvania, represented the energy industry's sharp division over whether the revival of nuclear power was at hand.

Mayo A. Shattuck III, Constellation's chief executive, said the economics were right for a nuclear comeback after 30 years of dormancy.

PPL Chairman William F. Hecht countered that nuclear power was too expensive and risky, and that shareholders' money would be better spent adding pollution controls to his company's coal-fired power plants.

Today, Hecht is retired, the cost of cleaning up coal is soaring and PPL is among the utilities talking with Constellation's UniStar Nuclear subsidiary about the potential purchase of a new reactor identical to one that Shattuck wants to build in Maryland.

PPL's transformation from nuclear skeptic to potential customer shows how rising fuel costs, global warming and government incentives are transforming the economics of nuclear power.

A wave of studies and analyses suggests that as the energy industry looks to meet a projected need for 250 to 500 new power plants by 2030, nuclear generation might well be cost-competitive with traditional types of plants even though new reactors could cost as much as \$4 billion apiece.

Constellation boasts that it can cut plant construction costs and prevent the overruns that crippled the industry in the 1970s by spreading regulatory and design expenses over a fleet of identical reactors built with assembly line efficiency. Government-backed loans and other financial incentives will help drive down borrowing costs. And expected climate-change legislation will soon make the power look as cheap as or cheaper than greenhouse gas-emitting fossil fuels, some energy analysts contend.

"If we get the kinds of carbon changes some are talking about, it will make coal less attractive and nuclear will look a lot better," said Paul L. Joskow, a Massachusetts Institute of Technology economist who did one of those studies.

Many of the pieces needed are still not in place and could be years off, industry officials concede. But Constellation officials say the improving economics are helping it win converts as they push to make Calvert Cliffs the site of the nation's first new nuclear reactor since before Pennsylvania's Three Mile Island experienced a near-meltdown in 1979.

The plant would be developed by UniStar, a partnership between Constellation and France's Electricite de France SA, the world's largest operator of nuclear plants. EDF, which has committed to invest up to \$625 million in UniStar, said Friday that it will work with Constellation to develop four reactors in the United States.

The company recently submitted the first 6,000 pages of its application for an operating license to the Nuclear Regulatory Commission. It plans to submit the rest this fall.

Though few expect it to act this year, Congress is inching closer to legislation that would place a price tag on carbon emissions, which would make generating power with fossil fuels - particularly coal - more expensive. Nuclear plants produce no such emissions.

The 2005 energy bill provided loan guarantees, tax breaks, insurance against regulatory delays and other incentives to help lower borrowing costs for nuclear developers. However, the Bush administration is still working on rules for the loan program. Constellation spent \$100,000 in the first half of this year to lobby the federal government on the issue, disclosure forms show.

Loan guarantees alone would reduce nuclear construction costs by a quarter, the Energy Information Administration said in its annual energy outlook. With the guarantee in place, it estimates that a new nuclear plant could generate electricity at 4.78 cents per kilowatt hour. Only a coal gasification plant - which turns coal into a gas before burning - came in cheaper, at 4.66 cents.

Environmentalists counter that much of the energy shortfall could be met through a combination of conservation and increased investments in such alternatives as solar and wind power. But some agree that clean coal technology and nuclear will inevitably be part of the equation and that economics will drive the choices.

"For us, good environmental policy comes from capping carbon dioxide and allowing the market to set the price for avoiding emissions," said Mark Brownstein, managing director of business partnerships for Environmental Defense. "Let the technologies compete on price."

To be competitive, the nuclear industry will have to overcome its history of making overly optimistic projections that didn't come true. Wall Street lost faith in nuclear construction after huge cost overruns in the 1970s and '80s forced the industry to write off more than \$17 billion in losses.

"The first 75 reactors built in this country had \$100 billion in cost overruns, and the public got taken for a ride," said Jim Riccio, a policy analyst for the environmental group Greenpeace.

He said Paris-based Areva SA, a UniStar partner, is more than \$950 million over budget and 18 months behind schedule on a plant it is building in Finland. The plant is the European version of the reactor design that UniStar and Areva plan to build at Calvert Cliffs and elsewhere.

But economists say several factors are conspiring to change the equation. For one, the same problems with soaring construction costs and environmental opposition that buffeted nuclear power 30 years ago are now afflicting coal plants because of concerns over global warming.

TXU Corp, the Texas energy giant, faced withering attacks from environmentalists after it proposed building 11 new coal plants. The resulting legal skirmishes and investor concerns about the high cost of the plants sent its share price plummeting. A weakened TXU agreed in February to reduce the number of coal plants it plans to build from 11 to three as part of a deal to sell itself to two large private equity

firms for \$45 billion.

Duke Energy ran into cost problems after it proposed in 2004 to build two 800-megawatt coal-fired power plants in North Carolina. The company's original estimate of \$2 billion for the pair grew to \$3 billion by late 2006. State utility regulators later approved just one of the plants, which is now expected to cost more than \$1.8 billion.

The price of such plants will increase in the future if expected climate legislation spurs utilities to add technology designed to capture carbon dioxide emissions and inject them into the ground. "Carbon capture" technology is still being developed, and no one is certain how much it will add to plant costs.

By comparison, the 1,600-megawatt nuclear reactor Constellation hopes to build is expected to cost more than \$4 billion but produce twice as much power. One megawatt is roughly enough to power 1,000 homes.

"Coal is a tough sell," said Roger W. Gale, an energy consultant in Washington. "And clean coal is getting comparable to a nuclear plant [in cost]."

Constellation says it can keep nuclear costs low in the future by marketing a fleet of reactors standardized down to the wallpaper and carpet. Reactor projects of decades past tended to be unique, making the design and regulatory process longer and more expensive.

Between traditional coal and nuclear, energy economists at the Massachusetts Institute of Technology have for years said that coal is the better economic value on a per-kilowatt basis. The United States has abundant coal reserves and relies on coal for about half its power.

Joskow, the MIT economist, says it might take a combination of lower construction costs and carbon emissions charges to ensure nuclear's place at the table. Lawmakers would likely have to establish a carbon trading system similar to that used in Europe. If approved, companies would be allowed to emit a certain amount of greenhouse gases. Those that emit less earn credits that they can turn around and sell to companies that are having trouble meeting their targets.

If Congress sets a price of more than \$25 per ton of carbon dioxide released, the expense of emitting greenhouse gases makes a strong case for nuclear, Joskow said in a recent interview. He noted in a December research paper that it would likely take a carbon price of \$25 to \$50 per ton to stabilize the nation's greenhouse gas emissions by 2050.

Joskow calculated that energy from a pulverized coal plant would cost 6.6 cents per kilowatt hour if carbon emissions are priced at \$27 per ton. That compares with 6.7 cents for a new nuclear plant. He based his estimate on a complex calculation of plant costs, which are generally less optimistic than the industry's. However, the nuclear price drops to as low as 4.2 cents per kilowatt hour when construction costs are trimmed 25 percent - as some in the industry say is possible - and borrowing risks are lowered to match those of a coal plant.

Absent carbon charges, the pulverized coal plant can produce electricity for 4.2 cents per kilowatt hour, which matches the nuclear industry's best figure and beats it handily when Joskow's higher cost estimates are used.

George Vanderheyden is president of UniStar Nuclear, which is housed on the 14th floor of Constellation's Pratt Street headquarters in Baltimore. He said the company's calculations show that its reactors will beat coal on price even without some form of carbon tax or trading system.

"Everyone is justifying these projects without that," he said. "Once a nuclear power plant is built, it's economically the cheapest kilowatt hour of power on the grid."

Revis James, director of technology assessment for the Electric Power Research Institute, said his estimates show that coal still beats nuclear absent some form of carbon tax. But the uncertainty about what Congress will do on climate control has energy companies conflicted.

"Nuclear is certainly much more well developed and established and mature than a carbon-capture coal plant," he said. "That makes it a little more predictable to look at what the potential costs of nuclear power will be."

paul.adams@baltsun.com

The employer of energy expert Revis James, the Electric Power Research Institute, was misidentified when this article was published in the print edition. The Sun regrets the error.