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Nuclear Power Primed for Comeback
Demand, Subsidies Spur U.S. Utilities

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CHEROKEE COUNTY, S.C. -- Two decades ago, after Duke Energy abandoned its partly built nuclear power reactors here, the site was sold and turned into a movie set. Director James Cameron used it to film "The Abyss," a 1989 movie about civilian divers who encounter aliens while trying to rescue a stricken nuclear submarine. Cameron filled the unused nuclear containment building with water and hauled a section of an oil rig, a tiny submarine and fiberglass rocks inside to make convincing underwater scenes.

Now there's a new twist in the plot: The nuclear power industry is trying to come back from its own abyss. With natural gas prices volatile and people anxious about climate change, the nuclear power industry is touting its technology as a way to meet the nation's growing energy needs without emitting more greenhouse gases. Over the next two years, the Nuclear Regulatory Commission expects applications to build as many as 32 new nuclear reactors.

Duke Energy could be among them. It reacquired the Cherokee County site and has been tearing down old buildings so it can ask the NRC to let it start all over again. On a hot mid-September afternoon, a giant wrecking hammer was prying huge chunks of concrete from the walls of the old containment facility. They dangled from steel reinforcing rods like stones tottering from the ruins of an ancient coliseum. Inside, the props for "The Abyss" lay covered with dust.

Other utilities and independent power companies are also laying the groundwork for a new wave of U.S. nuclear plants. On Sept. 24, NRG Energy filed the first full application for a new nuclear unit since the partial meltdown of Pennsylvania's Three Mile Island plant in 1979. Then the Tennessee Valley Authority approved plans to build two new reactors in northern Alabama, where it abandoned two mostly finished units in 1988 when electricity demand failed to meet forecasts. Earlier, Constellation Energy Group filed a partial license application to add a nuclear unit to its existing site in Calvert Cliffs, Md.

NRG Energy chief executive David W. Crane proclaimed "a new day for energy in America."

But there is still a lot of worry about the economics of nuclear power. Nuclear plants

are hugely expensive to build; they have long lead times and a history of cost overruns. Bottlenecks loom for key components if more than a few plants are built. The price of uranium has soared in recent years. So has the cost of construction materials and skilled labor, which is in short supply. Politicians, environmentalists and business still can't decide how to dispose of radioactive waste.

"If I were an investor, I'd be squeamish," said Jim Harding, a consultant and former director of power-supply planning at Seattle City Light.

To ease financial concerns, the nuclear power industry has turned to Congress. Among the biggest reasons for renewed interest in nuclear power are the tax breaks, loan guarantees and other subsidies in the Energy Policy Act of 2005.

Those benefits were "the whole reason we started down this path," Crane said after filing NRG Energy's license application. "If it were not for the nuclear provisions in there, we would not have even started developing this plan two years ago."

For each nuclear plant seeking federal approval before the end of 2008, the act provides tax credits of up to \$125 million for eight years, loan guarantees for up to 80 percent of a plant's cost, shared application costs and insurance that would cover the costs of regulatory delay.

Nuclear plants also receive other subsidies, including local tax breaks and limits on liability for catastrophic accidents.

Many utility executives, however, say they need more.

Designed for a variety of "innovative new energy technologies," the loan guarantee program was initially limited to \$2 billion, less than the cost of a single reactor. The nuclear industry has been lobbying Congress to expand it to \$50 billion or more. A Senate appropriations bill would remove the ceiling altogether.

The guarantees and subsidies may be too small for would-be nuclear plant builders, but they're too big for many budget experts.

"I don't take the position that there should be no nuclear power, but I believe that the price of the energy they produce should be reflective of their actual cost structure and they should not be shifting their risk of cost overruns and poor performance to us, the taxpayers," said Doug Koplou, a Cambridge, Mass., researcher whose Earth Track consultancy monitors government energy subsidies.

Many environmental groups, torn between concern about climate and long-standing antipathy toward nuclear power, are seizing on the cost issue. "We're not an anti-nuclear group," says Jeremy Symons, executive director of the global warming program at the National Wildlife Federation. "But it doesn't make sense for the government to be investing in nuclear when the money could be put into renewables and energy efficiency."

A study by a Keystone Center group -- which included academics, investment bankers

and nuclear industry experts -- said that when capital costs are included, the price of nuclear power is 8 to 11 cents a kilowatt hour, about the same as natural gas. If Congress adopts a carbon tax or pricing scheme to curb greenhouse gases, it could give nuclear an edge.

Even with government incentives, many utility executives are cautious about building new nuclear plants. James K. Asselstine, a former managing director and utility analyst at Lehman Brothers and a former member of the U.S. Nuclear Regulatory Commission, said that while companies must apply for licenses by the end of 2008 to qualify for federal subsidies, they can decide later whether to proceed after learning more about climate-related legislation, construction costs, competing technologies and electricity demand. "There are a lot of moving pieces," he said.

James E. Rogers, chief executive of Duke Energy, said a new nuclear power plant would cost as much as a quarter of his company's value on the stock market. In his first top executive stint, at PSI Energy, he spent much of his time cleaning up the financial fallout from an abandoned nuclear project that cost that company \$2.7 billion. That's why he says that in this wave of new plants, Duke Energy won't be "the first person on the beach."

"Having started my career fixing a company that was almost knocked out of the game because of its investment in nuclear and the change in public opinion . . . I'm very optimistic about the role nuclear can play in the future, but I'm cautiously optimistic," Rogers said.

For President Bush, getting new nuclear plants built has been a priority since his first months in office. "America should also expand a clean and unlimited source of energy: nuclear power," Bush said in May 2001. In a Gallup poll in March 2007, 53 percent of Americans surveyed favored the use of nuclear energy, little changed from the 57 percent who favored it when Gallup first asked the question in 1994.

There are 104 nuclear plants operating in 31 states now, and they provide about 20 percent of the nation's electricity. France, in contrast, relies on nuclear energy for 80 percent of its electricity. But no new U.S. plant has been completed since 1996. (The Tennessee Valley Authority this year reopened one it had closed in 1985.)

With plant construction frozen, U.S. nuclear facilities have boosted output by becoming more efficient. Utilization rates that once lagged around 70 percent now routinely exceed 90 percent. But proponents of nuclear power say that with electricity use rising, the country needs to build 30 or so more plants by 2025 for nuclear to provide the same share of the country's power.

Scientists studying climate change have tossed around even more ambitious figures. To solve one-seventh of the global greenhouse gas problem, Princeton University professors Robert Socolow and Stephen Pacala estimate that the world would need to triple current nuclear capacity. The U.S. share of that expansion (including replacement of aging plants) would require building about five nuclear reactors a year for 50 years.

The loan guarantees have become a major battlefield. As the industry points out that current limits on the program make the guarantees meaningless, and higher amounts alarm budget officials, the Office of Management and Budget needs to calculate the risk of default to account for the cost of the guarantees. Based on past performance of nuclear plants, that cost might be awfully steep.

"From a myopic American point of view, it is not a good record," said Crane, NRG Energy's chief executive. "But the record is 20 or 30 years old. I don't know a business today that wants to be judged on what it was doing in the '70s." Even if every plant could get loan guarantees for 80 percent of its cost, Crane said, projects would each require more than \$1 billion in equity. "That's a lot of money at risk," he said.

Industry executives say new technology makes better performance more likely. For example, to reduce the chance of an uncontrolled accident, Westinghouse's new nuclear plants use a passive design, rather than electronic or manual devices, for pumps that release cooling water in an emergency.

Nuclear reactor builders also say that they could cut costs and reduce licensing delays by using standard designs rather than tailoring plants to each customer. Four Westinghouse reactors are being built in China, which U.S. firms hope will resolve design difficulties. Plants built recently in Japan have been cheaper than those built in the United States 20 or 30 years ago.

Finland's experience, however, suggests that it remains difficult to build a nuclear plant on budget. The plant, the first of a kind designed by the French company Areva, is running two years behind schedule and \$2.1 billion over budget. One problem is that concrete provided by an Indian firm included too much water, raising safety concerns among Finnish regulators. Constellation Energy is considering using this design.

"While it is a disappointment because it is over the original schedule, by the standards of U.S. plant construction in the 1980s, it is a world record," said Thomas A. Christopher, chief executive of Areva's U.S. subsidiary.

Another issue is bottlenecks. At least nine nuclear power plant components such as giant pressure vessels and steam generators can be made in only one place, a Japan Steel Works facility, according to nuclear consultants. Some parts have a six-year lead time, the Keystone Center report said.

Uncertainties about energy demand are another factor. The drop in U.S. license applications began before the Three Mile Island accident, to 1973, when energy demand fell. If new building codes, new light bulbs and more efficient appliances offset increasing population, economic output and bigger homes, power companies could be in the same position Duke Energy was when it wrote off more than \$600 million that it spent on structures in Cherokee County.

The site here is a monument to that miscalculation. Near the containment building, a rusty old reactor head -- as big as the head of the Statue of Liberty -- lay in the dirt. Wrecking crews had started cutting it into 2-by-3-foot blocks, each weighing more than 1,500 pounds.

Rogers, the Duke Energy chief executive, said that when he toured the abandoned site, he got an "eerie feeling" that reminded him of the end of the film "Planet of the Apes." The lesson, he said, is: "If I build a nuclear plant, I want to walk hand in hand with regulators and consumers. I don't make big enough returns to take this risk on my own."