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Nuclear-Power Industry Sees Signs of a U.S. Revival

Utilities Face Opposition Over Safety and Storage; A GE-Westinghouse Contest

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The nuclear-power industry is laying the groundwork to build new plants in the U.S. for the first time in more than two decades.

Buoyed by the re-election of President Bush, whose administration has pushed to expand nuclear power as part of its national energy plan, the industry sees a window of two to three years in which the political environment could make it easier to win approval for new projects.


Late last week, two separate consortiums consisting of power companies and reactor makers received word that the Department of Energy would share in the cost of obtaining regulatory approval for new nuclear reactors. The two groups expect the cost of winning that approval to be about \$500 million apiece, due to the detailed engineering and testing required by regulators for new reactors.

"There's lots of enthusiasm for what we're trying to accomplish here," said William D. Magwood IV, director of the Energy Department's office of nuclear energy, science and technology. "If both of these goes to fruition, we could see new nuclear plants by 2014."

In part, the revived prospects for nuclear power stem from the volatile energy market and concerns about global warming, which are forcing utilities and their power-generation vendors to consider alternatives. Faced with skyrocketing natural-gas prices and uncertainty about the costs of containing carbon emissions from coal-fired plants, electric companies believe nuclear plants are becoming more economically competitive and safer.

They are also being driven by manufacturers -- **General Electric Co.** and its longtime rival **Westinghouse Electric Co.**, along with a new entrant, Canada's Atomic Energy of Canada Ltd., or AECL -- who are looking to sell newly designed reactors into the long-dormant U.S. market, which dried up in the early 1980s amid public outcry over safety and investors' dismay over high costs. Since then, the companies have continued to build reactors overseas in Asia and Europe; GE currently is nearing completion of new reactors in Taiwan. But the U.S. remains the most coveted market because of its economic might and hunger for new sources of energy.

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NEW NUKES?

While opposition to new plants is likely to be fierce, the companies

and Energy Department hope to win approval for construction from the Nuclear Regulatory Commission as early as 2009.

The Energy Department also is pushing to overcome legal and regulatory hurdles to establish a depository for used nuclear fuel in Nevada. Power companies say they won't build new plants without a storage site. They currently store spent fuel at their plants.

To be sure, the power companies and their reactor makers are being cautious not to commit formally to new plants. Longtime proponents of nuclear energy, fearful of being burned by policy changes, are seeking solid government guarantees before proceeding. The collapse of support for nuclear power in the 1980s cost the industry billions of dollars.

So far, the proposed new plants would be built at existing facilities. One group, led by Virginia's **Dominion Resources Inc.**, is proposing to build a new reactor, designed by AECL, on a site in Mineral, Va., where a nuclear plant has operated since 1980.

A second, much larger consortium led by Exelon Corp. and **Entergy Corp.**, plans to select in 2007 a newly designed reactor from either GE or Westinghouse for a potential new plant. The consortium, NuStart Energy Development LLC, hasn't selected a site but is considering existing locations in Clinton, Ill., and Port Gibson, Miss.

GE and Westinghouse, longtime competitors since they built their first reactors in the 1950s, are marketing new reactors that they say are more economical to build and operate. GE says its design takes a new approach to safety, relying on an automated system triggered by gravity instead of human operators to release 360,000 gallons of water to flood a core containing radioactive fuel if it becomes necessary to prevent a meltdown. The design attempts to eliminate human error, which contributed to the 1979 accident at the Three Mile Island nuclear plant near Harrisburg, Pa.

Pittsburgh-based Westinghouse, which was acquired by the British government in 1999, recently received approval from the NRC for its own new reactor design, which has safety features similar to those of the GE reactor. The approval enables it to begin offering customers clearer cost estimates and construction schedules, and the company, which has invested close to half a billion dollars on its latest reactor, is hoping to land contracts to build new reactors for China in the next year. "This opens up possibilities for us," said Westinghouse Chief Executive Steve Tritch.

By contrast, GE has so far invested about \$100 million in its new design. But under Chairman and Chief Executive Jeffrey Immelt, it is aggressively pursuing regulatory approval for its new design. "The opportunity exists for the industry to come together around the right technology for a new nuclear plant," said John Rice, chief executive of GE Energy, one of the conglomerate's two biggest businesses.

Electric companies also won't have to carry the entire financial burden this time around. GE, Westinghouse and government-owned AECL say they will share the financial risks of building new nuclear plants. That could include providing loans or equity to utilities that build new plants or construction budget guarantees. Such support was missing in the 1970s and 1980s when utilities got clobbered by billions of dollars in cost overruns, among other things.

Nuclear power currently accounts for nearly 20% of all the electricity produced in the U.S., compared with 51% coal and 17% natural gas. To maintain that mix, the industry says new plants must be built in the U.S. as older ones are retired.

One big challenge, however, is convincing the public that nuclear energy is safe. Opponents charge that utilities aren't adequately maintaining existing plants to prevent possible accidents.

The nuclear industry points to a strong overall safety record since the Three Mile Island accident, in which no one was killed, though a small amount of radioactive material leaked into the atmosphere. But the 1986 explosion and deadly aftermath at the former Soviet Union's Chernobyl nuclear plant -- which was caused by major design flaws and by engineers who were conducting unauthorized tests -- continues to haunt the public's view of nuclear power. More recently, a deadly explosion in Japan this year, in which a steam pipe broke because of poor maintenance, caused five deaths.

"Reactors aren't inherently safe," said David Lochbaum, a nuclear engineer with the Union for Concerned Scientists, a group that monitors the industry.

Mr. Lochbaum, who has sat in on hearings on the new reactor designs, said he thinks they are safer because they have fewer pieces of equipment to operate and maintain. But "a lot of those new features haven't been tested yet except in cyberspace," he said. Nuclear opponents also worry that new plants could become targets of terrorist attacks.

Said GE's Mr. Rice, "You've got all this hysteria. You still have in the rearview mirror Three Mile Island and Chernobyl, which people haven't forgotten about."

Reactors made by Westinghouse and GE already dot the U.S. landscape. Of the 103 reactors currently operating, 49 use Westinghouse-owned designs and another 34 have GE-made models.

For now, utility executives are hedging their bets on the new reactors, saying each has its pros and cons and they prefer to make a final judgment when they see pricing and final designs. Though Westinghouse is ahead with design approval, some executives expect that GE's new model could be cheaper because it will produce more electricity and spread capital costs across bigger plants.

GE's new design has no large water pipes entering the lower portion of a reactor below the fuel core. The risk in older models is that if those pipes, which carry water in and out of the vessel, burst, water could flow rapidly out of the container's bottom and leave the core uncovered. GE's new design places the pipes above the core so water can't drain out as quickly in case of an accident.

In case of accidents, both GE's and Westinghouse's designs use gravity rather than operator-run pumps to force water in and out of reactor vessels and flood the area surrounding the core containing fuel. GE's reactor also holds more water.

The NuStart consortium says that cost as much as design will determine its choice of a reactor. A new GE reactor that can provide power to about 1.5 million households could cost roughly \$1.8 billion, or 20% less than its current model. Westinghouse's reactor, which is smaller, could cost about \$1.14 billion once the costs associated with doing detailed engineering plans are recovered.

Building two of AECL's newest reactors, which would produce the same amount of power as one of GE's, would cost about \$1.89 billion. But Canada stresses that unlike other reactors, its design doesn't require the plant to be shut down during regular, lengthy refuelings. They argue to utilities that that will increase their revenue during the several weeks such refueling typically takes.

The Department of Energy cautions that these construction estimates are overly optimistic and new plants are likely to cost more. Still, proponents argue that nuclear power is efficient. Nuclear power, they note, costs

about \$1.71 a kilowatt-hour to operate over the life of a plant, compared to \$1.85 for coal and \$4.06 for gas, according to industry estimates. In addition, nuclear doesn't emit pollutants, while coal's carbon emissions contribute to global warming.

"I cannot see any energy future ... without an expanded nuclear base," John Rowe, Exelon's chairman and chief executive, told a group of managers at a climate policy meeting this summer.

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