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## China Promotes Another Boom: Nuclear Power

By HOWARD W. FRENCH

**D**AYA BAY, China - The view from this remote point by the sea, with lines of misty mountains stretching into the distance, is worthy of a classical Chinese painting. In the foreground, though, sits a less obvious attraction: one of China's first nuclear power reactors, and just behind it, another being rushed toward completion.

There are countless ways to show how China is climbing the world's economic ladder, hurdling developed countries in its path, but few are more pronounced than the country's rush into nuclear energy - a technology that for environmental, safety and economic reasons most of the world has put on hold.

In its anxiety to satisfy its seemingly bottomless demand for electricity, China plans to build reactors on a scale and pace comparable to the most ambitious nuclear energy programs the world has ever seen.

Current plans - conservative ones, in the estimation of some people involved in China's nuclear energy program - call for new reactors to be commissioned at a rate of nearly two a year between now and 2020, a pace that experts say is comparable to the peak of the United States' nuclear energy push in the 1970's.

"We will certainly build more than one reactor per year," said Zhou Dadi, director of the central government's Energy Research Institute, which has strongly supported the country's nuclear program. "The challenge is not the technology. The barriers for China are mostly institutional arrangements, because reactors are big projects. What we need most is better operation, financing and management."

By 2010, planners predict a quadrupling of nuclear output to 16 billion kilowatt-hours and a doubling of that figure by 2015. And with commercial nuclear energy programs dead or stagnant in the United States and most of Europe, Western and other developers of nuclear plant technology are lining up to sell reactors and other equipment to the Chinese, whose purchasing decisions alone will determine in many instances who survives in the business.

France, which derives about a third of its energy from nuclear power, is the only Western country committed to a large-scale nuclear energy program. It is in a building lull now, but will need to begin replacing aging reactors within a decade or so.

Japan derives about 10 percent of its energy from nuclear sources and was once among the most favorably disposed toward nuclear energy. But a string of scandals involving comically shoddy practices, like mixing radioactive materials in a bucket, and near accidents have turned public opinion in many areas strongly antinuclear.

That leaves China as the only potential growth area for nuclear energy. And for China, which still derives as much as 80 percent of its electricity from burning coal, the lure of nuclear energy is as obvious as the thick, acrid, choking haze that hangs over virtually all the country's cities.

The problem with nuclear power, some experts say, is that China's energy needs are so immense - each year, by some estimates, the country plans to add generating capacity from all sources equivalent to the entire current energy consumption of Britain - that even the enormous expansion program will do little to offset the skyrocketing power demand.

China's eight nuclear reactors in operation today supply less than 2 percent of current demand. By 2020, assuming the national plan is fulfilled, nuclear energy would still constitute under 4 percent of demand.

There has been almost no public discussion of the merits and risks of nuclear energy here, as the government strictly censors news coverage of such issues. But critics question whether such a small payoff warrants exposure to the risk of catastrophic failures, nuclear proliferation, terrorism and the still unresolved problems of radioactive waste disposal.

"We don't have a very good plan for dealing with spent fuel, and we don't have very good emergency plans for dealing with catastrophe," said Wang Yi, a nuclear energy expert at the Chinese Academy of Sciences in Beijing. "The nuclear interest group wants to push this technology, but they don't understand the risks for the future. They want to make money. But we scientists, we want to take a very comprehensive approach, including safety, environment, dealing with waste and other factors, and not rush into anything."

Chinese nuclear operators, like the people who run the Daya Bay plants here, scoff at such concerns.

"In China we have state-owned power companies, whereas abroad they have private companies," said Yu Jiechun, a senior engineer at the China Guangdong Nuclear Power Holding Company. "It's not a matter of someone's profit here, whether we do something one way or another. The government decides, and they have spent huge amounts of money on safety."

The government is also looking into a new generation of "pebble bed" reactors that some scientists say are far safer than traditional designs, though these are not a part of its immediate plans.

One sure sign of the Chinese industry's self-assuredness is the promotion of the Daya Bay plants as a tourist attraction. For now - in a country where surging power demand has led major cities like Shanghai to force companies to stagger working hours, shut down during the week and operate on weekends - the public is likely to support anything that promises more electricity.

American experts, mindful of the destructive consequences of the near catastrophic accident at the Three Mile Island nuclear plant in 1979, warn against overconfidence.

"In 1970 we had a net capability of 7 million kilowatt hours, and by 1981 we had reached 56 million kilowatt hours," said John Moens, a nuclear analyst at the United States Department of Energy. "So the rate of growth they propose is not only conceivable, it has been done before. The problem is, can you regulate it? Can you deal with the environmental problems? Can you deal with the hundred different things that creep up, as the Japanese found when they expanded their industry, just as we found when we expanded ours?"

Reinforcing this point, David Lochbaum, a nuclear energy expert at the Union of Concerned Scientists, a private, nonprofit group based in Cambridge, Mass., said that of the 103 reactors in operation in the United States, 27 have been shut down for at least a year since September 1984.

Daya Bay's location less than 50 miles from Hong Kong, where the proximity has become a political issue, only reinforces the environmental and safety concerns. That may sound like ample space, but it is not much different from the distance from New York City to the Indian Point nuclear plant in Buchanan, N.Y., which has become an issue since the Sept. 11 attacks.

"Of the technologies that exist today, you have to look at what can happen on the worst day," Mr. Lochbaum said. "With wind power, you can go bankrupt. With a dam burst, lives can and have been lost, but it's fairly localized. The cost of cleaning up after Chernobyl, though, is greater than all of the benefits of the entire Soviet nuclear power industry combined, and it could have been worse."