

Asian Energy Surge Hits America

THE IMPACT OF CHINA AND INDIA

BY GARY M. STERN

TO KEEP THE INDUSTRIAL REVOLUTION humming in Asia in 2006 and 2007, China and India needed to build new coal-fired power plants. In fact, the number of power plants developed in Asia is so staggering that its impact is being felt by U.S. utilities.

In 2006, China built 90,000 megawatts of coal-fired power plants, which exceeds the entire generation capacity of the United Kingdom by 13,000 megawatts, notes Jeremy Carl, a research fellow at Stanford University's program on energy and sustainable development. India built 22,000 megawatts of new electricity plants in the last five years and has plans to add 70,000 megawatts in the next five years, though Carl expected only 45,000 megawatts to be completed. "China dwarfs everything, and India's development is growing," Carl says.

What impact is this massive, unprecedented power generation in Asia having on U.S. utilities? Carl says that Asia's electricity boom is causing them several problems. "China has vacuumed up the technology and personnel needed to implement these power plants," he says. Hence, domestic utilities are having problems with "equipment availability, getting construction equipment on time, and obtaining the necessary number of engineers," he says.

Because of this development in Asia, material costs of steel and copper have been skyrocketing. Carl says the increasing cost of capital development may limit the building of coal-fired power plants in the United States, which are already more expensive to build than natural gas plants. "With regulatory uncertainty involving carbon emissions, it's hard to justify spending \$2.5 billion to build sizable coal plants and then have to make major modifications," he asserts.

Based on the worldwide demand for raw material and equipment, Siemens, which provides equipment and oversees building of coal, steam and natural gas power plants, has been facing delays on orders of steel fabrications and piping, explains Phil Karwowski, Siemens' director of energy solutions for the Americas, based in Orlando, Fla. A combined cycle power plant that took 24 months to build several years ago now takes 30 to 32 months because of the competition for equipment and raw material.

Hence utilities are confronted with sticker shock due to raw material price increases. Copper, which cost \$1 a pound four years ago, skyrocketed to \$4 a pound, so a \$1 million purchase of copper wiring for a new power plant now costs \$4 million, Karwowski points out. Moreover, the dollar is weak compared to foreign currencies, so purchasing any equipment or material overseas is more costly.

Labor costs are also on the rise in certain markets. Power



China is rapidly adding new coal-fired generation plants, including the Waigaoqiao plant located in Pudong, Shanghai, which provides 40 percent of Shanghai's power. The \$1.9 billion plant opened in 2004.

PHOTO COURTESY OF SIEMENS

plant contractors must compete with oil and gas projects for welders and pipefitters. Moreover, companies like Siemens are in a worldwide competition to hire qualified engineers who are in considerable demand.

Because of rising costs combined with pressure from environmental groups and an expected restriction in carbon emissions in the future, many U.S. utilities are exploring alternatives to building coal-fired electricity plants. Siemens has been ramping up building new natural gas plants, particularly in Utah, California, Oregon and Washington. Utilities are developing natural gas plants, which are often smaller in square footage and infrastructure and can be built in half the time of coal plants and usually at one-third to one-half the price, Karwowski notes.

MATERIAL IMPACT

As the utility with the largest capital construction program in the United States, AEP has been contending with the effects of the spike in Asian power plant construction. It



faces increased costs for nickel and zinc and has "to get into the queue for supplies such as cranes," explains Nick Akins, AEP's executive vice president for generation, who is based in Columbus, Ohio. Material costs have been rising at the rate of 10 percent a year, and Akins expects an 8 percent increase this year.

To counteract the wait for materials, AEP pre-ordered supplies for the building of its new ultra coal John W. Turk coal plant in Arkansas, which it expects to gain regulatory approval early this year. "We locked in orders for boilers, highly specialized tubs, and steam generators," Akins says. If construction begins in 2008, it is expected to take three years to complete. Had AEP waited to order materials after approval, construction might have been extended another two years because of equipment delays.

AEP has not shied away from building coal power plants. AEP is committed to developing "clean coal technology, capturing carbon, but we believe in a balanced portfolio of energy efficiency. Coal is a major resource, and the U.S. has a huge indigenous supply," Akins states.

Raw material bottlenecks are also slowing down the prospect of building new nuclear plants for many utilities. The demand for Japan Steel Works reactor vessels that contain the nuclear reaction and house the active fuel is causing long delays in building new nuclear plants. JSW is the major global manufacturer of the product. "The queue for vessels is so backlogged that they would be delivered in 2015," Akins notes. A nuclear plant begun in 2008 would likely not be finished until 2020.

Despite these delays and the increase in steel and aluminum prices, Eric Smith, associate director of the Entergy-Tulane Energy Institute in New Orleans believes new nuclear plants will soon be built in the United States. "Utilities are looking at nuclear power as an answer to a maiden's prayer and a way to get around complaints of environmental air quality," he says.

Because of the difficulty in obtaining material and competition for talent, building new capacity in a regulated market must be done five or six years in advance, reports Ed Day, an executive vice president at Southern Company Generation in Birmingham, Ala., who is responsible for engineering and construction. Since Southern and other utilities must do planning for the more distant future, it heightens risk factors and makes it more difficult to predict future power needs.

Southern Company faces stiff competition from refineries that need to be rebuilt because of the Katrina disaster in the Southeast for skilled ironworkers, sheet metal workers, and welders, Day notes. Workers who earned \$25 an hour several years ago are now earning \$35 to \$40 an hour and many have not previously worked in utilities or large industrial facilities.

Nonetheless, Southern has proceeded in building three natural gas units, two in Orlando, Fla. and one near Columbus, Ga. What previously required two to three years to complete now takes twice that long, Day says, because of having to wait for material, find the necessary engineers, obtain skilled workers and get the necessary permits in advance.

CHINA SYNDROME

All of China's infrastructure growth, not just coal power plants, is driving up the prices of raw materials, says

Barry Worthington, executive director of the United States Energy Association, based in Washington. The coal plants themselves are only having a modest effect on the United States, he adds. "Whether you're putting a plant in the ground in Nevada, Texas or China, you're paying global prices," he says. Whether a U.S. utility decides to build a power plant is more affected by regulatory and public opinion issues due to climate change than to electricity development in China, he says.

However, Worthington asserts that U.S. utilities are beginning to see a gradual rise of coal prices affected by global markets. Though most U.S. utilities are currently covered by long-term contracts, when these contracts are renegotiated, prices may rise. The United States doesn't export coal to China, though Australia and Indonesia do.

Tulane's Smith says the price increases due to new Asian plants are not the major stumbling block preventing the United States from building new plants. "It's part of the equation but not the major variable. Ask any utility that uses coal in great quantities and they'll say they can handle these other issues and still deliver enough power to satisfy everyone." Last year, U.S. utilities cancelled the building of 31 coal plants, mostly due to pressure from the environmental community.

Some experts say the rising cost of building materials will promote renewable energy in the United States. Brad Collins, the executive director of the American Solar Energy Society, a nonprofit membership organization based in Boulder, Colo., says, "The skyrocketing demand of energy in China will spur more renewables in the states. The construction of these plants in Asia has put a worldwide demand on steel and concrete and that raises the cost of construction of such plants in the U.S."

Much of the renewables energy growth in the United States has been centered in utility-scale wind farms, mostly in Arizona and Nevada. Ironically, Collins says that China also has mandated portfolio standards to increase wind, solar and geothermal renewables. Smith notes that with the Olympics coming to Beijing in 2008 the Chinese are concerned about environmental issues. "If you look up at the sky you can't see your hand in front of your face" due to pollution, he says.

Moreover, Collins adds that the additional carbons emitted in China are making a strong case for turning to renewable energy. "The increase of the amount of coal-fired electric generation in China ... makes an argument for carbon capture and sequestration," he says.

Renewables are facing their own price hikes. Worthington says the rising cost of materials is not solely attributable to China's development. The price of silicone in solar photovoltaics has been rising, and aluminum prices in wind turbines and blades have been moving up.

AEP's Akins expects that much of the rising costs of raw materials, which are partially due to the new construction in Asia, will result in "escalating prices to ratepayers." He adds, "The international market is driving prices in the United States."

In other words, new power projects in China and India are affecting the cost and timetable of proposed power projects from California to Connecticut.

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