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Water Demands of Coal-Fired Power Drying Up Northern China

The coal industry withdraws 15 percent of China's water, much of it in arid northern China

By Coco Liu and ClimateWire | Monday, March 25, 2013 | 14 comments

SHANGHAI -- The world's biggest coal consumer now has a new incentive to take a cleaner energy path, as China's coal-fired power plants are drying up the country's already scarce water resources.

A report published today by Bloomberg New Energy Finance notes that the top five Chinese power generators -- China Huaneng Group, China Datang Corp., China Huadian Corp., China Guodian Corp. and China Power Investment Corp. -- have hundreds of gigawatts of coal-fired power plants in the country's dry north and that retrofitting them with water-efficient solutions could cost billions of dollars.

"Today, 85 percent of China's power generation capacity is located in water-scarce regions and 15 percent of this still relies on water-intensive, once-through cooling technologies," said Maxime Serrano Bardisa, one of the report's authors as well as Bloomberg New Energy Finance's water analyst.

At the same time, the nation is seeing less and less water. According to separate research by the China Environmental Forum, an initiative of the U.S.-based Woodrow Wilson International Center for Scholars' global sustainability and resilience program, China's total water reserves dropped 13 percent from 2000 to 2009, with the water shortage being particularly severe in the north.

The coal industry has played a big role in the shortage, the report says. Northern China has 20 percent of the country's freshwater supply, but its coal mining and coal-fired power generators are thirsty for water. Bloomberg New Energy Finance estimates that in 2010 alone, the two sectors combined withdrew 98 billion cubic meters of fresh water across the region -- or nearly 15 percent of China's total freshwater withdrawals in the year.

If the five Chinese power giants continue their current development of coal-fired plants, the report predicts, the sector's water withdrawals will exceed 25 percent of China's 2030 target to cap its national water withdrawals at 700 billion cubic meters per year. Some Chinese regions have already extracted underground water faster than it is being replenished, and any increase in water withdrawals could further push China away from an environmentally sustainable future.

No easy solutions



DRYING UP: China's total water reserves dropped 13 percent from 2000 to 2009, with the water shortage being particularly severe in the north. Pictured: coal-fired power plant outside of Beijing.

Image: Flickr/Bret Arnett

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There are solutions to ease the water stress, but each comes with major trade-offs.

For instance, if China's coal-fired power producers move their future buildup from the dry north to parts of the water-abundant south like Jiangxi and Fujian provinces, they will have less trouble with water use but more challenges to sell the electricity they produce, as those regions are not industrial hubs. And replacing coal-fired power plants' once-through cooling systems with water-saving solutions like air-cooled systems will decrease the plants' thermal efficiency and as a result increase greenhouse gas emissions, the report notes.

Fixes for this carry a high price tag. The report says that if Chinese policymakers were to force the retrofitting of existing once-through cooling systems, more than 100 gigawatts of coal-fired power plants would be affected at a cost of \$20 billion -- not including the cost of a 10 GW reduction in power generation capacity due to lower efficiency.

"Thermal plants will have to use more efficient technologies -- but doing so will drive up both capital and operating expenditure," said Alasdair Wilson, co-author of the report. "We also expect water scarcity to continue driving the installation of wind and solar power in China," Wilson added.

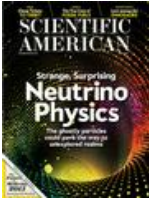
Besides a water crisis, global warming and air pollution also provide some impetus for China to burn less coal. The nation now emits more climate-harmful gas than any other country, and it faces international pressure to cut emissions. In addition, China's rising middle class in recent years has begun calling for blue skies and cleaner air, and the government here has promised to do more -- with cleaning up power supplies as a major pollution-reduction measure.

China has already made huge investments to provide more clean power. Statistics from Bloomberg New Energy Finance show that in 2012, China accounted for one-quarter of world investment in renewable sources, spending \$67.7 billion -- a 20 percent annual increase in a year when overall global investment declined.

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