



California drought is hurting the case for green energy

BY KEITH JOHNSON

Foreign Policy February 12, 2014

WASHINGTON — Among all the terrible things that California's historic drought promises to bring this year — fallow farm land, dead livestock, more wildfires — there are a couple more nasty treats in store: higher electricity prices and rising greenhouse-gas emissions.

That's because the drought is hammering California's ability to generate electricity from hydroelectric power, which will push the famously green state to burn even more natural gas, which is both pricier and dirtier. It underscores yet again just how vulnerable green energy sources such as hydropower can be to the vagaries of the weather, an issue that will vex not just the U.S., but also Brazil, China and other countries that have bet heavily on hydropower to run their growing economies.

California's drought is unrelenting. The latest information from the United States Drought Monitor shows more than 98 percent of the state facing some degree of drought; for the first time, nearly 10 percent of the state is deemed to be suffering "exceptional drought," the worst category. Since mid-January, California has been in an official drought emergency, with Gov. Jerry Brown calling for voluntary reductions in water use. But the biggest impacts are yet to be felt.

In a normal year, with average rainfall, California relies quite heavily on electricity generated from hydroelectric dams; hydropower can provide anywhere from one-tenth to one-quarter of the electricity generated in the state. But when the rain and snow stops falling during the relatively short wet season, it doesn't just affect California's ski industry or the rich farmlands of the Central Valley. It chokes the entire water system that underpins the state's dams.

Federal monitors show nearly that all of California's water resources are essentially half-empty. Usually, melting snowpack from the Sierra Nevada provides a shot in the arm for hydropower in the spring and summer, but California's sparse snowpack is currently only 16 percent as deep as it normally is this time of year.

But wait — it gets worse. Since California uses more electricity than it generates, it relies on imports from nearby states, including hydroelectric power from the normally rainy Pacific Northwest. But the drought is also hammering Washington, Oregon and Idaho, where

precipitation is in many cases about half the normal level. And that will limit California's ability to fix its own shortfalls. The only easy answer is to use more natural gas, which costs more and is significantly dirtier.

"There will be rate impacts, because we'll be using more expensive fuel, and there will be air-quality impacts in terms of greenhouse-gas emissions," Robert Weisenmiller, the chairman of the California Energy Commission, told Foreign Policy.

California knows what happens when it has to turn to more natural gas. In 2012 and 2013, thanks to dry years (and the shutdown of one nuclear power station) hydroelectricity's contribution to the electricity mix fell sharply. Gas came to the rescue.

In 2011, California generated about 42 million megawatt-hours of electricity from hydropower, and about 89 million megawatt hours of electricity from natural gas. The next year, hydroelectric generation plummeted to less than 26 million milliwatts per hour (mWh), while gas-fired generation soared to 121 million mWh.

Through November 2013, the latest statistics available, hydroelectric generation fell even further, though natural-gas generation also slipped.

The outlook for 2014 in California, then, could be one where the state increasingly turns to natural gas to supplement the lack of both in-state and out-of-state hydroelectricity. Weisenmiller said that in particularly dry years, like 2014, hydroelectricity generation could plummet a further 40 percent.

That would be bad news in two ways: higher power prices, and rising greenhouse gas emissions.

It's actually a delicate moment for natural-gas markets right now. The polar vortex drove record levels of natural-gas demand across much of the country. The prices at Henry Hub, the main physical pricing point for U.S. natural gas, prices spiked 50 percent in the last week, to levels not seen since 2008. Higher demand has drained U.S. natural-gas storage, which is currently well below average levels, which means that even as winter temperatures retreat in coming months, that storage will have to be replenished. That promises stubborn gas prices. Hedge funds are already betting on gas prices going higher.

The situation is so dire, in fact, that California's electric system operator asked customers across the state on Thursday to turn off lights and shut down big appliances in order to save scarce supplies of gas.

As California relies more on natural gas to keep the electricity running, it will mean higher average wholesale power prices, which means residential electricity bills will likely rise this

year. Add that to the list of other economic woes from the drought, from lost farm jobs to shrinking herds of cattle and other livestock.

But for California, which famously leads the nation in aggressive environmental rules and regulations, that's not the worst of it. Replacing clean electricity from hydroelectric dams with electricity from natural gas means more greenhouse-gas emissions, exactly what the state has spent years trying to avoid.

This already happened to a dramatic degree in 2012, when a weak year for hydropower and the loss of some nuclear energy pushed California into the arms of natural-gas fired power plants in a big way. For most states, and for the United States as a whole, relying more on natural gas is good for the environment. Since it normally displaces coal-fired electricity, natural gas actually helps reduce emissions.

But California already had a clean power sector. So relying more on natural gas has had the opposite impact there. That year, California's greenhouse-gas emissions from the electric power sector jumped 50 percent, making it the biggest laggard nationwide in reducing greenhouse-gas emissions, as The Rhodium Group documented. A hydropower deficit this year won't help matters any.

"In terms of reducing emissions at the rate they need to meet their target over time, just holding steady and not getting worse than last year is going to be a challenge," Kate Larsen, the director of climate change at Rhodium, told FP.

California's cautionary tale has echoes overseas, too. Brazil and China have bet big on hydroelectric power to provide large amounts of clean electricity. Indeed, both countries feature mega hydro projects - Belo Monte in Brazil and the Three Gorges Dam in China - that are at once the backbone of future power supplies and an ugly source of social strife in the present. And in both countries, droughts in recent years have hammered hydroelectricity's ability to contribute a reliable amount of power to the national grid.

For China in particular, which faces worries about a structural shift in rainfall patterns due to climate change, the potential loss of a big source of clean energy represents a huge headache for Beijing. The Chinese regime is desperately trying to clean up the coal-dependent electricity sector, because air pollution is becoming both an environmental burden and a threat to regime stability.

For now, California officials believe they've got enough options to weather a tough year. But a fourth year of extreme drought, with the severe impacts it is having on the power system, would be a different story.

"If this drought were to continue as bad into next year, then I would get nervous," Weisenmiller said.