

# Giant solar farm uses molten salt to keep power coming

- 23 April 2014 by [Hal Hodson](#)
- Magazine issue [2965](#). [Subscribe and save](#)



*Renewable energy could help underpin the grid now that the world's biggest concentrated solar storage plant is up and running in Arizona*

IN THE searing heat 130 kilometres south-west of Phoenix, Arizona, 3000 mirrors carpet hectares of desert. Part of a power plant that produces about 900 gigawatt-hours of electricity a year, they gather enough sunlight to power 70,000 homes.

This is Solana, the largest solar plant of its kind in the world, directly coupled to the biggest non-hydroelectric energy-storage system in the US. Opened in October 2013, it's a zero-carbon power plant that could underpin the energy grid of the future.

I'm standing on a raised platform at its centre, decked out in clunky safety boots and a high-vis jacket. Thick pipes run away beneath me like arteries, pumping oil out to the mirror field. There, it is channelled into thinner piping that runs right through the focal points of the mirror troughs, absorbing the heat of the Arizona sun until the oil reaches nearly 400 °C. It then returns to the plant, where the oil superheats water vapour that spins two 140-megawatt turbines.

Six enormous white tanks surround the platform. Filled with molten salt, they can store enough heat to keep those turbines spinning at full capacity for 6 hours. The oil from the mirror field unloads its heat into the salt when the generators are at capacity. These tanks are what make Solana truly useful, not just producing carbon-free energy for Arizona, but storing it for use whenever the grid operator needs it.

According to Haresh Kamath, who manages energy storage research at the [Electric Power Research Institute](#) in Palo Alto, California, Solana does a similar job to the coal and gas plants that provide the baseload supply underpinning renewable power. "It's renewable energy but it's also a balancing resource, which conventional photovoltaics are not," he says. "PV is variable and can drop off very suddenly. You've got to have something there to pick up for it."

A concentrated solar power (CSP) plant like Solana can play the baseload role because, unlike [solar cells](#), it produces energy in the form of heat. Heat can be stored far more efficiently than electricity, as it does not need to be converted to other forms.

"The attractive thing about thermal storage, particularly with CSP, is that the round-trip efficiency is very high," says Charles Barnhart, a physicist at the [Global Climate and Energy Project](#) at Stanford University in California.

Brad Albert of Arizona Public Service, one of the state's utilities, says Solana is a game changer. APS has agreed to buy Solana's electricity for the next 30 years.

More plants like Solana are due to come online in the next year or so. In California's Mojave desert, Abengoa, the company which built and runs Solana, is constructing an even larger plant. Globally, CSP capacity is set to roughly

double over the next three years as more plants come on stream, and a further 10 gigawatts of CSP has been announced worldwide.

For now, Solana is one of the few of its kind. Albert says its flexibility has already proved invaluable. "In the wintertime when it's cold, we have a morning peak in demand at 6 to 7 am, an hour or two before the sun comes up. We'll ask Solana to store energy overnight and start up a couple of hours before sunrise. How cool is that?"