

As solar floods California grid, challenges loom

David R. Baker, San Francisco Chronicle, 7-14-16

The same clear, sunny weather that broiled much of California in near-triple-digit heat this week also helped the state's solar power plants set a record, briefly generating enough electricity for more than 6 million homes.

Just after 1 p.m. Tuesday, large solar plants scattered across California produced a record 8,030 megawatts of electricity, according to the California Independent System Operator, the organization that runs most of the state's power grid. That's nearly twice as much solar power as California could generate just two years ago — and it doesn't even count the electricity produced by hundreds of thousands of small rooftop solar arrays statewide.

But the push to add renewable power has complications, given that the sun doesn't shine at night and wind is intermittent, too.

Shift to renewables

The output from solar plants peaks at midday, stays close to that level for several hours and then tails off sharply in late afternoon. California's wind farms produce most of their electricity from late afternoon into the night. Electricity demand, meanwhile, tends to hit its daily peak around 6 p.m. — just as solar power is fading and wind is still revving up.

To fill the gap, the state relies on power plants that burn natural gas, plants that can ramp their output up and down quickly. Utilities like Pacific Gas & Electric Co. also offer customers incentives to use less power, through measures such as turning off lights, during the critical afternoon hours. On Friday, for example, PG&E asked some customers to power down devices between 2 and 7 p.m.

Reversing plans

“We're changing our paradigm from a grid that is largely traditional resources augmented by renewables to one that's based on renewables augmented by traditional resources, mostly natural gas,” said Steve Berberich, CEO of the Independent System Operator, in a recent interview. “Our goal is to make the gas element as small as possible.”

As part of the fight against global warming, California law requires utilities to get 33 percent of the electricity they sell from the sun, wind and other renewable sources by 2020 and 50 percent by 2030. When electricity demand on Tuesday reached its peak, at 5:54 p.m., almost 29 percent of the electricity coursing over the grid came from renewable sources, according to the Independent System Operator.

For a brief time on May 16, renewables accounted for 56 percent of the grid's electricity, according to the operator.

These figures don't count the electricity generated by the more than 537,000 rooftop solar arrays on California houses and businesses. Together, those arrays can produce as much as 4,211 megawatts of electricity.

A megawatt is a snapshot figure, roughly equal to the amount of electricity used by 750 typical homes at a single moment in time.

PG&E, which is California's largest utility, currently gets about 30 percent of its electricity from renewable sources and may hit 33 percent by the end of this year, CEO Tony Earley said last month. PG&E also owns a

fleet of large hydroelectric dams, but under state law those dams don't count toward California's renewable power goals.

The company estimates that California's increasing use of solar and wind energy pushes up electricity rates between 1 and 2 percent each year. Renewable power prices, however, are dropping fast, as more solar and wind projects come online.

Declining prices

The growing availability and declining price of renewable power contributed to PG&E's recent decision to close California's last nuclear plant, Diablo Canyon, in 2025. PG&E has pledged to replace the plant with electricity sources that don't pump greenhouse gases into the atmosphere, so that the utility would get 55 percent of its electricity from renewable sources by 2031.

"Each time we go out for bids, renewable prices have been going down, particularly photovoltaic (solar), and we have no reason to believe that's not going to continue," Earley said.

One challenge, paradoxically, is that California has added solar plants so quickly that the grid doesn't always have room for all of the electricity. On Tuesday, for example, grid operators had to curtail 292 megawatt hours of solar electricity, equal to 292 megawatts over the course of an hour.

As a result, the Independent System Operator is exploring the possibility of launching a unified power market that would cover most western states, so that California's solar plants and wind farms could sell their excess power to customers outside the state.

"I don't think it makes societal or economic sense to turn off zero-carbon, zero-marginal cost power so frequently," Berberich said this week, discussing the possibility of a multi-state market. "The opportunity to sell that power out of state ... allows renewables to flourish within California and without."