

Solar energy expert shares blueprint for a carbon-free future in PV-tech power

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Last year, California set the nation's most ambitious energy goal—deriving 100 percent of its electrical power from renewable sources by 2045. Many other states have since joined with similar goals,

including New York, with Gov. Cuomo's "Green New Deal" calling for 100 percent carbon-free electricity by 2040.

Though critics argue these targets are not realistic, solar [energy](#) expert Richard Perez believes he holds the blueprint to success.

Perez, a senior research associate at the University at Albany's Atmospheric Sciences Research Center (ASRC), has published a new paper in PV-Tech Power that describes his cost-effective solution to bridge the gap between production of [renewables](#)—such as solar and wind—and customer demand. It combines the use of oversized renewable assets and energy curtailment.

According to Perez, energy storage technologies have long been considered a critical component of achieving high use of renewables. For example, solar [photovoltaic](#) (PV) panels can collect energy from the sun during the daytime and use electrochemical battery storage to meet demands after sunset and during winter or other seasonal variations. However, large and longer-timescale solar supply gaps are more complicated and expensive to maintain.

Instead, Perez and his co-authors, suggest a "counterintuitive strategy." By building oversized renewable assets, more energy is produced, limiting seasonal imbalances and the need for a large amount of storage. The oversizing strategy is combined with a practice called curtailment, which reduces output to below capacity during peak times, saving money and resources.

"There are many promises for 100 percent renewables in the next 25 to 30 years. We're creating a realistic, a [cost-effective](#) solution to get us there," Perez said.

Clean Power Research recently tested this method on the Minnesota

power grid. By combining oversized renewable assets with curtailment, the total electricity storage size was reduced by a factor of 10. The study projected that wind and solar could meet 95 percent of the state's energy needs by 2050 at a cost of 3.5 cents/kWh—lower than current wholesale market prices.

Perez said the study's results validated that "synergies between overbuilding and curtailment can transform solar and wind into dispatchable resources capable of meeting customer demands at all times and at a reasonable cost."

"Today, no one is talking about overbuilding and curtailment as a realistic solution," Perez said, "It's time to shift from thinking about how to monetize every unit of renewable energy and instead focus on how to balance the supply and demand throughout the year."

Along with Perez, the paper's other co-authors include Karl Rabago, the executive director of the Pace Energy and Climate Center at Pace University in New York, Marc Perez, a senior researcher at Clean Power Research in California and Morgan Putnam, vice president of solar analytics at RESurety.

Provided by University at Albany

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