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WSJ: For Storing Electricity, Utilities Push New Technologies.

SAN FRANCISCO—From backyard tinkerers to big corporations, inventors have been struggling to find a way to store solar, wind and other renewable energy so it can furnish electricity when the sun doesn't shine or the wind doesn't blow.

Now California is offering businesses a big incentive for success—contracts that the utility industry estimates could total as much as \$3 billion for successful, large-scale electricity-storage systems.

Starting this year, big utilities that do business here must begin adding enough battery systems or other technology so that by 2024 they can store 1,325-megawatts worth of electricity—nearly 70 times the amount that the handful of mostly experimental systems in the state store now. Regulators are also requiring municipal utilities to buy or lease energy-storage equipment.

The storage systems California wants don't exist on such a scale, so the new rules amount to a big bet—paid for by utility customers—that creating demand will produce workable new technology. If so, other states are likely to follow suit, experts say.

"We're not talking about lab experiments anymore," said Nancy Pfund, managing partner of Silicon Valley venture-capital firm DBL Investors. "We're talking about a real solution to a growing issue as renewables become a bigger percentage of everyone's grid. The whole world is watching this."

Like most states, California has an electric system that was built around big power plants that cranked out electricity around the clock. But utilities here are on track to get a third of the electricity they sell from intermittent resources like solar panels and wind turbines by 2020.

Nationally, renewables accounted for 37% of the new generating capacity added last year, according to the Federal Energy Regulatory Commission.

Utilities now use small natural-gas plants to fill gaps when power generation and demand aren't in balance, but the state thinks storage systems would be more efficient and produce less pollution.

At least in the first few years, many of the storage contracts are likely to go to projects that use rechargeable batteries, like the ones in electric cars and buses, industry officials say. Batteries have been tested for durability and safety by the automotive industry, and they are in widespread use.

"Battery technology is probably going to be the immediate, short-run leader," said Jeff Gates, managing director of commercial transmission at Duke Energy Corp. DUK +0.57% in Charlotte, N.C. Duke built a large battery-storage facility near one of its Texas wind farms, and the company plans to build similar projects in California and other states, he said.

While utilities have installed a handful of battery-storage systems in California and other places, many of them were designed to store less than an hour's worth of electricity to provide extra power to transmission lines. Under the new program, California utilities are likely to want systems that can

store at least two or three hours of power to fill in gaps left by solar panels after sunset, Mr. Gates said.

Different types of batteries are already being made by manufacturers including General Electric Co. GE -0.59% , of Fairfield, Conn., and LG Chem Ltd. 051910.SE -1.17% of South Korea.

Some people hope that California's bet on energy storage will create opportunities for technologies that currently exist only in the lab or in one-off projects, including storage based on compressed air or giant flywheels. Gravity Power LLC, a startup in Goleta, Calif., uses deep underground bore holes, filled with water, to create energy when huge pistons are dropped down central shafts.

Among the questions the California experiment may answer is where storage devices should be installed. Some experts think they should be built next to wind farms, for example, as Duke did. Others suggest they should be located along transmission lines or installed next to businesses and homes with solar panels.

"I don't think we understand the function of storage on the grid [enough] yet to know where it would have the highest value," said Mark Nelson, a power-planning manager at Southern California Edison, based in Rosemead, Calif.

SolarCity Corp. SCTY -4.16% , of San Mateo, Calif., in December began offering commercial customers rechargeable batteries—the same ones that are used in Tesla Motors Inc. TSLA -3.91% electric cars—along with solar panels. Tesla, of Palo Alto, Calif., said Wednesday that it plans to build a U.S. battery factory to supply its Fremont, Calif., car factory and SolarCity's energy-storage business. "Storage is important because the sun only shines part of the day, but we use electricity all of the day," Elon Musk, who is chairman and chief executive of Tesla and chairman of SolarCity, said Thursday during an appearance in San Francisco.

Southern California Edison recently installed stacks of lithium-ion batteries at an Irvine, Calif., parking garage that has solar panels on the roof and a row of electric-car chargers on a lower floor. The panels generate electricity for the car chargers and the batteries, which help power the chargers after sunset.

Some utilities and consumer advocates worry that the technologies are expensive and aren't ready for prime time.

Mike Niggli, president of San Diego Gas & Electric Co., a unit of Sempra Energy, said that although there are many storage technologies, "few of them are cost-effective at this time."

The financial strength of some companies likely to offer their products is also a concern, following a series of bankruptcies by battery makers, including Xtreme Power, which filed for Chapter 11 last month, and A123 Systems Inc. and Ener1 Inc., which filed for bankruptcy protection in 2012.

California is one of 37 states that have renewable-energy mandates or goals, but the only one to require utilities to buy lots of storage.

"Energy storage is a highly specialized market now," said Haresh Kamath, a researcher at the Electric Power Research Institute, a utility-funded group in Palo Alto, Calif. "But I expect it to become an important part of the grid's architecture in coming years."

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