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Used Batteries Might Help California Store Renewable Energy

A new report argues that batteries from old electric cars could help the Golden State store electricity from sunshine and wind

ClimateWire

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Used batteries from plug-in electric vehicles could help California meet its goals for energy storage, a report from the University of California, Los Angeles, and UC Berkeley law schools said.

In a few years, there will be a growing number of EV batteries that have lost some of their ability to hold power, the analysis said. That will decrease the number of miles the car can go on a charge, making it less useful to some drivers.

There could be a new life for those batteries and potentially profit for EV owners and car companies that make electric vehicles, the report said. The batteries, it said, could play a big role in the state's push to add more renewable power, holding energy for times when the sun isn't shining or the wind has stopped blowing.

"Instead of recycling them immediately, the thousands of batteries that will be coming out of electric vehicles in the coming years could be repurposed, leading to a flood of inexpensive batteries that can provide energy storage services for customers, utilities, and grid operators," the study said. "These second-life batteries could provide multiple value streams to customers and grid operators and benefit the environment by integrating variable renewable energy and reducing the upfront cost of electric vehicles."

California has been pushing for more energy storage. Energy managers last year set first-in-the-nation targets for boosting it. In total, Pacific Gas and Electric Co., Southern California Edison Co. and San Diego Gas & Electric Co. must obtain 1.325 gigawatts by 2020. When the standard was set last year, the amount represented a 50 percent increase in storage capacity worldwide, not counting energy stored behind hydroelectric dams (*E&ENews PM*, Oct. 17, 2013).

The state last month launched an effort aimed at helping that storage come online. Agencies that deal with electricity asked utilities, storage developers, environmental

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Tesla Roadster.
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groups, consumer advocates and others to describe the barriers impeding more storage. The California Energy Commission, the California Public Utilities Commission and the California Independent System Operator, which manages the grid, are crafting a storage "roadmap." They plan by the end of the year to issue a guide each agency could then use to address problems (*ClimateWire*, Aug. 4).

With sales for plug-ins growing, it became important to look at the battery issue, said Ethan Elkind, a climate research fellow at the UC Berkeley School of Law and author of the report.

California needs to get policies in place now, he said, to help the "second-life" EV battery market flourish.

"California is perfectly positioned to be the leader in the country, if not the world," Elkind said. About 40 percent of the nation's electric vehicles are in California. The state just passed 100,000 registered plug-in EVs. There's a need for storage because of the growing amount of renewable power, and utilities must comply with the storage mandate, he said.

"When you factor all of that in, it's sort of the perfect test bed for seeing the secondary market develop," he added.

Timing, scale are issues

Used EV batteries as storage are "a very interesting option," said Mark Higgins, senior director at the California Energy Storage Alliance. Utilities tend to be cost-sensitive, he said, and "this provides a mechanism to gain access to energy storage at lower cost."

"If the cost is competitive enough, a utility might make the choice, 'I'm going to go with used batteries instead of new ones,'" Higgins said.

But he noted that there are some obstacles. There would need to be a "very, very aggressive refurbishment process" to make used EV batteries work for energy storage, Higgins said. There would need to be the right infrastructure, the right software and "additional equipment developed to house those batteries" and convert their function.

The amount of energy storage needed under the state mandate is much larger than the amount of storage in EV batteries that is expected to be available in the short term, Higgins said.

"The scale that the utility would be looking at would require them to use many, many car battery cells," Higgins said. "You'd need tens or even hundreds of thousands of recycled batteries, used car batteries, to meet the procurement target California has as a state."

As well, he said, there's an issue of timing and how soon batteries would be available. Nissan, maker of the Leaf, Higgins said, offers an eight-year, 100,000-mile warranty against defects in the car's battery. There is a five-year, 60,000-mile warranty against capacity loss.

"You're probably looking at like eight to 10 years before cars have enough capacity loss to need battery replacement," Higgins said. He added, though, that it is a "medium- to long-term opportunity that could be really interesting and is really complementary to some of the shared goals that the state has."

Although the used EV batteries will fall short of meeting the total amount of the energy storage mandate, Elkind, said, they will get one-third of the way there by 2020. That's based on an assumption that half the battery packs on the road this year could be repurposed with 75 percent of their original capacity.

Competing against new batteries?

Anthony Eggert, executive director of the Policy Institute for Energy, Environment and the Economy at UC Davis, said that the idea of using refurbished EV batteries has merit. It will come down to the economics, he said.

Battery prices are expected to drop in the future, he said, and used EV batteries will be competing with new batteries. To figure out whether the EV batteries are cost-competitive, he said, "you have to look at the future costs of batteries, not the current cost of batteries."

Some automakers, including Tesla Motors Inc., have expressed interest in selling batteries directly into the energy storage market, Eggert said. Those batteries would be made at Tesla's planned "Gigafactory." The EV company would partner with SolarCity, as Tesla CEO Elon Musk is chairman of SolarCity.

That also could help make the used EV batteries more marketable, Eggert said, as they would be considered already proven to work for storage.

The state should get started now with demonstration projects and other efforts that could prove out the concept and the economics of EV batteries as storage, Elkind said.

"Let's take next three to four years and put rules in place" to help give EV batteries a second life, he said.

There are rules already in place that might also need to be reviewed, he said. For example, batteries are considered hazardous waste, so shipping them is difficult.

The right policies could give businesses assurances, he said. Car manufacturers, if they see a market for it, might want to sell the EV batteries when leased cars are returned.


It could mean money for EV makers and owners, Elkind said. The study, citing other research, said that "a used 24 kilowatt hour Nissan LEAF battery could net the vehicle owner up to \$2,400 in resale value, while a Tesla Model S owner could sell the 85 kilowatt hour battery pack for up to \$8,500."

"Lower upfront prices from this future revenue mean greater adoption of these vehicle technologies that can dramatically reduce air pollution and save consumers money over the life of the vehicles," the report added.

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