BMW and PG&E think electric vehicles could stabilize California grid

As blackouts become more common during California's fire season, utility PG&E is looking to electric vehicles as one potential backup plan for the state's stressed-out grid. It's been working with carmaker BMW to test whether electric vehicles could provide power when there's an outage or not enough energy to meet demand.

Theoretically, a network of EV batteries could one day provide a backup source of energy for communities called a "virtual power plant." But first, automakers and utilities will need to see if it's worth it to work with each other. Then, they'll need to get their customers on board, too. BMW and PG&E's partnership is a sort of test run for that.

The two companies started working together in 2015. Until now, the pair has mostly focused on increasing the amount of renewable energy used to charge EV batteries. It's a strategy called "smart-charging" that encourages EV owners to charge their cars during times of the day when there is less electricity demand and more available renewable energy, like solar power. Starting this week, they're expanding the program, and PG&E customers who drive electric or hybrid BMWs can apply for a 24-month "smart-charging" pilot program and earn cash incentives when they charge their cars during recommended hours.

The cars won't be selling energy back to the grid, but the program could give PG&E some early insight into when and where drivers charge their cars, according to Adam Langton, an

energy services manager at BMW of North America. That'll be key for getting drivers on board for vehicle-to-grid charging.

The two companies also said they would begin testing hardware in a lab this year. BMW needs to know how often PG&E might ask drivers to connect to the grid and what toll that might take on the car. PG&E needs to know how much energy a car battery can provide and for how long. They're also figuring out what additional infrastructure might be needed at someone's home and across the grid to make all of this happen.

PG&E's territory is a fertile testing ground for vehicle-to-grid technology

PG&E, which is based in San Francisco, serves a territory that's a fertile testing ground for vehicle-to-grid technology. It's already home to more than 320,000 electric vehicles. That's roughly 20 percent of all electric cars in the US, according to the utility. By 2030, 5 million EVs are expected to be on the road in California. (Last year, California became the first state to ban the future sale of internal combustion engines.)

All of those new EVs could put more pressure on an already-strained, aging grid system in the US. But tapping EV batteries for their energy storage capabilities could also provide a boost to the system.

"The amount of energy storage you have driving on four wheels is much more than any electric utility will ever build and put on the grid. So it now starts to make sense that you use this as a resource to stabilize the grid," Gerbrand Ceder, a professor of materials science and engineering at the University of California, Berkeley, told *The Verge* last year after Tesla CEO Elon Musk said its future vehicles will be able to connect to the grid.

BMW's upcoming i4, its first fully electric sedan, is supposed to be able to drive up to 300 miles on a single charge of its

80kWh battery pack. Since most commuters don't regularly drive that far in a single day, they could one day choose to sell some of that unused energy back to the grid.

In a separate initiative, BMW plans to test the first 50 i3 cars capable of backfeeding energy to the grid in Germany starting in June. Nissan and Honda have also looked into so-called "bi-directional charging."

With enough EVs connected to the grid, they could become sizable "virtual power plants"

With enough EVs connected to the grid, they could become sizable "virtual power plants." These are basically just networks of connected batteries that utilities might be able to call upon collectively when they need more juice. Interconnected residential solar power systems can also serve the same purpose. The hope is that by working together, all of those batteries can alleviate stress on the grid whenever there's peak demand. Virtual power plants could also replace polluting, fossil-fueled "peaker plants" that utilities have historically relied on when they're short on energy.

Virtual power plants can also supply energy if a disaster like a storm or fire forces a power plant offline. Since a virtual power plant is a more "distributed" source of energy (meaning it's made up of a bunch of batteries spread out across many people's homes), it's less likely to suffer a complete failure during a single disaster than a more centralized power source like a power plant.

After investigators found that PG&E's transmission lines sparked the deadly 2018 Camp Fire in California, the utility started implementing preemptive outages during fire season in an effort to prevent another blaze. In that scenario, car batteries could potentially provide power to their owners' homes once the lights go out.

When asked whether PG&E is working with any other automakers

on vehicle-to-grid technology, product manager Maria Sanz said in an email that the company “expect[s] to have more to share on this topic later this year.”

BMW is still a small player when it comes to electric vehicles, with just one fully electric vehicle model available in the US. And even if the world’s leading EV-maker, Tesla, plans to build bidirectional charging cars in the future, Musk admittedly isn’t a fan of the technology. “Very few people would actually use vehicle-to-grid,” Musk said during Tesla’s Battery Day last year. (Tesla already sells home batteries called Powerwalls, which can also be used to form virtual power plants, to accompany its solar panels.)

“We think that the drivers are going to be willing to participate”

In the past, car manufacturers and consumers have been concerned about whether vehicle-to-grid charging might prematurely wear out car batteries. As a part of its tests, BMW plans to study how well its batteries would hold up if they’re called on by PG&E to provide energy — and by extension, whether it makes sense for its customers to plug into the grid at all.

Figuring out how they can actually get customer buy-in will be another big part of BMW and PG&E’s joint initiative. “From our perspective, we think that the drivers are going to be willing to participate in [vehicle-to-grid charging], but we need to do that in a way that doesn’t compromise their mobility,” says Langton. Future EVs might be able to do wonders for the grid, but that can’t come at the cost of their main job: driving.

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