

Battery-powered vehicles can clean California's air and help cut electricity rates

By Cliff Rechtschaffen and Pataaty Monahan
Sacramento Bee, Wednesday, April 14, 2021

Gov. Gavin Newsom's executive order requiring all new cars and many trucks sold in California be zero-emission by 2035 advances not only cleaner air but also, potentially, cleaner and more affordable electricity for all Californians.

With a \$1.5 billion boost proposed in this year's state budget and renewed support from Washington, D.C., the directive will significantly accelerate the electrification of transportation in a state that already dominates the country in both the sales and manufacturing of battery-powered vehicles.

California has cumulatively sold more than 800,000 zero-emission passenger vehicles and thousands of nonpolluting trucks and buses. To support the continued rise, the state has been expanding battery charging stations and options, especially in low-income communities and for renters.

If we meet our ambitious climate-fighting goals, the electric fleet and charging ports will swell to millions in the next 15 years, becoming the most significant new load on the state's power grid since the rise of air conditioning in the 1950s.

Having so many more vehicles tapping into an electricity system already stressed by climate-driven extreme heat and wildfires may seem like a recipe for overload and outages. The good news, however, is that electrified transportation at the mass scale needed to combat smog and climate change can also fortify the grid.

A process known as vehicle-grid integration, or VGI, allows drivers to program their battery charging in a way that helps balance demand and supply on the electricity system. Engineers are well into the commercialization of standardized, scheduled charging technologies that will make it easy for drivers to charge up during hours when demand on the grid is low — and yet meet their driving needs at the lowest possible cost.

Currently, most motorists in California can fully charge their cars at the equivalent of \$1.12 a gallon during off-peak hours. In the future, cars plugged in at work or home wouldn't begin charging until the grid sends a signal that demand has tapered off and electricity is cheapest. The pocketbook savings from lower fuel costs will especially benefit lower-income families, who spend about 30% of their household budget on transportation.

The arrangement is not just economical for participating drivers. As electricity replaces gasoline, utilities can spread the costs of operating their electrical system over a higher sales volume, resulting in lower rates per kilowatt of electricity for all customers.

Grid-integrated vehicles could also help make California's electricity greener. Currently, California can't use all the power that renewable plants can generate. The operator of the state's grid has been curtailing production from solar and wind farms at increasing amounts. During some months last year, the amount curtailed was enough to recharge all electric passenger vehicles in the state.

As VGI technology progresses, some electric vehicles will be able to send power back to the grid during peak demand periods, offsetting the need for new power plants and providing backup power to homes and buildings during outages. Electric car batteries will act as on-site generators — only cleaner, running on electricity rather than diesel or gas.

The batteries, which are typically replaced with 80% capacity remaining, could also live productive second lives, providing storage to help balance supply and demand on the grid. A recent McKinsey report found that the supply of these second-life batteries could meet half of global storage demand by 2030. The value from second-life batteries will further cut the costs of owning an electric car.

The state's energy agencies are taking steps now to expedite vehicle grid integration. With the right policies and technologies in place, California will have many more drivers going electric and drawing more clean power from the sun and wind — all the while ensuring a steady supply of affordable power to all residents.

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