Forbes

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GREEN TECH | 9/28/2011 @ 11:54AM | 2,258 views

The Cash-Back Car: NRG Wants To Buy Electricity From EV Owners

Image by AFP/Getty Images via @daylife

The cash-back car is one step closer to reality in the United States. This week NRG Energy Inc. (NYSE: NRG) announced that it will play a key role in vehicle-to-grid implementation here, allowing electric vehicle owners to earn potentially $1,000 a year, or net about $440 after paying for charging. Car owners could earn this money by selling an energy service called frequency regulation to the grid from their parked cars' batteries.

Now NRG has bought the U.S. license to a proprietary aggregator technology created at the University of Delaware that interfaces between individuals and energy wholesalers, such as regional transmission organizations (RTOs) or independent system operators (ISOs).

In one of my first columns for Forbes, I wrote about the promise of the cash-back car, outlining the grid's growing need for energy storage, including short-term frequency regulation; why the grid values energy storage devices like car batteries over existing natural gas peaker plants; the changing regulatory environment that aims to make such services profitable; and the patented technology that NRG bought rights to this week that could help to transform the electricity sector.

When I wrote that article in late June, the technology's inventor, University of Delaware professor Willett Kempton, had just sold the international license to Copenhagen-based Nuvve. Kempton had also done a pilot study at the university. Now the U.S. license is settled as well. Princeton, N.J.–based NRG

owns and operates power plants in the United States that generate more than 25,000 megawatts, enough to supply electricity to about 20 million homes. It is incorporating a subsidiary company that will hold the license and will be called eV2g.

Traditionally we've been a power generator," said Denise Wilson, president of alternative energy services, NRG. "But in last couple of years, we've really moved into the smart energy solutions area. We also have an EV group that's ... really done a lot in the EV space."

The grid needs short-, medium-, and longer-term storage to run smoothly, and car batteries could most easily meet the short-term need, a process called frequency regulation. And as we ramp up our percentage of renewable energy from variable sources like wind and solar, the need for this service is growing. Balancing the grid with car batteries could decrease electricity costs over time by delaying or eliminating the need to build new generation.

The technology for which NRG bought the license is necessary because RTOs and ISOs aren't equipped to manage power from individual cars. The energy generators and frequency regulators wholesalers work with must be of a certain size. So for cars to play, they have to aggregate. That's what the software does.

For example, PJM, the RTO that operates in Delaware and 12 other states, requires 500 kilowatts to be registered as a generator, although it may revise that down to 100 kilowatts by the end of the year. Still, that means vehicles have to be grouped together to be able to earn payment. "One hundred kilowatts would require about 15 cars, some offline and some driving," said Kempton.

The technology will allow EV owners to sell battery storage back to the electric grid while the EV is plugged in—without impacting daily driving needs. EV owners can schedule in advance any times their vehicles need more charging than usual and what minimum level of charge they want to maintain. NRG's eV2g will then collect payment from the grid operator and pay EV owners for making their vehicles available.

"What we're looking at is now taking this to scale with a conventional commercial fleet so we can show that it actually operates," said Wilson. She estimates that NRG will announce pilot partnerships with company fleets by the end of the year, and it will take 2 to 3 years to achieve full scale on the fleet side. Offering the service to regular car owners would be the next step after that.

Some people worry that using their car battery in this way would shorten its lifespan, but that's not the case. Frequency regulation doesn't require the deep discharges that shorten battery life. "Frequency regulation is very short periods of charging and discharging which will have very little impact on the general state of charge of the battery," said Nathaniel Pearre, a V2G analyst and graduate student in energy policy who works with Dr. Kempton.

But that doesn't mean battery manufacturers are yet allowing this practice under warranty. Companies' knee-jerk reaction to questions about whether something would void the warranty is often yes.

"We have spoken with several [manufacturers] who have looked at our duty cycle and said, 'Well, that's not going to have any effect at all,'" said Pearre. Of

course, those comments “certainly were not indicative of a warranty policy,” he said.

But most EVs currently on the market, including the Nissan Leaf and Chevy Volt, are not able to participate in a vehicle-to-grid program because they are not equipped to send power back to the grid. To do that, they would need a bi-directional power electronics unit, and V2G promoters are encouraging manufacturers to add this feature.

“We all know car companies are a little bit like giant ships: it takes them a long time to change direction,” said Pearre. “There’s a lot of talk about vehicle-to-grid and integrating electric vehicles, and the new bold, bright future. But getting that to be boots on the ground is something that we’re really going to have to wait and see what they do.”

On both these potential stumbling blocks — warranties and bi-directional power electronics units — “we’re working with the OEMs and suppliers to get them to understand this is going to be a competitive advantage for them and for the EV owner,” said Wilson. “It’s going to be an option that you’d offer on a vehicle, like Bluetooth. People are going to want this.”

The energy regulation market in the United States today is $1.5 billion and is expected to grow to $2.5 billion by 2020. The EV market is also taking off. Today there are only about 11,000 on U.S. roads, but Wilson cites projections of 1 million by the end of 2015.

“We see this as next logical step toward creating what we consider a fully integrated clean energy ecosystem as it relates to the whole EV car revolution,” said Wilson.
