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Industry

Vehicle to Grid: Threat or Opportunity?

By SGN Staff

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Incoming! Incoming trend!

It's our job at SGN to scan the horizon to let you know of new threats and new opportunities. In this issue, we want to alert you to an incoming concept called Vehicle to Grid (V2G).

Will V2G fall short of its potential? Or will it truly impact North American utilities? *Our take:* Every utility that serves a metropolitan area with a high density of automobiles must start thinking about V2G. *Here's why:* Plug-in electric vehicles (whether hybrid or pure battery) are on the way, and sooner than you think. Since they will be arriving in big numbers anyway, utilities must find a way to turn them from a problem (another big load to serve) into a benefit (storage for nighttime power).

V2G simply means using the batteries of electric vehicles as an energy storage resource. Those vehicles will initially be plug-in hybrids, but battery electric vehicles may eventually catch on as well. In concept, thousands (someday millions) of those vehicles would charge up at night. During the day, they would return some of that power to the grid through a two-way plug.

V2G power could theoretically provide regulation services, level peak loads, or even replace spinning reserves. The result could be increased asset utilization, improved reliability, and increased viability for intermittent renewables such as wind.

How V2G can make electric vehicles into a bigger win

According to a recent study by Pacific Northwest National Laboratory, not all utilities would gain from electric vehicles. The utilities that would benefit the most are 1) those with high fixed generation costs and low variable generation costs and 2) those with spare generation capacity or access to cheap power. For such utilities, increasing vehicle electrification means increasing asset utilization.

Adding V2G capabilities would increase the number of utilities in the winners circle. Vehicle electrification would become a boon to utilities looking to add significant amounts of renewable energy, and to utilities in need of more peaking plants and spinning reserves.

Issues along the way

As interesting as it is in theory, V2G faces big obstacles. Several early studies point out that V2G economics don't work unless a) utilities are paying for the needed smart meters already anyway and b) car buyers are paying for the batteries already. V2G then becomes a way to get more value from assets already in place.

In addition to the challenges you can read about in the literature, SGN foresees other hurdles that rarely get press:

- **Policy changes:** America's unbelievable tangle of obsolete regulations will hinder V2G just as it has hindered so many other advances. Here's just one of many, many examples: Some jurisdictions treat storage the same as generation. In theory, that could mean each and every car would have to go through the same siting and permitting process as a nuclear plant. Sounds insane, and yet...
- **Who pays and how?** Even if we assume that automobile buyers will pay for the batteries as part of the vehicle, who will pick up the incremental cost of the two-way plug? Will utilities give rebates to car buyers? How will they pay for the power used?
- **On-board power electronics:** It will take onboard intelligence and onboard communications to determine how much charge is left, when to charge, how much to charge, when to give power back to the grid, when not to give power, and so on.

- **Back-end systems:** Some giant computer somewhere needs to determine which vehicles to tap for power, how much to credit to their account, how much to charge the utility using the power, and so on.
- **Setting standards:** This could be the single biggest blocker. It has been 15 years and we still don't have a single standard for high-definition TV. What makes us think we could set nationwide standards for V2G? Consumers won't buy unless they know their cars will work with any utility in any city.

What utilities must do right now

Work is underway right now to bring plug-ins to market in quantity beginning in 2010 (three short years from now). Utilities must urgently get involved in setting research agendas, conducting demonstrations, educating policymakers and, above all, helping to establish standards.

If utilities fail to get involved right away, the decisions will be shaped by automakers, battery makers and renewables advocates without sufficient thought to the needs of utilities. To make sure that V2G moves in a direction that is beneficial to utilities, they must play an active role in its early development.

In the next ten years, billions will be spent on cars and trucks with significant on-board batteries. Those electric vehicles can be dumb, one-way, load-sucking problems. Or they can be intelligent, two-way, storage-providing advantages. What utilities do in the next 18 months will determine which way it turns out.

Those interested in learning more about V2G can turn to this issue's Spotlight article, "V2G Primer for Utilities."

[V2G Primer for Utilities article in SGN](#)

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