

Vehicle-to-Home technology boosting the value of automobiles

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Cars aren't just for driving around in; they can also supply power to the home. This new capability of the automobile, called Vehicle-to-Home (V2H), is now entering commercial use in electric vehicles. Development is also under way for use with plug-in hybrids and fuel-cell vehicles. This new dimension of utility, swapping energy with the home, is something the conventional gasoline engine vehicle simply cannot do, but it could mean significant new value for vehicles. The promise is reducing home electricity bills, and serving as emergency power in times of need.

This report examines the V2H initiatives of three major Japanese automobile manufacturers: Nissan, Honda, and Toyota. Nissan already offers commercial V2H service based on its Leaf electric vehicle, while Honda and Toyota are in demonstration trials. Development is well under way for electric vehicles and plug-in hybrids, but sales are minimal for all types except hybrid electrics. It will take time for the fuel-cell vehicles marketed in 2015 by Toyota and Honda to penetrate the market, and likewise to construct a hydrogen fuel infrastructure. Practical V2H system rollout from manufacturers will boost the real value of electric vehicles, and provide impetus for widespread adoption.

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Vehicle-to-Home (V2H) technology offers a number of merits, including reducing home electricity bills by shifting the peak load, and offering a ready source of emergency power when the grid is down. It would enable consumers to reduce both their demand charge (monthly fixed-rate cost) and energy charge rate (cost per kWh). Supplying the home with power from the vehicle during the noon peak would lower the demand charge, and by recharging it at night it would be possible to take advantage of late-night discount rates to keep the energy charge rate low, too.

With functions to change vehicle energy into electricity, the automobile also becomes an emergency power supply for the home during power outages. “Consumer need for V2H systems is clearly rising,” says a source at Nissan Motor Co., Ltd., pointing to the rising number of outages, from the rolling blackouts after the 2011 Tohoku earthquake to natural causes such as typhoons.

There are three major firms involved in V2H development: Nissan, Honda Motor Co., Ltd., and Toyota Motor Corp. Nissan already offers a commercial product, while Honda and Toyota are still running demonstration trials. All three systems offer peak reduction and energy supply (regular and emergency use), but each manufacturer has a slightly different design, in terms of system configuration, output, and supply capacity (**Fig. 1, Table**).

A variety of electricity generating systems are already available, including solar power, home-use storage systems, fuel cells, and fuel gas generators. By introducing V2H

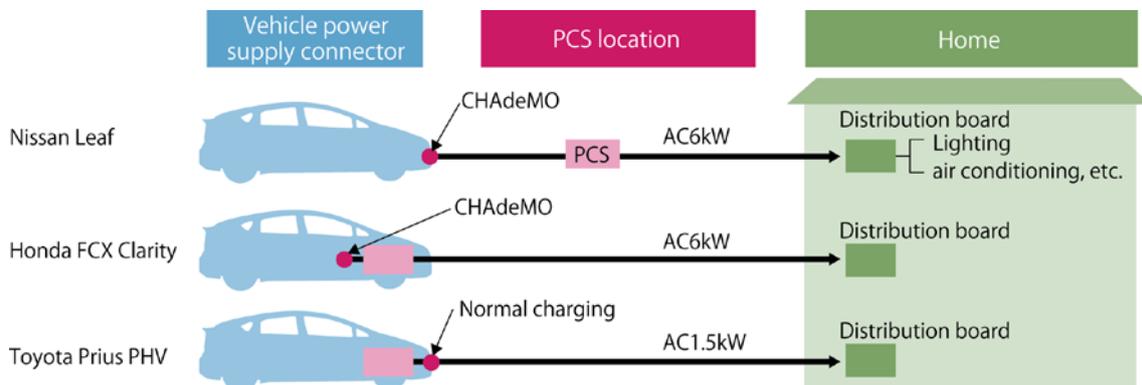


Fig. 1 Fundamental V2H technology

A power conditioning system (PCS) converts DC to AC power for supply to the home. Different automobile manufacturers position the PCS in different places, and use different connectors.