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### **30 Years Of Innovation Is Just The Beginning**

September 3, 2013, Auburn Hills, Mich. - After 30 years, Chrysler Group LLC minivans have a lot to be proud of. Since introducing the segment in 1983, Chrysler minivans have sold 13.5 million units, dominated minivan sales, won more than 320 awards and topped all competitors with 78 segment-first innovations. What's more, some of these segment firsts have caused manufacturers to re-think how they design and equip their vehicles, beyond just minivans.

Such features like the revolutionary class-exclusive Stow n' Go seating, integrated child seats and dual-DVD entertainment systems capable of playing different media at the same time, were first seen on Chrysler Group minivans, and have inspired other manufacturers to go back to their drawing boards. In order to stay at the head of the pack, Chrysler Group engineers continue to look for ways to increase the minivan's utility, comfort, ease of use and performance. But there's more to this story than just creating the best minivans on the market.

The Chrysler Group is constantly developing and testing technology that could be used in vehicles from one to five to 10 years down the road. Striving to produce the best, most advanced and user-friendly vehicles on the market is what drives our company engineers. Just as important, though, is their desire to create vehicles that are environmentally friendly. Chrysler Group engineers have been using the minivan as a test bed for future technologies that could one day proliferate throughout all of the brands in the Chrysler Group.

#### **Giving back**

In 2011, Chrysler Group engineers went to task to help determine if electric-vehicle (EV) batteries could generate revenue as well as power. Chrysler Group partnered with NextEnergy to evaluate Vehicle-To-Grid (V2G) technology using four all-electric minivans. If the EVs prove to be viable storehouses of electricity, they could provide energy savings by sending surplus power to the grid.

Detroit-based NextEnergy is a non-profit energy-technology and business accelerator.

The battery-powered minivans are connected to a charging module that, thanks to unique NextEnergy technology, can simulate any electrical grid in the world. Among the scenarios under study is reduced reliance on "spinning reserves," the expensive practice of having huge generators at the ready to balance spikes in energy demand.

If EVs were linked together in sufficient numbers and their combined surplus power was sold to utility companies, they could conceivably offset demand surges. The expectation is that tapping such a reservoir would cut costs for utility companies, while also putting money into the pockets of EV owners.

Similarly, a mini-grid composed of EVs would enable "peak-shaving," which would see EV owners draw from their own power reserves during those hours when demand for electricity – along with its price – is highest.

The V2G project also considers the impact of cloudy days on solar-panel function. EVs could provide a ray of sunshine in the form of supplemental power, a process known as "generation-firming."

The two-year Chrysler-NextEnergy partnership launched in 2011 and has been gathering data from four Chrysler Town & Country minivans equipped with all-electric powertrains. Each is powered by a 24kWh battery modified to accommodate bi-directional charging.

In addition to studying vehicle design elements, such as battery size, engineers are investigating how EVs with

reverse power-flow might affect grids known as Independent System Operators (ISO).

An ISO buys, sells and transmits electricity. Project engineers are collecting real-time pricing data from ISOs and weighing them against projected battery performance to help define revenue expectations.

Preliminary results show particular promise for ISOs that utilize solar and wind energy. Final results will be compiled at the end of 2013. Even though V2G testing is on-going, Chrysler Group engineers and NextEnergy have already determined that customers would generate revenue by selling electricity back to the grid. Engineers are now experimenting with ways to further increase revenue to customers before testing is completed.

The project complements Chrysler Group's concerted efforts to develop clean-running, capable powertrains for today's drivers, such as the battery-electric system that powers the 2013 Fiat 500e.

### **Plugging away**

In addition to the V2G study, Chrysler Group engineers also used the minivan to study the feasibility of Plug-in Hybrid-Electric Vehicle (PHEV) technology. They created 25 PHEV minivans and gave them to municipalities in Arizona, California, Michigan and New Mexico for testing in 2012. They obtained real-world data from this demonstration to quantify the customer's acceptance of the technology, impact on the grid, fuel economy and vehicle performance in temperature extremes and different drive cycles.

The PHEV minivans contributed to the 1.3 million miles of real-world data for the Chrysler Group PHEV test fleet and achieved a peak average fuel economy of 55 miles per gallon.

The plug-in hybrid minivans were each equipped with an E85-compatible 3.6-liter Pentastar V-6 engine mated to a front-wheel-drive, two-mode hybrid transmission.

They were powered by a liquid-cooled 12.1 kilowatt hour (kwh) lithium-ion battery that afforded a total output of 290 horsepower and a 700-mile driving range. Charge times were 2-4 hours at 220 volts with a "Level 2" charge cord unit and 8-15 hours at 110 volts with a "Level 1" charge unit.

### **Staying out front**

Clearly, the minivan is a very important player in the Chrysler Group. It has been one of the key vehicles in the company's success since 1983, and will continue to be moving forward. As leaders in the minivan segment in powertrain performance, utility, in-car entertainment and design, it is critical that the Chrysler Group continues to be at the forefront of innovation and technology.

When you look at Chrysler Group's dominance in sales, utility, user-friendliness and innovation, as well as using the minivan to conduct important research on future technologies, there should be no doubt in anyone's mind that the minivan is here to stay.

The Chrysler Group's minivans have been on the market for 30 years, and the opulent Chrysler Town & Country and best-selling minivan of all time Dodge Grand Caravan are as compelling as they've ever been.

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