



Mark Rinehart

**Hydrogen Fuel-Cell Power Supply**  
**Jadoo Power Systems, \$999 (as tested, \$2,500)**

**DV Score:**

**Pros:** System cost is comparable to standard battery technology, but the system has significantly greater energy efficiency and faster recharge (or refill) times. No need to worry about battery memory or degrading energy efficiency over time. Environmentally friendly.

**Cons:** Air-travel limitations. Gold Mount interface did not engage properly with my Sony DSR-500. More bulky than the Anton/Bauer Pro Pac battery bricks. Hydrogen refill tanks can be cumbersome.

**Bottom Line** Makes great sense for off the grid applications--network remotes and military use--where shipping issues and wrangling refill tanks are incidental to getting the shot. For more typical shoots, the convenience and familiarity of batteries is hard to beat.

**What the ratings mean**

 Excellent! A score of 4.5 or better earns an Award of Excellence.	 Very good.	 Solid choice.	 Almost.	 Don't bother.
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**Jadoo Power Systems: Hydrogen Fuel-Cell Power Supply**

Fuel-cell technology has been in the news for the last few years, especially as an alternative to that gas-guzzling, pollution-causing internal combustion engine under the hood of your car. Jadoo Power ([www.jadoodpower.com](http://www.jadoodpower.com)), founded in 2001, is in the business of developing fuel-cell solutions. While the company's product plans scale all the way up to powering houses with this technology, Jadoo Power chose to target the professional video camera market for its N-Gen fuel cell.



The Jadoo fuel-cell system uses industry-standard Anton/Bauer Gold Mount interfaces to attach to the rear of a video camera. But as I found out, one size does not fit all.

## Getting acquainted

Fuel cells convert hydrogen and oxygen into water, and produce electricity in the process. The advantage, in the pro video world, is that the fuel cells can power a video camera (and lights and other gear) for much longer than a typical battery of the same size and weight. Fuel cells also are designed to have the capacity for unlimited recharges, unlike even the best camera batteries, which lose their ability to hold a full charge over time and eventually must be discarded.

All of which sounds very good and very green. I have to admit, though, using fuel cells takes a little getting used to. When I first took the N-Gen cartridge out of the box, the many "flammable" and "transport only on non-passenger aircraft" stickers made me nervous (along with the other folks in my office). My jumpiness dissipated after I began to use the Jadoo system-overall, I was impressed with its simplicity and energy efficiency. However, I ran into a few downsides. More on those later.

## How it works

Hydrogen in the N-Gen portable power system is stored in and delivered by the N-Stor cartridge. I tested the N-Stor 130 (\$449), which holds 130 watt-hours of energy. (An N-Stor 360, with three times the storage capacity, is also available.) The cartridge has a textured rubber grip at one end and a State-of-Fill button on the other end. This handy feature allows you to see exactly how much fuel is left in the cartridge.

As I already noted, there is an air-cargo-only travel limitation for the N-Stor product. This means that, for any air travel you need to do for your shoots, you will have to ship this part of your power supply separately. That the U.S. Department of Transportation approved any air travel for this hydrogen-filled cartridge is a testament to the safety of its design.

To use the N-Stor cartridge, you need the rest of the fuel-cell system. Jadoo's version is the 100-watt N-Gen system that weighs about 5 pounds and is priced at \$999. Using the cell couldn't be easier. You take the hydrogen cartridge, insert

it into the port, and turn until you hear a distinct click. The system runs some diagnostics and displays the remaining fuel and watts drawn. Now the unit is powered and ready to go. Occasionally a small fan engages on the unit, but overall, the N-Gen is surprisingly quiet--no problems recording sound while using it. The N-Gen also supports hot swapping. If you need to replace a cartridge mid-shot, the unit will stay powered for several seconds while you make the swap.



Both the N-Gen and a standard battery weigh about 5 pounds. The N-Gen is definitely bulkier, though.

### Attachment issues

Although the unit can power a number of appliances, I was interested in how it worked with the camera itself, in this case, a Sony DSR-500 WS. Throughout the testing process, I used the industry-standard Anton/Bauer Pro Pac 14 battery brick as a basis for comparison. The back of the Jadoo fuel cell has the same Gold Mount interface present on an Anton/Bauer brick. However, when I attempted to mount the cell on the back of the DSR-500, it didn't fit. A plastic foot on the bottom of the N-Gen bumped up against the plastic casing around the DSR-500's FireWire port, making it impossible for the Gold Mount interface to engage properly. I notified Jadoo and am hopeful the problem can be addressed on future models. The DSR-500 may be the only camera with this problem, but a great confidence-builder would be a list of qualified and unqualified cameras on the Jadoo Web site.

Not having immediate access to another camera, I proceeded by connecting the powered N-Gen unit to the DSR-500's external power supply port, and I tested energy efficiency by recording some DVCAM tapes. The display on the N-Gen showed that the DSR-500 was pulling an average of 27 watts. When new, the Anton/Bauer Pro Pac 14 battery has a run time of 2 hours on a 30-watt draw. The Jadoo N-Gen system, with the N-Stor 130 cartridge, lasted about twice as long--nearly 4 hours on a 27-watt draw. Of course, the larger point here is that the energy efficiency of batteries decreases over time. The Jadoo system should get the same run time for the entire life of the product--more than 3,000 hours, according to the company.



Ready for refill. The N-Stor cartridge clicks right into the FillOne station. In my tests, it took about 2 hours to top off a cartridge.

### Fill 'er up!

The filling process was surprisingly simple, once you get your hands on a tank of compressed hydrogen. The one I received for the review was the size of a small torpedo, would have refilled my N-Stor 130 about 60 times, and cost about \$35 to rent.

The tanks also are available in a more-portable scuba-tank size, good for about 15 refills. Although you can purchase these tanks at thousands of outlets around the world, it's a bit more cumbersome and hazardous than plugging into your standard electric socket. Also, the cost of the tank and hydrogen, while fairly nominal, must be added into the lifetime cost of the fuel-cell alternative.

That said, the Jadoo FillOne system (\$599) works well. The unit comes with a fixed pressure regulator that is attached to the top of the hydrogen tank (next page). Once the regulator and hose are connected to the FillOne station, you simply open the supply valve on the tank and insert the empty cartridge. The FillOne station calculates and displays the refill time. In my test, a complete refill took about 2 hours. The Anton/Bauer battery takes around three times as long for a complete recharge.



The refill process is pretty easy-just hook the FillOne station to a hydrogen tank and click in an empty cartridge. Transporting large hydrogen tanks, however, is not so easy.

## Conclusion

Compared to the decades that batteries have been around, Jadoo's fuel-cell technology is quite new. The company began shipping product in 2004, and the N-Gen system is new this year. So there are still some developmental wrinkles to work out, such as the inability to mount the N-Gen on my fairly common pro camera. Lugging around the refill tank was also a chore, and despite all the safety certifications secured by Jadoo, the explosive potential of compressed hydrogen gas still makes me nervous. For the average shooter, fuel cells are probably more of a hassle than working with batteries. But if your video work takes you off the grid, then the long run times and refillability of fuel-cell technology could be very useful, indeed.

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