

UPS THOUGHT LEADERSHIP

# UPS Energy Storage Options

## One Technology Does Not Fit All



There is only one area of universal agreement regarding UPS systems in data centers – you most likely need one. How that solution looks, however, can vary from data center to data center.

There is no real agreement as to what works best because there is no one answer. The good news is that there are several solid energy storage options that can reliably ensure your uninterrupted operation and the integrity of your data. You simply need to weigh the benefits, costs, risk and performance characteristics of each one to pick the best solution for your unique data center needs.

### **Cost, Duration, Longevity**

Your five UPS energy storage choices are sealed Lead Acid batteries (VRLA), wet cell Lead Acid batteries, NiCad batteries, Lithium-Ion batteries and Flywheels. While all deliver seamless power when your main source is interrupted, they are very different technologies in terms of initial cost, the length of time they can deliver clean backup power, maintenance and how long you can rely on them before you need to install replacements.

### **Lead Acid (VRLA) Batteries**

You get the peace of mind that comes from a proven technology that's readily available and normally covers power interruptions from five to 15 minutes. Although designed to perform for ten years, these older battery technologies realistically give you four to five years of protection before you need to replace them. You usually find Lead Acid batteries in small data centers

or data rooms that are willing to trade off life-cycle duration for significant capital-cost savings.

### **Wet Cell and Ni-Cad Batteries**

Wet cell battery plants have a battery design life of 20 years, but jar failures actually start between years ten and 12. A large footprint, heavy weight and expensive capital costs (close to Lithium-Ion) have made it fall out of favor with data center users. NiCad batteries are also quite expensive for the performance they provide. They are also seeing market share declines as Lithium-Ion preference grows.

### **Lithium-Ion Batteries**

You can realize a major step up with Lithium-Ion batteries, but those improvements in duration, performance and technical specs come at a price. Lithium-Ion batteries cost 20-30% more than VRLA battery power equivalents. Why consider spending more up front? That larger capital cost delivers equivalent backup power but lasts two to three times longer than VRLA batteries. Lithium-Ion also takes up 10-30% less space, weighs 30-50% less, recharges in less than one-third the time and can operate effectively for 1,000 to 3,000 discharges, vs. 200-400 discharges for traditional VRLA batteries. Their higher initial cost pays for itself over time and is becoming the standard in large, mission-critical data centers.

### **Flywheels**

Flywheels are very different from battery backup. They store energy by spinning a mass and converting kinetic energy into electricity. They are ultra-reliable machines for delivering 15 to 60 seconds of backup time. While they carry a high initial cost, they should operate reliably for 20 years, with almost no maintenance other than oil changes for the pump. They require a small footprint and, unlike batteries, have no environmental considerations. Flywheels are a green, sustainable energy storage alternative without eventual disposal challenges. Flywheels work best as power-glitch protection on critical processes or in data centers that are comfortable with standby generator backup commencing within ten seconds of losing grid power.

### **Total Cost of Ownership**

Understanding the capital-cost differences between UPS battery technologies is easy. Using VRLA batteries as a baseline cost X, expect NiCad batteries to cost 1.3X more, Lithium-Ion batteries to cost 1.2-1.5X more, wet cell batteries to cost 1.7-2.0X more and Flywheels to cost 2.3X more. But when looking at a 15-year total cost of ownership, the expense profile changes. Factoring in labor, maintenance, and replacement costs, Lithium-Ion batteries and Flywheels look far more attractive. Also keep in mind assembly and installation costs. VRLA batteries and Flywheels typically come as pre-assembled solutions, with only simple cable connections needed onsite. Lithium-Ion, NiCad and wet cell battery plants need considerable site assembly, which can affect system reliability if not done correctly.

### **Making the Right Choice for Each Facility**

As with most good business decisions, the right UPS module and UPS battery choice will be a matter of balance. You need to balance your operating profile, critical data needs, capital budget availability, maintenance resources and reliability needs. Some larger datacenter users may choose Lithium-Ion for its design life, compact convenience and significantly lower total cost of ownership over time. Budget-minded users can still get adequate protection with older battery technology that costs less today.

### **Where to Shop for Advice**

How do you determine the best solution for your facility or facilities? You need to take the time, weigh the risks, analyze the data and balance the Capital vs Operating Cost differentials. Larger organizations may have the resources to crunch the numbers in house. Others may enlist the help of consultants or UPS vendors. Any of those strategies can work – with a strong caveat.

UPS manufacturers and distributors tend to have a bias towards the solutions they make or sell. Lithium-Ion UPS suppliers are most likely quite sure Lithium-Ion is the choice for you. The same with Flywheels, Lead Acid or NiCad batteries. Suppliers are biased towards the technologies they understand and have experience with.

When working with consultants, ask for samples of their past projects and recommendations. If they all come to the same conclusion and recommend the same solution, despite facility differences, you may want to find another consultant. When using the free advice of manufacturers and distributors, be sure they offer all these energy storage technologies and have installed them all recently. Then you know you're getting the best advice that considers all the alternatives equally and without bias.

### **When Is the Last Time You Checked?**

UPS Systems are a vital business safeguard that is, unfortunately, often installed and forgotten. You check the box and move on. When your UPS modules reach eight years of service or your UPS VRLA batteries reach year five, it's time to reevaluate your protection. Aging equipment may be shortchanging you on the protection you can get from new technologies that offer attractive total costs of ownership.