The Next Big Challenge for Energy Storage
Renewable Energy World
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The energy storage era is upon us. States like California and New York have adapted energy policies that will make it possible to economically deploy storage systems, while technology advancements have boosted performance and trimmed costs. For the first time in history it will become feasible to store electric energy.

These breakthroughs in turn will change the underlying infrastructure of our whole industry. Utilities in most jurisdictions are legal monopolies because it was the only way to economically and technically bring electricity to a society. Forcing companies to build competing grid networks and power plants would have led to bankruptcies, chaos and terrible service.

Energy storage allows monopolies and the regulatory infrastructure that comes with it to become less relevant. Microgrids erected by private companies or owned by small groups of individuals, with benefits in security, reliability and low-cost deployment, are suddenly a very attractive alternative.

The three Ss — storage, solar and software — are the forces accelerating the so-called utility death spiral.

Now comes the hard part: proving it works. The energy storage industry is at a true inflection point. We've seen tremendous breakthroughs in batteries, flywheels, thermal storage concepts and other technologies in the last decade. Our engineering feats are generally hailed by reporters. Collectively, however, we're an asterisk. Few of these concepts have been deployed at scale or deployed broadly. Compressed air energy storage, for instance, has been tested for years but only a few facilities exist in the field.

There have been a few visible mishaps, as well. Each time an airplane gets grounded because a lithium ion battery pack catches fire, it equates to another step in the wrong direction. And let's not forget the cavalcade of lithium ion and/or "advanced" lead acid battery companies like A123 Systems, Ener1 or Firefly Energy that called it quits or got bailed out by Chinese investors. Fuel cells, as industry analyst Eric Wesoff likes to point out, as a whole has been unprofitable for decades. Storage companies are going to have to show that they can produce their products in volume, with high manufacturing yields, for a profit.

This mismatch between potential and success is not insurmountable. We're simply at the first step of the second half of the journey. Energy storage remains one of the most challenging fields anywhere. Think of it this way: Storage companies make systems that can operate in harsh environments — freezing temperatures, dust storms, high heat — that can operate flawlessly for two and even three decades. They have to be cheap; we aren't storing oil, which sells for over $100 a barrel. We store electricity, which sells for 11 cents per kilowatt-hour and sometimes even less.

The science is also incredibly complex. There is no Moore's Law for the Periodic Table of Elements. J.B. Staubel, one of the founders of Tesla, has noted that battery performance doubles approximately every

ten years and performance gains come an unsteady fashion. Put another way, batteries take five times longer to reach a major milestone than semiconductors.

On the other hand, the potential for impact is colossal. Energy storage will change the world. It will have a big effect in Europe and the U.S., but its impact in Africa, Asia and Latin America will even be greater. Over 1.4 billion people don't have access to the grid due to inefficient and expensive infrastructure. Storage will finally make electrification a global phenomenon in the truest sense of the word. The changes we see coming will have the same sort of impact as computers, telephones and antibiotics.

Microgrids are also more reliable because it protects users from cascading blackouts, storms or terrorist attacks — users are not dependent on a centralized system for power. Take New York, where many large building owners have begun to leave the distributed heating system and install microgrid technology in the wake of Hurricane Sandy.

If you want a historical analogy, take a look at solar. A lot of people still think solar didn't begin until 2007 when the DOE started giving it support. But some of the most important developments took place somewhat in the background years prior. SunPower was founded in 1985. First Solar started in 1999. SunEdison, which helped popularize the power purchase agreement (PPA), was founded in 2003, but the PPA didn't become a mainstream, well-understood offering among consumers until around 2011. Solar is now the fastest growing segment in the energy business in the U.S.

It's time to flip the switch.