



# SOLAR AND WIND GO FLAT WITHOUT BATTERIES

Battery technology leads the charge to make renewables viable, but many hurdles remain

By ANCA GURZU

Solar panels and windmills are making enormous technological strides, but without a huge leap in battery technology those renewables will have a tough time competing against nuclear and natural gas.

It turns out the economic and engineering hurdles to building batteries that can store power at night or on windless days are still substantial. While windmills dot the landscape from the German Alps to the North Sea and solar panels point skyward from Czech fields to the plains of Spain, battery technology is merely inching forward.

"We are at the end of the beginning," said Jacques Boppe, vice-president for corporate development at Swiss battery manufacturer Leclanché, referring to the growing use of batteries for industrial applications.

After about five years of battery testing, he said, "Today we are at a time when the technology is better understood."

The company is preparing to deliver an energy storage system based on lithium ion batteries for a renewable energy project on the island of Graciosa, in Portugal's Atlantic Azores Islands region.

The 2.8-megawatt battery park, together with wind and solar power production, will allow the island to boost its annual share of renewable energy from 15 to 65 percent over the next 25 years.

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— Jacques Boppe, vice president for corporate development at the Swiss battery manufacturer Leclanché

ILLUSTRATION BY DARREN HOPES FOR POLITICO

According to Leclanché, this is the world's first megawatt-scale renewable energy project to contain a storage system.

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Industrial-scale energy storage ranges from using excess power to pump up water in hydro dams for later use to experimental efforts to pump pressurized air underground. But in most of Europe such exotic applications won't work, which is why there is an enormous effort to develop better batteries.

A lot of research has focused on lithium-ion technology, but there are also utilities using traditional lead-acid batteries, as well as aluminium ion and zinc bromide batteries, the latter is more durable and are good at daily discharge and recharge cycles. Sodium sulfur batteries are being used by several U.S. utilities, but there are questions over costs and safety.

Large battery systems are well suited to renewable energy, stepping in quickly when power levels fluctuate.

In March, the German government launched a program to promote photovoltaic battery storage systems, with a total of €30 million to be given to companies meeting project criteria. U.S. company AES also began operating a 10 MW battery-based energy storage system in the Netherlands

in January.

Batteries could prove to be a game-changer not just for utilities, but also for consumers.

Photovoltaic energy alone would allow one household to produce about 20 to 30 percent of its own power needs per year, but an added battery would boost self-sufficient electricity consumption to 50 percent, said Fabio Genoese, research fellow at the CEPS think tank.

## CONSUMERS LEAD THE CHARGE

Building a windmill requires millions of euros, but a roof solar panel costs only a few thousand, Genoese said.

"Potentially millions of people can do that," he said. "That's the fundamental change in the industry. In the past you couldn't do it on a small scale and be cost competitive. That's changing."

There's also an additional economic benefit. Instead of dumping excess power onto the grid in the middle of the day, when prices are low due to slack demand, homeowners can play a bit of arbitrage and send their power to the grid at peak price times.

But few Europeans are getting to test those sorts of results for themselves.

Sonnen, the German company, says it is Europe's leading manufacturer of residential battery units, has installed batteries in about 10,000 homes, and says it has about half of Germany's 15,000 residential units. Germany makes battery development easier than most

other countries, as it offers an 30 percent subsidy for storage.

A basic Sonnen unit costs almost €3,600 and the company says that groups of residential users can link themselves into a mini-network, channeling power among themselves and selling the excess back to the grid.

Although it is currently a niche product, the residential market potential is enormous. German Industry & Trade, the country's foreign trade and investment agency, estimates that 1.5 million solar power plants (most of them rooftop residential units) have been installed in the country over the last quarter century, with a total power capacity of 38 gigawatts. But only a small fraction have batteries.

It estimates that the annual installation rate for photovoltaic-battery systems in Germany alone could reach 100,000 by 2018.

But the current state and cost of batteries and solar units still mean customers have to be connect to national grids. Today's batteries can only store energy for a few hours, so "economically it doesn't make sense at all to fully disconnect from the grid," said Genoese. "After a cloudy day you will sit in the dark."

The other problem is that it is not clear how long a consumer battery will last, said Harald Diaz-Bone, senior research fellow at the Agora Energiewende, the think

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