SOLAR INVESTOR'S GUIDE

SIG 2/2025

Large storage systems

New business for utilities and grid operators

pv Europe
solar technology and applications

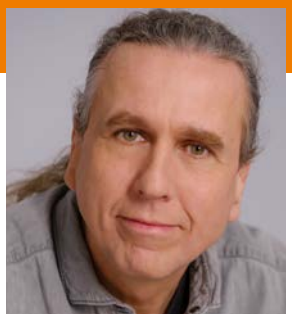

photo: MildredKlaus

Storage systems - new players with strong prospects

The solar markets are volatile, but business with large storage systems is booming. This brings a new lease of life into the project business, which is being hampered by power grid operators almost everywhere in Europe. It is now clear that decades of stalling tactics have delayed important investments in network modernisation.

With storage systems this Gordian knot will be broken. Technology, availability and prices now enable investors to develop completely new business models. Driven by digital processes for buying and selling electricity, AI and access to the grid, electricity storage can generate significantly more returns than solar systems that feed in only.

The storage systems, previously developed to collect solar power, become active providers of clean electricity on the grid. When there is oversupply and low prices, they pull energy from the grid to use it for e-heat and e-mobility. Or to feed back in high-price time.

Solar storage and solar parks are an unbeatable team. Their flexibility and lightning-fast action on the grid offer lucrative returns – without subsidies from the state.

The battery containers will change the way we generate and distribute energy, from prosumers up to large systems for utilities. A new age is dawning – the age of decentralized supply of 100% renewable energies.

Heiko Schwarzburger
Editor-in-chief
PV Europe & photovoltaik

SOLAR INVESTORS GUIDE 1/2025

photo: Move On Energy

ELTIF & PPA: Funding solar projects

The reform of the European Long Term Investment Fund (ELTIF 2.0) offers institutional and private investors significantly better investments in solar projects. And, secondly, Power Purchase Agreements (PPA) provide return of investments independent of public subsidies.

These two ways to fund solar projects are giving the project business a boost. This year, 2025, significantly more private capital will flow into the solar energy transition - across Europe.

▶ *https://www.pveurope.eu/sig-2025-1-eltif-and-ppa*

PREVIEW SIG 3/2025

Innovation at The smarter E Europe

photo: Solar Promotion

Our next Solar Investors Guide (PDF) will look at new solutions and products which will be offered at The smarter E Europe in Munich. The most important solar exhibition in Europe is scheduled on May 7th to 9th, 2025. It will be published on **April 23rd, 2025**.

photo: LEAG/Andreas Franke

Construction site of a large battery in eastern Germany, near the Polish border. The foundations for switchgear and transformers can be seen in the foreground.

Large batteries in Europe are all the rage

Utility-scale storage systems ■ They become more and more popular in Europe. Important reasons for this are the increasing demand for grid stabilization services and the shifting of peak loads. Italy, Great Britain and Germany are ahead of the game. **by Hans-Christoph Neidlein**

photo: Munch Energie

This battery storage optimizes the marketing of solar power on the grid.

photo: Vattenfall

Swedish utility Vattenfall is planning around 300 megawatts of new battery storage per year in Germany alone.

Not only in Germany, but throughout Europe, battery storage systems are booming as a result of the energy transition. According to SolarPower Europe, battery storage systems with a capacity of 17.2 GWh were installed in 2023, almost twice as much as in the previous year. The total installed capacity in Europe was 35.8 GWh. For 2024, the industry association estimates that at least 22.4 GWh will be added across Europe (an increase of 31%). Final figures are not yet available.

While growth has so far been driven primarily by residential storage systems in households, more and more energy suppliers, solar and wind farm operators, as well as industrial and commercial enterprises, are now acquiring large battery storage systems. According to the "European Market Outlook for Battery Storage 2024-2028" by SolarPower Europe, the European battery storage market is expected to grow to a total installed capacity of up to 135 GWh in four years, and to 78 GWh in a medium scenario. The latter corresponds to an annual market growth of 30-40%.

Boom in utility-scale projects expected

Large battery storage systems, especially grid storage systems (so-called utility-scale storage), are becoming increasingly dominant. Their share of newly installed capacity is expected to climb to 45% by 2028 (2023: 21%), while the share of commercial storage (commercial and industrial) is expected to rise to 25% (2023: 9%), and the share of private home storage is expected to fall to 29% (2023: 70%).

The increasing importance of large-scale battery storage systems is mainly due to the growing demand for grid stabilization services and the shifting of peak loads caused by the increasing share of fluctuating solar and wind power across Europe. In many places, energy suppliers are increasingly relying on grid storage systems to absorb large amounts of electricity in a matter of seconds and release it again when needed, thus keeping the grids stable and making better use of the lines in normal operation.

In addition, it often makes economic sense for companies to invest in large battery storage systems when electricity supply and prices fluctuate. This is because electricity can be bought cheaply on the exchange, for example at midday when photovoltaic systems are running at full speed, and sold again in the evening when prices rise. Operators of solar and wind farms can avoid their plants being disconnected during periods of surplus electricity and price cannibalization by using large battery storage systems to shift the feed-in to the evening hours.

Tumbling prices – lithium-ion dominates

This is particularly worthwhile for companies because the costs and prices of battery storage have fallen sharply due to economies of scale and technological improvements. According to the International Energy Agency (IEA), prices for the predominant lithium-ion batteries (cells and rechargeable batteries) have fallen from around 690 USD/kWh (6 35 EUR/kWh) in 2014 to less than 140 USD/kWh (129 EUR/kWh) in 2023. This corresponds to an average annual decrease of about 15 %.

The IEA expects battery storage costs to fall significantly again by 2030, by an estimated 30% for large-scale battery storage and 21% for small-scale battery storage. "Lithium-ion batteries are the leading technology for stationary storage, not only because of their low cost but also because of their high durability," says Raffaele Rossi, Head of Market Intelligence at SolarPower Europe. They also have a high energy density per weight and volume, high charging and discharging performance, are scalable and currently readily available, according to Katja Esche, spokeswoman for the German Energy Storage Systems Association (BVES).

Italy most important European market

According to SolarPower Europe's forecast, Italy will be at the forefront of large-scale battery storage in Europe over the next four years. Grid storage systems in particular will benefit from the rapidly growing demand for balancing the fluctuating electricity production resulting from the strong expansion of renewable energies. The use of storage systems will be supported by a state-backed capacity mechanism and legally regulated auctions for storage capacities (MACSE) with long-term supply contracts.

In this case, the national transmission system operator Terna pays a capacity premium to MACSE-supported projects, i.e. to the operators of corresponding grid storage facilities, which is exchanged for income from electric-

ity trading. In addition, companies are offered 15-year contracts to support investment in storage capacity as part of the capacity market.

In addition, Terna will launch a new energy trading platform that will enable storage operators to sell time-shifting of energy to solar and wind farm operators, as well as ancillary services. As a result of the new regulations, the addition of grid battery storage in Italy is expected to increase to 5.2 GWh in 2024, which corresponds to 67% of the total Italian battery storage market. By 2028, an annual new installation of grid storage with a capacity of more than 8 GWh is expected in the country (59% of the Italian storage market).

Great Britain number two – Germany number three

Great Britain is number two in Europe for large-scale battery storage. There, the provision of grid storage by companies is also actively financed through a statutory capacity remuneration mechanism. In addition, there are ambitious national expansion targets for energy storage – 24 GW by 2030. For 2024, SolarPower Europe expects an increase of 3.7 GWh in grid storage (82% of the British battery storage market), and 4.7 GWh annually by 2028 (65% of the British battery storage market).

In the ranking for the forecast from 2024 to 2028 in total battery storage growth in Europe, Germany is in third place, with utility-scale storage expected to increase to 65% in 2028.

Trends in Eastern Europe

In Eastern Europe, too, large battery storage systems are becoming increasingly popular as a result of the expansion of renewable energies and the pursuit of energy security. Their expansion is financially incentivized – supported by the EU – as was recently demonstrated at the Cisolar & Greenbattery 2024 conference in Bucharest. Among other things, Romania will introduce capacity auctions for grid storage from 2026 and is already relying on Contracts for Difference (CfD).

Poland also has capacity market auctions and tax incentives to promote large-scale battery storage. In Hungary, up to 45% of the project costs for large-scale battery storage are covered by grants, in addition to a CfD program and grid connection facilitations.

Lithuania is also promoting grid-scale battery storage through various measures. The expansion of large-scale battery storage in war-torn Ukraine is heavily financed by international donors, and there are also exemptions from import duties. By 2030, the market for utility-scale battery storage in the six most important countries in Eastern and Central Europe will grow fivefold, according to industry representatives such as Eliza Stefan from Jinko Solar at the industry event in Bucharest.

Market set to increase fivefold by 2030

There are a number of drivers for the installation of large-scale batteries especially in Central and Eastern Europe. These include the increasing renewable energy integration, grid stability, energy security & independence goals, EU regulation & support, regulatory & market developments, electricity price volatility, carbon reduction goals & coal plant phase out, electric vehicle growth and grid relief.

In addition, flexibility assessments will be mandatory for transmission system operators (TSO) in the EU from 2026. By June 2026, they must assess system flexibility needs, set national targets for non-fossil flexibility, and quantify energy storage needs for inclusion in National Energy and Climate Plans (NECPs). “This is a clear signal to investors and developers, funding

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will help kickstart emerging storage markets," emphasized Eliza Stefan, Sales Manager BESS for Central & Eastern Europe, Jinko EES.

Strong financial incentives

In addition to high energy prices, there are strong financial incentives for the use of large-scale battery storage. For example, the approved EU State Aid for Eastern Europe since 2022 in Hungary and Poland adds up to 1.2 trillion euros each; in Bulgaria to 0.75 bn euros, in Romania to 0.375 bn €, in Slovenia to 0.2 billion euros and in Lithuania to 0.2 billion euros.

Among other things, Romania is introducing capacity auctions for large-scale battery storage from 2026 and is already relying on contracts for difference (CfD). Poland is also relying on capacity market auctions, but also on tax incentives, to promote large-scale battery storage. Up to 45% of project costs of utility-scale storage are covered by grants in Hungary, in addition to a CfD scheme and modern grid connection rules. Lithuania is also promoting modern grid connection rules and large-scale BESS support. The expansion of large-scale battery storage in war-torn Ukraine is being heavily financed by international financial donors, and import duty exemptions are also in place.

Strong growth, but still limitations

Overall, the large-scale battery storage market in six key countries in Central Europe is expected to grow by a factor of five by 2030. Poland is in the lead with an increase in installed large-scale battery storage capacity from around 350 MWh to 4,000 MWh, followed by Romania with an increase to around 3,750 MWh and Lithuania with around 3,500 MWh in 2030. The Hungarian large-scale battery storage market is estimated to be around 3,300 MWh by then, the Bulgarian market around 3,000 MWh and the Ukrainian market around 2,750 MWh.

However, regulatory and market barriers, grid infrastructure limitations and limited financial incentives are still hurdles, as Eliza Stefan pointed out. In Romania, for example, there are no clear connection rules for utility-scale BEES projects and delays in processing grants hinder rapid development. In Bulgaria, there are also no clear regulatory for C&I BESS storage and the future plans for frequency regulation are underdeveloped.

The new champions

The analysis by SolarPower Europe mentioned above shows that 17.2 gigawatt hours (GWh) of new battery energy storage systems (BESS) will be installed in Europe in 2023, supplying 1.7 million additional European households with electricity - an increase of 94% compared to 2022. This is the third year in a row in which the annual energy storage market in Europe has doubled.

According to the "European Market Outlook for Battery Storage 2024-2028", battery storage systems with a capacity of 35.8 GWh were installed in the EU at the end of 2023. In addition to photovoltaics, growth was primarily driven by home batteries. In the wake of the energy crisis, European citizens turned to batteries to increase their energy self-sufficiency.

Home storage systems have dominated so far

Interesting is the share of batteries in the three market segments: residential, C&I and utility-scale. With 63% of total installed BESS capacity, the residential segment led the way, followed by large-scale battery systems with 27% and commercial and industrial systems with 10%. In 2023, the share of domestic battery storage systems grew by 70%, the share of large-scale battery storage systems by 21% and the share of commercial storage systems by 9%.

Germany maintained its position as the leading market in Europe with installations of 5.9 GWh last year and significant growth of 152%. It was closely followed by Italy with a record 3.7 GWh (+86%) and the UK with 2.7 GWh (+91%).

Slower market growth to boost large systems

For the years 2024 to 2028, SolarPower Europe forecasts further growth in the European battery storage market, albeit at a slightly lower level, to a total

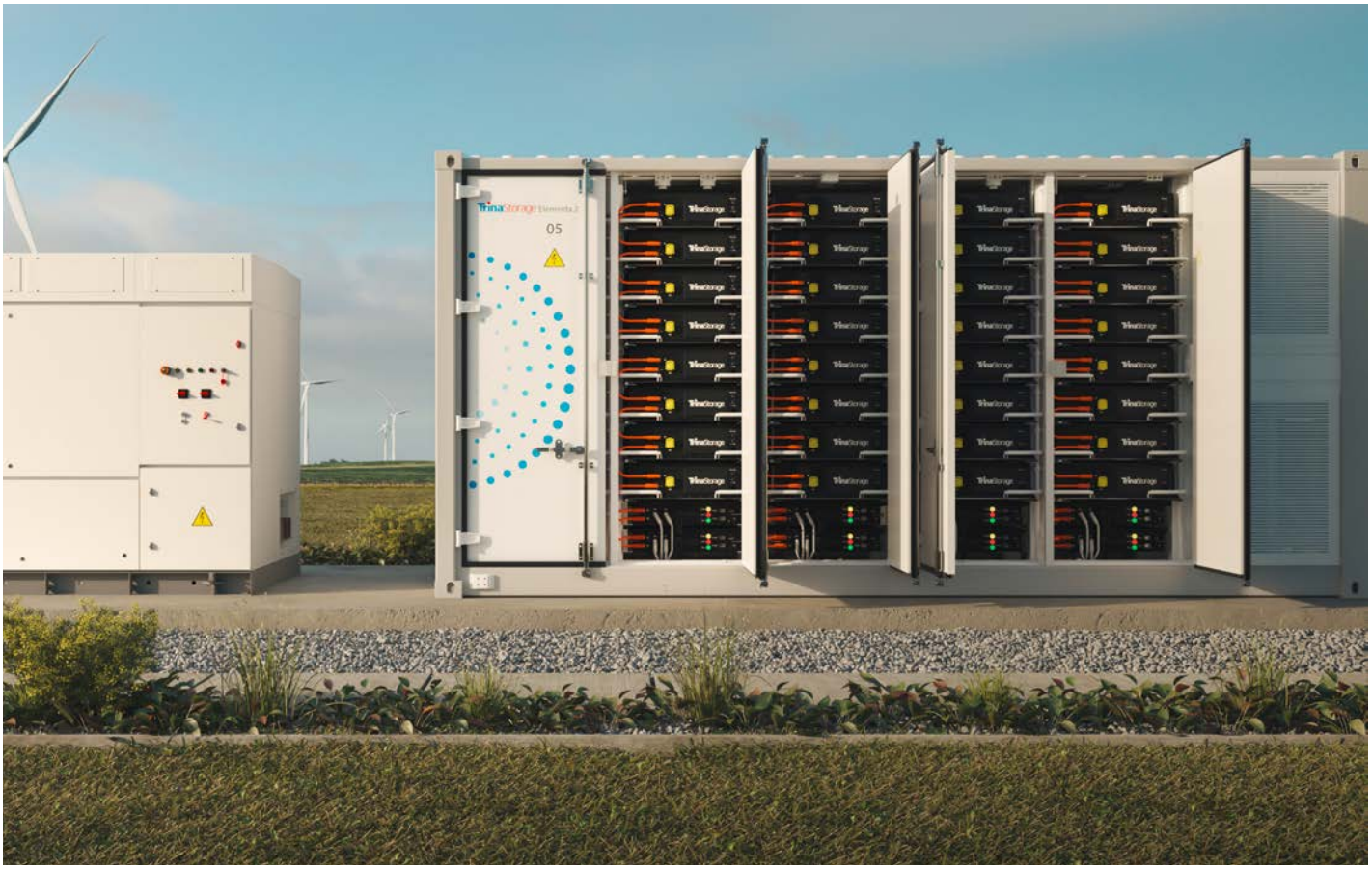

photo: Tinia Storage

Large storage container from China.

capacity of 78 GWh in 2028. The industry association expects annual market growth of 30% to 40%, which will be driven primarily by large-scale battery storage systems. Their share of newly installed capacity is expected to rise to 45% by 2028, the share of commercial storage systems to 25%, while the share of home storage systems will fall to 29%.

According to SolarPower Europe, the declining importance of home battery storage systems is primarily due to falling electricity prices and signs of saturation in the previously dominant markets of Germany, Italy and Austria.

Longer electricity storage

The increasing importance of large-scale battery storage systems is primarily due to the rising demand for grid stabilization services and the shifting of peak loads as a result of the growing proportion of fluctuating solar and wind power. At the same time, large battery storage systems that can store electricity for slightly longer than today are expected to become increasingly popular. "With the increasing demand for flexibility in the electricity grid and the shifting of energy, we will see a significant increase in BEES capacity duration from around 1.5 hours today to 4-8 hours," the report states.

Still a number of obstacles

However, according to Dries Acke, Vice President of SolarPower Europe, there are still a number of hurdles that are currently slowing down the potential of large battery storage systems to stabilize the energy system. These include double grid charges for the storage and withdrawal of electricity, restrictive regulations for the operation of large battery storage systems that are linked to solar and wind farms, or different standards in the EU member states, for example in terms of fire protection.

„While politicians have focused on batteries for the electrification of the automotive industry, their crucial role in the transition of the European electricity system to environmentally friendly technologies has been largely overlooked. Flexibility through battery storage is not just a technical issue for regulators and standardization bodies, but requires immediate political attention and prioritization," emphasizes Michael Schmela, Director Market Intelligence at SolarPower Europe.

IEA: Costs fallen by more than 90%

The industry association is therefore calling for a comprehensive EU electricity storage strategy and a target of at least 200 GW of installed battery storage capacity in the EU by 2030.

The report „Batteries and Secure Energy Transitions" – the first comprehensive analysis of the entire battery ecosystem – finds that in less than 15 years, battery costs have fallen by more than 90%, one of the fastest declines ever seen in clean energy technologies.

The most common type of batteries, those based on lithium-ion, have typically been associated with consumer electronics such as smartphones. But today, the energy sector accounts for over 90% of overall battery demand. In 2023 alone, battery deployment in the power sector increased by more than 130% year-on-year, adding a total of 42 gigawatts to electricity systems around the world.

Still a significant scale up needed

In the transport sector, batteries have enabled electric car sales to surge from 3 million in 2020 to almost 14 million last year, with further strong growth expected in the coming years.

Even so, according to the IEA batteries report, battery deployment will need to scale up significantly between now and the end of the decade to enable the world to get on track for its energy and climate goals, including those set recently at the COP28 summit in Dubai. In this scenario, overall energy storage capacity rises sixfold by 2030 worldwide, with batteries accounting for 90% of the increase.

▶ ***https://www.pveurope.eu/solar-storage***

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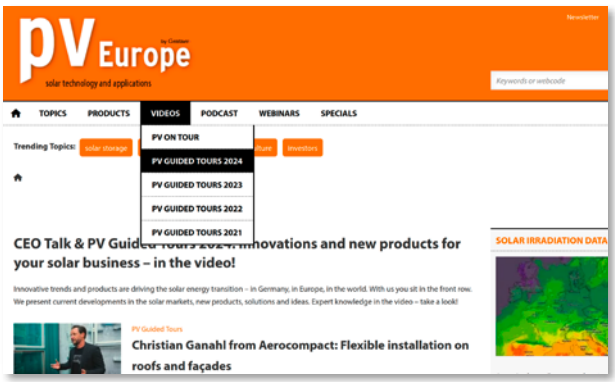

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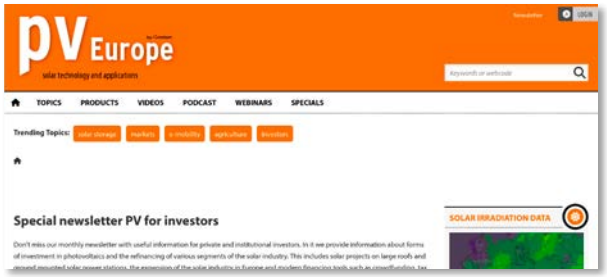

photo: PV Europe

photo: Heiko Schwarzburger

Model of a battery container of Rolls-Royce at EES Europe 2024 in Munich.

„Customers seek solutions for next 20, 30 or 40 years"

Project business ■ Large storage systems are the recent trend in the market for big solar projects. But the planning and the installing is much more complicated than it is said. Now we learn from **Michael Hierholzer** how important a strong and reliable partner is. He is working for Rolls-Royce and outspoken expert in this field.

an interview

Big batteries, real big batteries: How is this market developing?
Michael Hierholzer: *The market is developing great, I must say. We really see a strong growth trajectory, double-digit growth for the next years to come with even energy storage capacity reaching 350 gigawatt-hours in terms annual installed capacity in 2030. So quite promising.*

And what are the technological trends? Where does the journey goes to?
For this decade, I would say we really see lithium-ion storage as dominating storage technology for these areas. We see a clear shift, though, from NMC technology or chemistry towards LFP technology.

What's the reason for that?
Predominantly pricing factors. So LFP is slightly cheaper than NMC, but then also further advancements now with LFP technology and an added safety feature.

What storage systems does Rolls-Royce offer in this business?
We really offer a wide variety. As you see, we brought it all today. We have started with the smallest models because they're too big to get into the hole. This, realistically, is a 10-ft container. Reaching up to 625 kilowatt-hours in capacity it is small, really compact, and can be relocated.

Do you offer larger systems, too?
On the other side we have our slightly larger unit, the Energy Pack QL, a 40-ft shipping container, walk-in possibility, really for harsh environments so that the technicians can go inside. A really large scale utility solution is our MTU Energy Pack QG, which we can really scale up to the gigawatt-hours.

Is it a larger commercial and utility system?
It's both. You can expand That's the advantage that we bring as a company. We have for industrial customers, smaller or mid-size products, and then, of course, for the utilities, a large scale product or solution, That scales up to whatever the customer requires.

In which segments of the market the demand is highest? Is it grid connected, utility scale or more commercial applications?
It is both, and that's why we play in both. On the industrial side, we really see a lot of customers seeking energy independence, trying to lower their cost of elec-

tricity, lower emissions. On the utility scale the utilities continue to integrate renewables for which you need the battery. The battery is needed to balance that, as well as to offer grid services, for instance frequency regulation, frequency response, and such.

That's all included in one system, correct? So one system fits all and it's expandable according to the wishes of your customers?
Correct. It's really a turnkey, customizable solution. We talk with the utility, what are the requirements technologically, but also on-site, what needs to be integrated, what capacity do I need, and then we really do everything from end-to-end.

What are the main markets for you at the moment?
Main markets at the moment is the EMEA region, that means Europe, Middle East, Africa. We also have some exposure towards Asia. At the moment, we're not too focused on China due to price competition.

They make that business themselves, right? It is a closed shop.
We also lay strong focus for the next month on the US market. It is the largest microgrid and also battery energy storage market globally.

Rolls-Royce is a famous brand. Everybody expects high value and reliability. What do you offer, especially for your customers, which is unique Rolls-Royce?
Our strength is really that we are one-stop shop to our customers, a solution provider. We are there for the customer right from the get-go, doing the consulting, doing the simulation of a project, and then really delivering that turnkey to the customer. Then after that is done, we're not leaving the customer alone, but we are there with a holistic service approach and concept for many years to come. It's 20, 30 or 40 years. That's our ambition.

Interview by Heiko Schwarzburger
▶ ***https://www.mtu-solutions.com/eu/en.regionselect.html***

CURRENT VIDEO

photo: Vorsatz Media

Michael Hierholzer of Rolls-Royce: Partner for big storage projects

CEO Talk: The demand for intelligent battery energy storage systems for commercial and industrial use is rising sharply. But planning and installation are anything but easy. This is where a reliable partner can help! We now find out what needs to be considered and what solutions are available – in our talk with Michael Hierholzer, Vice President of Rolls-Royce Solutions.

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Battery modules of a C&I storage system.

photo: Heiko Schwarzburger

Every fire is one too many!

Safety ■ Burning storage system fires are very, very rare events - and preventable. Experts provide practical tips on how to correctly install solar storage systems and minimize risks for investors.

by Heiko Schwarzburger

In 2023 and 2024, reports of burning electricity storage devices and electric cars kept the industry on tenterhooks. When it comes to stationary storage, older generations of home storage systems, which are gradually being replaced, were particularly affected. Other home storage providers have also analyzed risks and replaced older models.

Fires at large storage facilities

Even large storage facilities burned. In the spring, the media reported on a fire at the solar park near Dresden in Saxony. Flames were coming out of a storage container there and heavy smoke could be seen from far away.

A worker was injured. A car parked next to the container also burned out. The television station quotes Thomas Fischer, the fire chief in charge. According to him, a lithium storage device caught fire. The solar park in Priestewitz (13.5 megawatts) was put into operation in March 2022. It was built by local utility and electricity producer.

The large-scale storage system can store 3.7 megawatt hours of solar power and its discharge capacity is 3.7 megawatts. The battery system and the power electronics are located in a secured 40-foot container.

According to the fire department, extinguishing work was difficult due to a lack of water and the highly flammable lithium batteries. No information has yet been given as to the cause of the fire.

Fire register since 2013

The fact that burning storage devices are increasingly being discussed in public is a fate that the storage industry shares with the providers of electric cars. The Internet is full of films about expensive electric cars going up in flames. "The public perception of fires in lithium-ion storage devices increased significantly in 2023," says Ralf Haselhuhn, solar expert from Berlin. By the summer of 2024, he counted more than a hundred national media articles on this topic - in the German press alone.

In order to objectify the emotional debate, Haselhuhn keeps a fire register. Since 2013, it has been collecting all cases of stationary storage systems that have caught fire. Eight damage events were recorded in 2020 and five in 2021. In 2022 the number rose to 17 and in 2023 to 42. By mid-May 2024, 17 storage fires were recorded. The expert calculated: "There have been a total of 104 fire cases since 2013." These figures cover the German market, which is the leader in the installation of electricity storage systems in Europe.

The expert points out that, on the other hand, the number of installed storage systems has increased dramatically. In 2020, 88,000 stationary battery storage units were newly installed. In 2021 there were already 141,000, in 2022 around 211,000. In 2023, 573,000 new storage units were brought into the buildings. To date, around 1.4 million storage systems have been installed in Germany. Haselhuhn summed up: "The risk of a fire is 0.005 to 0.01 percent. It's extremely low."

Extremely low risk, but…

Nevertheless, every fire is one too many. "The problem must not get any bigger," demands Haselhuhn. "And the batteries age and show derating. Then the battery management system can reach its limits when balancing. This means that fires could increasingly occur in older systems."

A service provider in Thuringia found out the hard way that old batteries can burn. A well-known manufacturer had replaced older home storage systems with new devices in order to prevent possible fires. The collection container for the old systems in the service provider's yard caught fire. Unfortunately not just once. The fire brigade arrived several times to extinguish the burning devices. The motorway runs directly past the company premises. The smoke was so heavy that the traffic artery had to be closed for hours.

Overcharged and aging

The reason for fires: Lithium-ion cells are sensitive to fluctuations in operating temperature and voltages. The permissible operating window is very narrow and must be strictly adhered to. "Lead batteries are much more robust," reminds Ralf Haselhuhn of the batteries that dominated the market for stationary storage systems before 2013.

With increasing age or overuse during operation, the cathode of the lithium cell can dissolve. Overcharging or charging at very low temperatures leads to lithium plating. The dreaded dendrites form, which can cause an internal short circuit.

Ralf Haselhuhn also addresses common mistakes that promote fires.

The main cause of fires is sloppy installations. Highly flammable materials are negligently stored in the immediate vicinity of the batteries or minimum distances are not maintained.

Then the air cannot circulate, the ventilation of the batteries fails and they overheat. Sometimes the potential equalization is missing or the ground connection is inadequate. It is not uncommon for signs to be missing, for example to inform the fire brigade about the storage facilities.

Carelessness can take its revenge

Overheating battery cells does not always lead to fire. Overheated contactors or blocked fans can also be the cause. Cables hang freely above the attic and the wife hangs the laundry on them. Shoe racks have been set up under some home storage units. In one case, the storage tank was leaning against the wooden cabinet and became hot because the heat accumulated on the contact surface.

It also happens that installers set up the storage unit right next to air conditioning systems, whose waste heat additionally heats up the batteries. On the other hand, the fact that paint cans are left in the attic almost seems like a trivial offense. "Most of the time, storage operators don't know the fire protection requirements," criticizes Haselhuhn. "Private customers in particular are often left in the dark."

No installation in the living room

In general, home storage systems should, if possible, not be located in the immediate living area. One can only be surprised that some home storage providers still advertise with press photos that locate the storage cabinet in the living room. Well-ventilated basements or rooms for building services with windows that provide easy access for firefighting personnel are best suited.

Marko Finke is familiar with the security of commercial storage systems. He is an expert from Tesvolt's technical service. To date, the company has delivered around 5,000 commercial storage units – throughout Europe. The battery modules are imported from South Korea (Samsung) and assembled into storage cabinets at the factory in Wittenberg.

Finke explains the effort that a carefully prepared storage project necessarily requires: It begins with an on-site inspection to check access roads and the load-bearing capacity of the ground for installation. Before indoor assembly, it is important to clarify whether the assembly area is accessible at all. Ceilings, stairs and doors must correspond to the tilting dimension of the storage cabinet.

It was not uncommon for it to only become apparent at the cellar door that the heavy battery cabinet did not fit. If the battery cabinet is two meters high, it will not fit in a basement with a ceiling height of 2.05 meters. To avoid unpleasant surprises, the tipping mass can be measured as the diagonal of the cabinet or calculated from width and height using the Pythagorean theorem.

Pay attention to the tipping mass

The temperatures at the planned installation location are also important. They must be within the operating window of the storage system, otherwise the battery cells may age very quickly.

Marko Finke refers to the IEC 62619 standard for fire-safe rooms. It prescribes various measures that also apply to electricity storage. The operating rooms need a fire alarm system and defined temperatures must be ensured through air conditioning. The operating room must be kept free of fire loads. The installation surface must be level, straight and dry. Stability must be checked especially on upper floors.

Create fireproof rooms

From his experience in technical service, Finke knows that the wrong current and voltage converters are often installed. "If battery modules have been damaged during transport, they should not be installed under any circumstances," he warns. Because the memories work with a system voltage of 800 volts, the voltage tester should be able to measure up to 1,500 volts. "The DC cabling is one of the most critical points," warned Finke. "The danger of short circuits should not be underestimated; it requires a lot of concentration."

He also recommends doing the initial configuration with a LAN cable. "It's better than Wi-Fi," he says. "My tip: Always have 20 meters of LAN cable with you." In order to carry out commissioning smoothly, the installer should create an Excel list for all IP addresses, passwords and serial numbers.

Observe the torques

When installing the battery modules, the tightening torques of the screws must be strictly adhered to. At 1,500 volts and 100 amps, loose contacts can overheat, become deformed or catch fire. Installers should carry out and document.

Tesvolt's storage systems are embedded in sophisticated security architecture. Five-fold system protection and certification by TUV Rheinland prove the effort required to prevent fires. This doesn't stop after commissioning.

Maintenance is very important

Marko Finke gives important information on the maintenance of commercial storage systems: "Visual inspection first," he recommends. "Any abnormalities must be photographed and documented. Active ventilation must be cleaned of any coarse dirt or dust." The installer should then read the system using a laptop to detect any deviations. This system report from maintenance must be documented as evidence. You should also check whether the current version of the firmware has been installed.

▶ ***https://www.pveurope.eu/installation***

photo: Heiko Schwarzburger

Burnt lithium cell of a solar storage device.

photo: Heiko Schwarzburger

Big storage solutions from Fenecon.

„Value chains are working“

C&I ■ Storage systems for commercial and utility use are the hotspot of the energy transition. They have to be universal geniuses, to be safe and they have to be installed very easily. The latest trends we now learn from **Franz-Josef Feilmeier**, founder and CEO of Fenecon. **an interview**

The demand for C&I storage systems is very high. Does the market have plenty of cells?

Franz-Josef Feilmeier: *The value chains are working. As well as for the LFP cells, which we use in our indoor stationery systems, now from residential to commercial range, but also for the car batteries, those obsolete, very new batteries. Unfortunately, the electric car industry has some issues right now, but for us this means there are a lot of batteries available. Tehy are very new,of perfect quality, and they allow a quite good pricing for big storage systems.*

Which innovations does Fenecon offer this year?

We have a very new commercial storage system. There the core idea was to make it as easy as the residential systems. Just stackable, just add an inverter, automatic commissioning protocol, the same monitoring, the same energy management as everybody is used to.

To lower the obstacles for your customers?

The hurdle for the installer to do commercial also when he is used to do residential systems is quite easy. On the other end, we have our large systems. They are based on electric vehicle batteries. As I said, there are quite a lot of them available right now. That means we offer big and even much bigger systems at very good pricing. For those products we built two new factories One in Germany, already in operation, and another one in US. This will go into operation by the end of this year.

Can you deliver the new products in a very short time to the customers?

Yes, of course. High demand, fast supply.

Everybody is expecting everything from a commercial storage solution. It has to be a universal genius. What are the most important functions to offer to your clients?

photo: Heiko Schwarzburger

C&I solution presented at EES Europe in Munich.

Especially in the C&I segment you don't have this one system which you install one time and then it runs for 20 years without any change. Exactly, it's completely opposite, by the way. We don't see any system which does no changes. It's an energy journey which is started with the installation of a storage system. Typically, the system itself grows by capacity, by power or by different applications from the energy management system or the surrounding.

You mean, during the operation many things may change?
Of course! Maybe the solar installation will grow or the charging park will grow at a company site. This all needs to be handled by the energy management system. This is the core request for a C&I system. We actively manage and support this energy journey and support, especially for the installer who does the single separate steps then.

You have to include dynamic proicing in your energy management system and more things which are coming up in the future, right?
Just imagine, you would have a storage system which would not be able to look in the period of time and involve actively dynamic tariffs. You would definitely get rid of the system, sorry to say. You definitely need it. Otherwise, the system is just not worth being operated there any longer. It's a core requirement to really implement dynamic tariffs with a look into the future forecast of production of PV, if there is a photovoltaic installed. The curve of consumption and the solar yield have to be brought together to decide if you need additional electricity from outside. And when do you need to buy it from the grid.

We talked a lot about fire security of battery systems in Germany. How do you deal with that?
That's an important issue. The biggest thing is quality. Unfortunately, there are so many suppliers, so many startups, especially in Asia, who produce something which looks good, definitely. But it's a system which you really need to have under control that it's not dangerous. That's why I'm a bit concerned.

What Fenecon does to make the systems secure?
For us, it's very important. We're working very closely with CATL. They are the supplier of our LFP cells for the stackable indoor systems, but they are also the manufacturer, typically of these automotive cells, which we buy then from the automotive OEMs when they have its surplus,. But the cell still comes from CTL. The quality approach in the car industry, especially looking at the European premium or German premium OEMs, is definitely on much higher level than maybe a tier 2, tier 3 stationery storage manufacturer from somewhere.

Interview by Heiko Schwarzburger
▶ ***https://fenecon.com/***

CURRENT VIDEO

photo: Vorsatz Media

Franz-Josef Feilmeier of Fenecon: More demand for C&I storage

CEO Talk: The need for cells and large scale batteries is growing, as are the demands for functionality, safety and the easiest possible installation. With Franz-Josef Feilmeier we now find out where the journey is headed. He is founder and CEO of Fenecon.

▶ ***https://www.pveurope.eu/videos/pv-guided-tours-2024***

UNITED KINGDOM

40 MWh battery storage site to power South Wales

The UK is expected to be the second most important market for large-scale battery energy storage in Europe in the coming years. Recently another major project has been realized in Newport/South Wales.
Field Newport is operational and offers dynamic frequency response to balance fluctuations in electricity demand, also enabling wholesale market arbitrage to reduce the price of energy during off-peak periods.

Clarke Energy was responsible for the full engineering, procurement and construction, delivered on time and within budget, while Trina Storage acted as supplier and integrator. The battery solution, provided by Trina Storage, includes tier-1 battery racks, power conversion systems (PCS), and an advanced software and control system, seamlessly integrated for optimal performance and lifetime.

This is the third UK project Trina Storage has finalised in partnership with Field and follows on from a 20 MWh battery storage site that opened this July in Gerrards Cross, on the outskirts of London. A fourth venture managed by the pair is expected to be commissioned soon. Once complete, the partnership will see a total of 180MWh of storage capabilities delivered for the UK grid.

Large battery storage systems, especially grid storage systems (so-called utility-scale storage), are becoming increasingly dominant, according to the latest forecast of SolarPower Europe. Their share of newly installed capacity is expected to climb to 45% by 2028 (2023: 21%), while the share of commercial storage (commercial and industrial) is expected to rise to 25% (2023: 9%), and the share of private home storage is expected to fall to 29% (2023: 70%).

photo: Trina Storage

New battery storage site in Newport/UK.

The UK is the second most important market after Italy in Europe for large-scale battery storage. There, the provision of grid storage by companies is also actively financed through a statutory capacity remuneration mechanism. In addition, there are ambitious national expansion targets for energy storage – 24 GW by 2030. For 2024, SolarPower Europe expects an increase of 3.7 GWh in grid storage (82% of the British battery storage market), and 4.7 GWh annually by 2028 (65% of the British battery storage market).

▶ ***https://www.clarke-energy.com/***

TESVOLT

New subsidiary to trade energy with C&I storage

Tesvolt has announced a spin-off: Tesvolt Energy. The start-up's business model makes energy trading with battery storage systems of 100 kWh and above not only possible but profitable as well.

Until now, battery storage systems of this magnitude were excluded from highly complex energy trading or only accepted on less lucrative terms. Here Tesvolt Energy is working with the German traders Enspired, Entrix and The Mobility House.

„The volatility of renewable energy suppliers means the electricity grid needs all the buffer power it can get. Commercial and industrial companies have enormous potential for bringing urgently needed flexibility to the utility grid with battery storage systems. But in competition with the big battery park operators, they often have no chance of finding a good trader who will trade their storage capacity on the utility grid," explains Daniel Hannemann, co-founder and CEO of Tesvolt AG. "With Tesvolt Energy, we are providing commerce and industry with a very, very lucrative opportunity for taking part in front-of-the-meter energy trading."

photo: Andreas Keuchel

Tesvolt Energy is bundling battery storage systems from 100 kWh in a pool that is managed by energy traders.

Tesvolt Energy focuses on battery storage systems between 100 kWh and 10 MWh and incorporates them into a pool. Numerous smaller storage systems can thus combine to form a virtual power plant. "What no one else on the market can offer so far: we don't just work with one trader, we work with three – the leading traders in Germany, no less – and put them in competition with each other.

The energy trader whose trades generate the highest revenues with the least intensive operation of the storage systems gets to manage the most battery systems in our pool," explains Sebastian Kratz, who is heading the new company together with Anshoo Pandey. "For our customers, this means higher revenues and lower risk, because all revenues go into a pot and are distributed fairly and transparently among the customers at the end of the month – much like they are in a cooperative."

The start-up has developed software that controls the battery storage systems in the pool so that they generate the greatest possible revenue with the least intensive operations. This ensures a significantly longer service lifespan. In developing the software, Tesvolt Energy also benefited from Tesvolt AG's many years of expertise in battery storage.

"We already have battery storage systems with a total capacity of 100 MWh in the pipeline. With such an attractive, transparent model, we will have many more by the end of the year. The return on investment is usually three to four years. It's a compelling economic argument for anyone looking to invest in a commercial storage system and has a grid connection point," says Anshoo Pandey, Managing Director of Tesvolt Energy.

▶ ***https://www.tesvolt.com/en/***

DENMARK

European Energy launches first battery storage project

European Energy has started on its first large-scale battery storage project. This is done in collaboration with Kragerup Estate. This is the first battery storage project that European Energy has undertaken in Denmark, and it will provide valuable operational experience in integrating battery solutions with the grid for the company.

The Kragerup project is essential for European Energy, enabling the company to manage increasing volumes of renewable energy generated in Denmark. With the installation of a state-of-the-art battery, European Energy is positioned to enhance the stability and resilience of the electricity grid.

"Battery storage is a key component in the development of future energy projects. This collaboration with Kragerup Estate will provide us with hands-on experience in battery storage and further the development of integrated energy systems, not only in Denmark but also in other markets where we operate," said Mads Lykke Andersen, Director and Head of Technology Development at European Energy.

The battery will start test operations during Q1 2025 and will initially have a capacity of 3.75 MW, with the option to upgrade to a 7.5 MW capacity. When fully charged, it will be able to provide electricity to a significant number of households for up to eight hours. In addition, the battery will offer crucial system services to help balance the power grid in eastern Denmark. It will store surplus renewable energy during periods of high production and supply it back to the grid when demand is high, improving overall energy efficiency.

photo: Better Energy

Solar park with battery storage in Denmark.

▶ ***https://europeanenergy.com/***

STOCKHOLM

Pioneering fast-charging project

Stockholm is relying on networked, battery-supported systems and digital solutions to reduce environmental pollution and electrify urban transport. "The cooperation with the smart city of Stockholm is not only an outstanding vote of confidence in our concept of urban fast charging networks. Following our market entry in the Netherlands last May, it is also another important step in the implementation of our European city cluster strategy, with significant impact," says Maurice Neligan, CEO of Jolt.

Nils Blom, project manager at the City of Stockholm, adds: "The cooperation with Jolt Energy is an important element for us in achieving our ambitious climate targets. This is a good example of a technology that enables ultra-fast charging in areas with limited grid capacity." According to Jolt CEO Neligan, the company expects that German cities will increasingly follow the example of Sweden in using a space-saving and extremely powerful battery-supported fast-charging infrastructure to make an important contribution to achieving their climate protection goals.

Jolt's fast charging stations, equipped with a powerful battery storage unit, require only a connection to the low-voltage grid despite a maximum charging capacity of up to 300 kW. This enables quick and easy installation without the need for extensive construction work or grid expansion. Electric cars can be charged at Jolt charging stations in just five minutes for a range of more than 100 kilometers. This means that an electric car can often be charged from around 20 to 80% in the time it takes to visit a supermarket, which is usually around 20 minutes, and meets exactly the demand that citizens have for electric mobility.

Jolt's high-performance charging technology is also extremely space-efficient, because significantly more cars can be charged daily at one station than with conventional AC charging technology. "This technology offers significant advantages, especially in densely populated cities where parking space is scarce. The high level of space efficiency frees up additional space for cycle paths, public transport or green recreational areas, which increases the quality of life in cities," explains Rauno Fuchs, Vice President Government Affairs at Jolt and an expert in sustainable urban development.

▶ ***https://jolt.energy/en-de/***

photo: Jolt Energy

Installation of the fast-charging stations, that are connected to the low-voltage grid.

BMZ GROUP

Battery manufacturer to built factory in North Macedonia

Battery production at the new factory is scheduled to start in May 2025. It will create 700 new jobs. BMZ wants to use the plant to strengthen its position on the global market.

The new plant has an area of 6,800 square metres in the Skopje technological-industrial development zone. There is still enough space on the site to expand production at a later date.

photo: BMZ Group

Construction has begun. Politicians attended the ground-breaking ceremony.

The Group is investing a total of 65 million euros in the construction of the new factory. It is another important milestone in BMZ's global expansion plans, says Jelica Ivanovska, Managing Director of BMZ North Macedonia. The new factory also secures the company's competitiveness on the global market.

From January 2025, BMZ will begin moving the current production lines from its current facility in the centre of Skopje to the new site. The new plant is scheduled to be fully operational in May 2025.

BMZ has been pursuing the expansion of production in the southern Balkan country since the beginning of September 2023, and now Jelica Ivanovska, together with the North Macedonian Prime Minister Hristijan Mickoski and the Director General of the Directorate for Technological-Industrial Development Zones Goce Dimovski, has broken ground for the new plant.

The previous plant in the centre of Skopje was intended from the outset as a temporary solution for training and product validation. It will be closed once the new building is completed in May 2025.

According to the company, no job cuts are planned. Instead, up to 700 new jobs will be created in the long term in order to further expand BMZ's local and global business.

▶ ***https://www.bmz-group.com/en***

BULGARIA

55 MWh battery energy storage system deployed

EPC company Solarpro has deployed a battery energy storage system (BESS) with a capacity of 55MWh in Razlog, Bulgaria. It was realized in partnership with battery manufacturer Hithium.

The new facility officially went live in early June, with the delivery of Hithium's 16 energy storage containers, each with a capacity of 3.44MWh, to Solarpro. Solarpro, in turn, managed the entire project lifecycle – from design, to implementation, and integration of the SCADA management system.

The Hithium Block 3.44MWh container is a liquid-cooled battery storage system based on Hithium prismatic LFP BESS cells with a 280Ah capacity and a high cyclic lifetime. It is specially optimized for use in stationary battery storage systems regarding safety, reliability, and performance.

The system's low levelized cost of storage (LCOS), combined with thermal management, improves energy throughput by ensuring optimal operating temperature and high energy density. It also integrates with a thermal management system, fire protection system, battery management system (BMS), and more.

Hithium is committed to fostering a stronger and more collaborative relationship within the local European market, the company announced.

Furthermore, Hithium has formed strategic alliances, including Scan Global Logistics, to offer unparalleled transportation services, and CarbonX, to advance the energy sector in terms of environmental responsibility and technological advancement.

▶ ***https://www.hithium.com***

photo: Solarpro

The large-scale storage system was installed next to a solar park in Razlog, Bulgaria.

FRANCE

MET Group to purchase battery storage developer Comax France

MET Group has purchased a 100% shareholding in Comax France, an owner, operator and developer of combined heat and power (CHP) and battery energy storage systems (BESS).
The acquisition, MET Group's first investment in French energy infrastructure, expands its flexible assets portfolio in Western Europe and addresses the increasing need of balancing technologies to support the energy transition.

Founded in 2003, Comax operates a 170 MW portfolio of small-scale thermal assets and 29 MW of battery energy storage systems (BESS) across France providing flexible power generation, storage and balancing services. In addition,

Comax is developing further BESS projects to support the continued growth of flexible energy solutions in France. The company's project pipeline consists of several hundred MW of BESS projects in various stages of development. MET Group intends to support the construction of the company's ready-to-build projects to be operational by mid-2026.

The production and storage of flexible energy and the provision of balancing services play crucial roles in the European energy transition in support of the continued integration of weather-dependent renewable energy sources. Also

MET Group's Flexibility Assets Division aims to acquire, operate and build assets which can provide this system flexibility. Niemetz, Chairman of the Flexibility Assets Division said: "Flexibility assets are an essential part of MET

photo: MET Group

Battery energy storage systems and flexible energy solutions are an essential part of the energy transition.

Group's integrated strategy to support the energy transition. Our investment profile is fully aligned with the green transition priorities. We are excited to enter the French market for flexible power generation and balancing services as we expand our asset portfolio in Western Europe."

▶ *https://group.met.com/en*

SWEDEN

Battery storage enables expansion of PV charging infrastructure at Postnord TPL

Soltech Energy Solutions has developed, installed and commissioned a 4 MWh energy storage facility next to Postnord TPL's logistics property just outside Norrköping/Sweden. This enables the expansion of the property's charging infrastructure for electric trucks.
The project is carried out together with the investment and energy company Swede Solar, and the energy storage of 4 MWh, together with the solar panels, solves several challenges for the customer's climate efforts.

The solution provides both access to renewable energy and an increased power capacity that enables fast charging of electric vehicles. Power capacity is a problem that the entire transport sector is facing as the properties' grid connection and electricity capacity are often not sufficient for example, fast charging of electric trucks. A problem for which Soltech has now developed and installed a solution.

photo: Soltech

6.5 MW roof-mounted PV installation with battery storage at logistics company Postnord TPL in Norrköping/Sweden.

With the energy storage, Postnord TPL can even out power peaks, gain greater power capacity and thus be able to expand its charging infrastructure for its electric trucks. The overall solution means that they now are able to avoid the bottleneck problem that the property's limited grid connection previously constituted.

The energy storage facility and the 6.5 MW roof-mounted solar energy solution also contribute to the property producing more solar electricity than it consumes, which means that PostNord TPL will be a net exporter of locally produced green electricity over the whole year. Through smart control, the surplus solar electricity is exported to nearby properties or stored in the large batteries that Soltech has installed next to the property.

„The energy storage will help stabilize the electricity grid and be an important part of PostNord being able to avoid the power challenge in the electricity grid and therefore accelerate the conversion of its vehicle fleet."

„The solution will create great value as it solves several problems at the same time and it feels great to have been able to conduct this with Swede Solar as a long-term partner. It would surprise me if other transport and logistics companies did not glance at this type of overall solution to create energy-smart logistics properties" says Rickard Lantz, Business Development Manager at Soltech Energy Solutions.

▶ *https://www.tpl.postnord.com/en/*

▶ *https://soltechenergy.com/en/*

Flow battery of Elestor for commercial use.

photo: Peter J. Reese

photo: www.jurjenpoeles.nl

Guido Dalessi from Elestor.

Between hydrogen pipelines and electrolyzers

Flow batteries ■ They are considered one of the most economical options for long-duration energy storage. **Guido Dalessi**, CEO of the Dutch company Elestor, explains how the business uses innovative technologies for its flow batteries to benefit from the synergy of electricity and hydrogen. **an interview**

What can be understood by a flow battery?

Guido Dalessi: *Flow batteries are a unique type of battery initially developed by NASA in the 1960s. It was not until the 1980s that they gained popularity in the industry after demonstrating the ability to withstand over 10,000 charge or discharge cycles.*

What is the focus of Elestor's flow technology?

Our flow battery design is based on an electrochemical cell, where chemical energy is generated by a reaction between two active materials. In theory, a flow battery can be built using a variety of active materials, so-called redox couples. Elestor has developed several of these. At first, Elestor developed a hydrogen-bromine chemistry concept which is still considered the holy grail of chemical compounds. Minimizing the time to market, we already introduced the hydrogen and iron-sulfuric acid chemistry concept last year. We selected these chemicals to meet our goal of creating a storage system with the lowest possible storage cost per Mwh.

Does the storage system encompass numerous components?

The active materials are separated by a membrane and circulate in a closed loop, each within its own compartment. Charging the battery triggers a chemical redox reaction, discharging reverses the reaction.

What is the advantage of this technology compared to lithium systems?

Flow batteries are ideal for long-duration energy storage as they are designed to economically deliver power for a minimum of eight hours to a few days. While other batteries can technically provide power for a similar amount of time, flow batteries are among the most cost-effective solutions for this purpose. In contrast, lithium batteries are more viable for short-duration applications. As the

energy transition progresses, periods of renewable electricity shortages are becoming longer, lasting up to a several days. That's where flow batteries come in.

You say your technology can be integrated into electrolyzers and hydrogen infrastructure. How does this work?
To explain how hydrogen is integrated into our system, we need to take a closer look at the battery design: Each cell stack membrane in our storage systems has one side in contact with an aqueous solution of iron-sulfate, while the other side is in contact with a hydrogen circuit. The battery generates hydrogen during the charging process, essentially acting as an electrolyzer. In the stand-alone battery, the generated hydrogen is stored in a separate tank, as it is required for discharging.

Does the battery consume hydrogen?
The battery does not consume hydrogen but utilizes hydrogen and iron-sulfate as active materials for charging and discharging. When the battery is discharged, the hydrogen becomes part of the electrolyte again. Rather than storing hydrogen in a large tank, we can connect the battery to a hydrogen pipeline. In this case, the battery feeds hydrogen into the pipeline when charging and extracts the same amount of hydrogen from the pipeline when discharging. This approach reduces both space requirements and capex, which in turn reduces the storage costs per Mwh.

Does that mean that you are competing with the hydrogen industry?
On the contrary, we support the hydrogen industry by maximizing the utilization of electrolyzers. Our flow battery can significantly reduce the cost of green hydrogen production when integrated with electrolyzers. By supplying the electrolyzer with low-cost electricity, we help ensure a cost-effective 24/7 hydrogen production. This effectively bridges the perceived divide between the hydrogen and electricity infrastructures, which are often viewed as competing solutions rather than complementary parts of a unified system.

Are there other companies with the same or similar technologies?
As far as I know, we are the only company using this specific chemical compound of hydrogen and iron-sulfate. Our approach to integrating our flow battery with electrolyzers and connecting to pipelines is particularly unique.

How does your technology reduce electricity storage costs?
The best time to charge the battery is when electricity prices are low, and discharge when the prices rise. The difference between these prices determines the margin per megawatt-hour. However, it is also essential to consider the storage costs for each megawatt-hour held in the battery – the lower this cost, the better the margin.

Normally redox flow batteries use vanadium. What is the economic advantage of your chemistry?
Many other flow battery manufacturers use vanadium as an active material – an example of how the choice of chemicals also impacts storage costs. While vanadium-based batteries have been on the market for about a decade and are highly reliable, the chemical is unfortunately expensive and its sources are limited. In contrast, iron-sulfate is abundant worldwide and is one of the most widely used chemicals in the industry. This widespread availability ensures that there will be no shortages or economic dependencies, keeping prices consistently low, even in the future.

What markets are you focusing on?
Although we are based in the Netherlands, our primary focus extends beyond its borders as we seek opportunities that better match our goals. Additionally, the new right-wing government does not support the energy transition strongly enough. There are other European countries where our flow battery technology is likely to gain more traction than in the Netherlands.

For instance?
To identify our best markets for adopting our flow technology, we conducted a detailed analysis of all European countries, evaluating over ten factors that influence how quickly this technology could be adopted. At this time, our top markets are the UK, Spain, Italy, and Germany, where we see the most immediate potential. Storage capacity will continue to increase and eventually last several days. With the ongoing advancements in our flow batteries, we are committed to helping accelerate the energy transition.

Interview by Heiko Schwarzburger.
▶ ***https://elestor.com/***

EES INNOVATION HUB

New concept at Europe's largest energy storage exhibition

Elestor will exhibit the new technology at the ees Innovation Hub from 7–9 May 2025, as part of The smarter E Europe in Munich. The Hub is ees Europe's new exhibition concept for young and innovative companies. Projects and products relating to energy storage will be presented in an attractive environment together with research institutes, start-ups and international companies.

In addition, on all three days of the exhibition the ees Innovation Hub Stage offers a varied program on innovations from areas such as battery technologies, AI in battery research, recycling, as well as industry pitches. Community and networking events are a central component of the ees Innovation Hub in Hall B0, for example with the finalists and winners of The smarter E AWARD in the category Energy Storage. Also planned are a "4 o'clock beer" meetup, the "ees Islands Challenge" hackathon and an attractive meeting place for influencers, podcasters and TV teams.

▶ ***https://www.ees-europe.com/***

PODCAST SOLAR INVESTORS GUIDE

photo: ESS

Long-term storage with iron flow technlogy

Energy Center is an iron flow storage system from ESS Inc., a company located in Oregon in the United States. The storage device offers 1.16 megawatt hours of storage capacity and a maximum charging capacity of 174 kilowatts. This modular solution comes completely in a container and can be adapted to many commercial and network applications. Alan Greenshields is CEO of ESS. He talks about long-term storage systems and the prospect of redox flow technlogy with sustainable materials – iron, salt and water. Duration of the podcast: 43:27 minutes

▶ ***https://www.pveurope.eu/podcast***

ECOFLOW

New home storage system delivers 30 kilowatts

photo: Ecoflow

Manufacturer EcoFlow presents the Power Ocean Plus as a central component for the home energy ecosystem. It delivers a maximum AC output of 29.9 kilowatts and can accommodate up to four solar strings totalling 40 kilowatts.
A total battery capacity of up to 60 kilowatt hours is available. This makes the storage unit particularly suitable for complex roof areas.

The design of the inverter and the device reduces installation time by up to 40 per cent. The certified aluminium housing (IP65) and a proprietary battery management system ensure safety and mechanical resistance. Each battery pack also has a fire protection module.

The company offers a 15-year warranty for the LFP batteries as well as a dedicated app that simplifies the commissioning process and improves diagnostic options. Power Ocean Plus also supports dynamic tariffs. EcoFlow works together with green energy provider Tibber for this.

▶ ***https://uk.ecoflow.com/***

SAX POWER

Home storage system with more capacity

SAX Power's storage system with integrated inverter function is now introducing a new version of the home storage system with more capacity: The new model stores 7.7 kilowatt hours and can be expanded to up to 23 kilowatt hours.

The intelligent battery communicates with the electricity meter via cable, powerline or wirelessly, so that the amount of electricity consumed by the household is delivered accordingly. The device uses a battery with lithium iron phosphate cells. The home storage system works without an additional inverter.

This saves the installer a lot of time. Not least because the storage unit is plugged directly into a fused socket. Another practical feature is the option of modular expansion. And this can be done years later. The system can be expanded to up to three modules if required, which is advantageous for e-mobility applications, for example. In terms of the materials used, SAX Power is environmentally friendly: the battery cells are cobalt-free.

▶ ***https://sax-power.net/***

photo: SAX Power

photo: SolarEdge

SOLAREDGE

AI platform to optimise commercial storage

Solaredge presents the One platform for commercial and industrial applications. It was developed as the company's first optimisation platform for project planners (EPCs), technical service providers (O&M) and companies.

Solaredge's One automatically manages the energy production, storage and consumption of an installation. This enables companies to achieve energy savings by using real-time data analyses and making intelligent decisions on this basis.

The platform provides in-depth performance analyses for the entire solar installation down to module level. It is also designed to help EPCs and O&M teams minimise downtime and reduce site visits. Included are functions such as: Remote maintenance, device operation and remote configuration. The platform's live alert system enables a proactive response to critical issues to prolong system performance. The platform comes as a complete ecosystem for the control and management of solar installations - including storage units, charging stations and building systems.

▶ ***https://www.solaredge.com/en***


photo: Neoom

NEOOM

Liquid-cooled battery system

Manufacturer Neoom presents the Terra outdoor storage system for commercial and industrial applications. The system has been specially developed for outdoor use.

It has a liquid-cooled battery system with lithium iron phosphate cells and an integrated battery inverter. With the Connect and Grid functions, multi-use applications can reduce energy costs and improve efficiency. The large storage system can also be expanded as required. The Terra can be interconnected with up to six systems under one master.

The battery system can thus cover an output of up to 750 kilowatts and a usable capacity of up to 5,882 kilowatt hours. The master utilises the intelligent Neoom Connect energy management system and distributes the electricity as efficiently as possible. In this way, several of these systems can be linked together to achieve ranges of several megawatts of output and megawatt hours of capacity.

▶ *https://neoom.com/en/*

KOSTAL SOLAR ELECTRIC

Package with VartaWall and Plenticore

Inverter manufacturer Kostal Solar Electric and battery manufacturer Varta are offering a new package for greater self-sufficiency. Thanks to the close co-operation between the two development departments, the compatibility of the Plenticore G3 and the VartaWall is now assured.

The communication connection to Kostal's Plenticore is made via RS485, while the high-voltage connection is made using a classic DC cable - as is also used for solar modules. The home storage system can be operated with two (ten kilowatt hours) to four modules (20 kilowatt hours). Depending on the Plenticore model, it offers an output of up to 10.5 kilowatts with a discharge current of 26 amps.

The hybrid inverter G3 is available in three power classes as standard: S, M and L. What is new here is the option to expand each of these three models by two further power classes by activating them via Plenticoin. This means that the capacity of the solar system can be easily expanded at any time.

▶ *https://www.kostal-solar-electric.com/en-gb/*


photo: Kostal Solar Electric

photo: Intilion

INTILION

Control unit for commercial storage systems

German supplier Intilion has developed the new control unit called the Application Unit (IAU), which can be used to efficiently control and integrate battery storage systems. The IAU is part of the overall concept for controlling ABC battery storage systems. The system is completed by the BMS interface Intilion Battery Unit (IBU) and the system interface Intilion Control Unit (ICU).

The IAU offers four core functionalities: interface management, applications, functions to ensure grid conformity and other system functions. Traders, network operators and customer applications can be integrated via up to seven interfaces. The IAU can also control several battery storage systems connected in parallel. Additional green energy systems can also be integrated.

The outdoor control cabinet can be housed in a switching station, for example. Intelligent power distribution between the AC strings optimises the service life of the storage units and prevents overloading or underloading of the individual batteries.

▶ *https://intilion.com/en/*

SUNGROW

Large storage system uses AI and liquid cooling

photo: Sungrow

Chinese manufacturer Sungrow is launching the Powerstack 200 CS commercial storage system on the European market. The energy management system (EMS) is equipped with an intelligent algorithm.

By deep learning the data, this system from Sungrow quickly develops strategies to maximise revenue. This facilitates the seamless integration and operation of photovoltaic systems, energy storage systems and charging facilities. It also supports synchronised strategies. According to the manufacturer, this leads to improved peak load coverage and efficient demand management.

The Powerstack 200 CS is equipped with an intelligent second-generation temperature control system for liquid cooling. It ensures a temperature difference of just two and a half degrees between the cells. This innovative technology extends the service life of the system by up to two years and improves energy efficiency at the same time. The system therefore achieves a cycle efficiency of over 90 per cent. This means that it can discharge an additional 4,500 kilowatt hours per year. (mfo)

▶ *https://en.sungrowpower.com/*

SIGENERGY

Safe, modular and AI-enhanced battery storage

photo: Sigenergy

The SigenStor system from Sigenergy offers modular storage, advanced safety and AI-driven battery management, ideal for residential and small-scale commercial use.

Featuring a modular adjustable storage capacity of between 5 and 48 kWh and an AC output of between 3 and 30 kW, Sigenergy's SigenStor battery storage system is directed at the residential storage system and small-scale C&I segments. It boasts high system security thanks to its numerous safety innovations such as aerogel insulation pads and an extinguishing system on a modular level. The AI-supported EMS is expected to enable a cycle life of 10,000 full cycles to be reached.

The storage system also features an interface to link a CCS DC charging connector for 400 V and 800 V with up to 25 kW charging power directly from the PV system, which in turn supports bidirectional charging for V2H and V2G. The storage system can be easily controlled by the user via an app with integrated GPT-4 (ChatGPT from OpenAI) functionality.

▶ *https://www.sigenergy.com/en*

TRINA SOLAR

Energy storage with advanced cooling technology

photo: Trina Storage

The Elementa 2 energy storage systems from Trina Storage offer a highly integrated solution for modern energy needs. Housed in 20-foot containers, these systems are equipped with an advanced cooling system featuring a bionic design, ensuring a minimal temperature variation of just 2.5°C. This precise temperature control is critical for maintaining the system's longevity and efficiency, which is evidenced by its impressive 12,000-cycle lifespan and zero degradation during the first year of operation.

With system voltage capable of reaching up to 1,500 V, the Elementa 2 is designed to handle high-demand energy applications. The in-built battery modules, crafted to IP67 standards, provide robust protection against adverse environmental conditions, ensuring reliable operation even in challenging settings. Trina Storage's Elementa 2 represents a significant advancement in energy storage technology, offering a reliable, efficient, and durable solution for large-scale energy needs.

▶ *https://www.trinasolar.com/sites/en-glb/storage/*

SOCOMEC

Modular C&I storage system

The French storage manufacturer Socomec has presented a new complete solution for commercial applications. The capacities of the modular system can be scaled from 250 kilowatt hours to three megawatt hours, with outputs ranging from 150 to 750 kilowatts.

Socomec has thus developed a new solution for storing green electricity, charging EVs and for use in off-grid systems. Thanks to peak load optimisation, the new storage unit can also be used to reduce energy costs in commercial and industrial buildings. Solar modules with an output of up to 300 kilowatts can be connected directly to the storage system. Anyone who connects the IOT-capable system to their own cloud can also monitor and control their system remotely.

Batteries and inverters are now even easier to integrate into the system and the connection to the busbars is simpler, according to the manufacturer. With the third outdoor storage generation, the manufacturer claims to have made the integration of batteries and inverters 25 per cent more compact.

▶ ***https://www.socomec.co.uk/en-gb***

photo: Socomec

photo: Solarwatt

SOLARWATT

Next generation of Battery Vision

Solarwatt presents the next generation of storage systems with the Battery Vision. The home storage system has a modular design with a capacity of 5.2 to 182 kilowatt hours and has been developed for sector coupling in the home.

Solarwatt's Battery Vision system can temporarily store solar power from your own system as well as charge electricity from the grid when the market prices are particularly low.

The design was developed together with BMW. The storage unit can be installed as a DC or AC battery and is suitable for new installations as well as for retrofitting existing solar systems. The new storage unit is also capable of providing emergency power.

The battery quickly absorbs a lot of energy and can then release it just as efficiently when required (1C power rate). The home storage system is part of the new Vision product series. The energy system is controlled by the company's energy manager, which customers can also use for services such as dynamic electricity tariffs.

▶ ***https://www.solarwatt.com/***

BMZ

Commercial storage system to charge up to 300 kilowatts

Storage system manufacturer BMZ presents the Power Bloxx outdoor container solution for commercial customers. The storage unit enables small commercial enterprises to achieve a high degree of self-sufficiency from the electricity grid. However, the solution is also interesting for larger residential complexes with their own large solar system.

The Power Bloxx from BMZ is easy to install via plug and play and comes with an integrated inverter. The storage modules supply 68 to 204 kilowatt hours of electricity with an output of 50 to 300 kilowatts. The device is equipped with an intelligent control and monitoring system and also serves as an emergency power generator with a long runtime.

The storage unit comes in a standard ten-foot steel container. According to the manufacturer, the integrated air conditioning system enables operation in the usual European temperature range for use in both summer and winter. The areas of application range from coastal areas to high altitudes in mountainous regions.

▶ ***https://www.bmz-group.com/***

photo: BMZ

SONNEN

New Sonnenbatterie 10 Performance Plus

Battery manufacturer Sonnen presents the new Sonnenbatterie 10 Performance Plus. This increases self-consumption of solar power, ensures intelligent networking and provides an island-capable emergency power supply.

Twelve kilowatts of three-phase power are available - in line with the increasing requirements for charging EVs or heat pumps. The new home storage system also integrates a backup power solution that enables an AC island function as standard. In the event of prolonged power outages, the backup reacts within seconds so that the household can set up its own three-phase power grid. This ensures a power supply of up to eight kilowatts.

The integration of this function significantly reduces installation costs and space requirements, emphasises the manufacturer, as there is no need for an external emergency power box. The new Sonnenbatterie can also be combined with the recently introduced Home Charger two. There is also the option of participating in Sonnen's virtual power plant (VPP) via the community. The prerequisite for this is the conclusion of the Sonnenflat direct smart electricity tariff.

▶ *https://sonnenbatterie.co.uk/*

photo: Niels H. Petersen

CATL

Liquid-cooled storage units

The EnerC liquid-cooled system from Chinese manufacturer CATL is an integrated storage solution with an innovative cooling system.

The cell-to-pack solution, also known as CTP, combines the liquid-cooled battery system with a temperature spread between the cells of a maximum of up to five degrees Celsius. In addition, the system is an emergency power supplier integrated with a fire extinguishing system and a control system compactly packaged in a container.

The lithium iron phosphate-based cells used are classified as very safe and are designed for a service life of 1,200 cycles. With independent liquid cooling plates, the EnerC ensures reliable operation of the entire system for 20 years, the manufacturer promises.

▶ *https://www.catl.com/en/ess/*

photo: CATL

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