

## Energy Turnaround in the Front Yard: Outdoor Home Storage Systems

**Intersolar Exhibition: Outdoor Storage Systems for Family Homes and Summerhouses / New Economic Solutions for the Installation of Photovoltaic Systems / Home Solar Energy Storage Systems Put to Test**



*KIT Energy Center: Having future in mind*

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*Outdoor storage solution designed by KIT: The lithium-ion battery in its weatherproof housing opens up new fields of application. (Photo: build\_up design)*

**The transformation of the German energy scheme builds on many pillars. At the Intersolar and ees Europe exhibition for the solar industry, KIT will introduce innovative concepts for the energy turnaround: an outdoor storage system, novel fastening systems for photovoltaic modules, and a test environment for home storage systems that will test their quality, grid-compatibility, and economic efficiency. KIT will host booth B1.152 in hall B1 at the Intersolar and ees Europe exhibition in Munich from June 22-24, 2016.**

The price-performance ratio of home storage systems equipped with lithium-ion batteries is getting more and more favorable. But not every household has enough space left for these systems. While all conventional home storage systems need to be installed in temperature-controlled rooms of residential homes, KIT now introduces a solution that allows for an installation in a yard, garden, or carport. "With the

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photovoltaic system mounted on the roof, the inverter possibly realized as an outdoor installation, why not make the home storage system weatherproof and place it outside as well?" Dr. Olaf Wollersheim, Group Leader of Competence E at KIT asks. "We leveraged our experience from the development of home storage systems to create a compact and cost-effective design for an outdoor storage device." The outdoor concept makes it possible to move the storage device from the cellar or utility room to a place outside the house, thereby freeing up valuable space inside the building for other purposes. This way, it is extremely straightforward to supply especially weekend cottages and summerhouses with green power. Long-term tests conducted by KIT proved that a high-quality lithium-ion battery in a weatherproof housing can operate even in winter, with only minor efficiency losses, compared to the same battery indoors – and above all: with the same operational safety. This aspect is especially important because the safety guideline for home storage systems issued by the manufacturer associations and the reference made to it in the new KfW funding rules have considerably increased the safety level in Germany. Even with today's installations, the risk of a gas leakage or fire is very low. The new outdoor energy storage system concept now completely eliminates any risk inside the house. KIT will present a close-to-production prototype of the outdoor energy storage device at its Intersolar booth.

### **Install Your Photovoltaic Modules Wherever You Want**

More economic efficiency, optimum space usage, and easy installation – KIT comes up with promising new fastening concepts for photovoltaic modules. For example, photovoltaic modules can be used as a roofing solution above the front door, saving the costs for a conventional porch roof. Another cost-effective installation technique makes it possible to fit the modules vertically on the house wall, protecting the latter from sun, wind, rain, and cold. Our research shows that the energy yielded by modules with an extreme orientation, such as 60° to the east or west and an inclination of 60°, is still 79% of that with the common south orientation and 30° inclination," says Nina Munzke, Solar Power Storage Park research coordinator. "In the overall balance, however, this reduced energy yield is made up for by low installation, module, and home storage costs when using your own solar power." The Solar Power Storage Park contains a setup of more than 100 different system configurations differing, for instance, in their east-west orientation, inclination, or technical components. This research facility develops concepts for the use of lithium-ion batteries as grid-compatible buffer storage systems for alternative energies. For mobile homes or campgrounds, where no wall surfaces are available, the KIT concept provides a solution with low-cost PV racks

that are similar to laundry drying racks. KIT will present all these PV rack concepts at the Intersolar exhibition.

### **Home Storage Systems Put to Test**

More and more private households utilize home storage devices in order to buffer the power from photovoltaic systems and use as much own solar power as possible. The commercially available lithium-ion storage batteries, however, differ considerably in terms of safety, price, and capacity and ultimately in their economic efficiency. The largest German comparative study, conducted under the “Safety First” project, compares more than twenty commercial home storage systems for safety, quality, and grid-optimized behavior with the state-of-the-art in research and technology. “We put the systems to the acid test – they are inspected directly after receipt and assessed according to the safety guideline for home storage systems,” explains Nina Munzke, who is responsible for the SafetyFirst project. “Then, they are integrated into the test environment and subjected to endurance tests. Unlike the known consumer product testers, it is not our aim to present a comparison of products. We rather record deviations from the state of technology and give corresponding feedback to the industry. This enables the manufacturers to constantly improve their systems.” The SafetyFirst project is funded by the Federal Ministry for Economic Affairs and Energy with a total volume of approx. 4 million Euros and is coordinated by the Karlsruhe Institute of Technology. This project is partnered by the Fraunhofer ISE (Institute for Solar Energy Systems) in Freiburg and the ZSW (Center for Solar Energy and Hydrogen Research Baden-Württemberg) in Ulm. First results from the comparative tests and a prototype of the test environment will be presented at the Intersolar and ees Europe 2016.

[https://www.kit.edu/kit/pi\\_2016\\_072\\_solarstrom-heimspeicher-auf-dem-pruefstand.php](https://www.kit.edu/kit/pi_2016_072_solarstrom-heimspeicher-auf-dem-pruefstand.php) (available in German only)

### **Special Exhibit: “Wind meets Solar and Storage”**

In cooperation with the ees Europe 2016, KIT has also organized the special exhibit called “Wind meets Solar and Storage”, presented in hall B2, booth B2.290. Besides the system design and integration of solar and wind power storage batteries, it presents a close-to-production prototype of a large-scale storage system developed by KIT that features a high energy density and an innovative cooling concept. This storage system can be used both to provide an operating reserve and for the power supply for residential areas. It will be built under the Helmholtz Energy Lab 2.0 project with the objective to explore the interaction of the various components of future energy systems in a real-world scenario.

[https://www.kit.edu/kit/english/pi\\_2014\\_15859.php](https://www.kit.edu/kit/english/pi_2014_15859.php)  
<http://www.presseportal.de/pm/82549/3324742> (available in German only)

### **Lectures Held by KIT Experts at the Exhibition and Conference**

“Small-Scale PV Storage Systems - Status Quo and Required Future Developments”, Nina Munzke, KIT  
ees Europe Conference, June 21, 2016, 2:30 PM - 4:00 PM , ICM - International Congress Center Munich, Room 14 B

“Correlation Cell-Battery-Safety, Experience with Safety Guidelines/ Latest Norm Developments”, Thomas Timke, KIT  
ees Europe Conference, June 22, 2016, 11:00 AM - 12:30 PM, ICM - International Congress Center Munich, room 14 B

„Marktvergleich von Li-Ionen Heimspeichern: Performance, Netzdienlichkeit und Sicherheit auf dem Prüfstand“ (Comparison of commercially available lithium-ion-based home storage systems: performance, grid-compatibility, and safety put to test), Nina Munzke, KIT  
ees Forum, June 22, 2016, 11:20 AM - 11:40 AM, booth B1.151

„Marktvergleich von Li-Ionen Heimspeichern: Montage, Inbetriebnahme und Sicherheit auf dem Prüfstand“ (Comparison of commercially available lithium-ion-based home storage systems: installation, commissioning, and safety put to test), Nicolaus Lemmert, KIT  
ees Forum, Friday, June 24, 2016, 1:00 PM - 1:20 PM, booth B1.151

The Competence E project covers all research aspects from the battery materials to the electric storage system in a way that is unique in Germany. With an open technology platform for battery-electric vehicle drives and stationary energy storage systems, the systemic approach is aimed at developing industrially applicable solutions and their production methods. This will be an important step towards the energy turnaround and reaching climate objectives: Increased storage capacity or stationary storage systems to compensate the fluctuation of renewable energies and enhance the range of electric vehicles for increased acceptance.

Find more information on the Competence E project at

<http://www.competence-e.kit.edu/english/index.php>

More about the KIT Energy Center: <http://www.energy.kit.edu>

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