

becomes possible and thus new fields of application are opened up. This also facilitates the creation of new business models where the energy utility retains ownership of the system; placing it outdoors allows them easy access for service and maintenance.

The novel KIT mounting concepts for solar panels guarantee affordability, optimised use of space and simple installation. Solar modules can, for example, be installed as rooftops, vertically on the wall or as a structure similar to a clothes horse in case there are no available wall surfaces. The mounting concepts open up new DIY installation applications with cost-effective and appealing designs.

KIT sets new standards for the quality and performance of stationary storage systems.

KIT has been working for several years on pioneering technologies in the field of stationary energy storage systems. The KIT service portfolio covers a broad spectrum, from system dimensioning and battery system development via system integration and validation to performance and safety tests, as well as consulting and quality control for storage systems and the respective production processes.



Outdoor storage and innovative photovoltaic mounting
(Image: build_up design)



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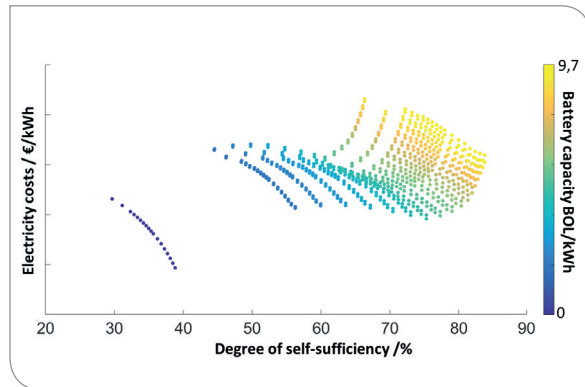
Cost-effective solutions for the energy supply of tomorrow

COMPETENCE E



(Image: build_up design)

Energy storage systems with lithium-ion batteries have the potential to play a decisive role in the establishment of an efficient and sustainable future electricity supply. Widespread deployment of this technology depends to a large extent on whether the energy costs in each specific application are financially competitive.

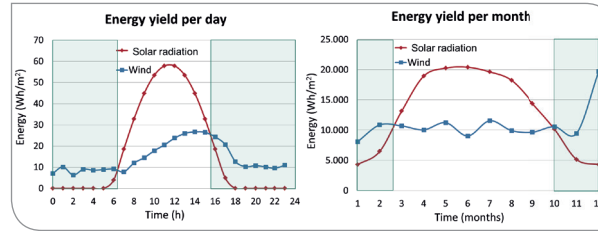


Dimensioning of a solar battery storage system – single family home

System dimensioning is crucial for profitability.

A decisive factor in the economic viability of a storage system made up of solar photovoltaics (PV) and/or wind power, battery and power electronics is the correct sizing of each of the system components as well as a careful consideration of the interaction between them. The main aspects of system dimensioning are the choice of the size of the different components and the PV orientation. The goal is to identify the most economical combination as a function of the customer's requirements (e.g. attainment of a specific degree of self-sufficiency) and the local conditions (e.g. current local electricity price).

The battery is currently still the most expensive component of a stationary storage system: the smaller it is, the lower the final unit cost of electricity will be. In most cases this can be achieved by synchronising the energy generation and load with each other so that surplus energy generation is minimised and the necessary storage capacity can



Comparison of available solar radiation and wind power in a specific location

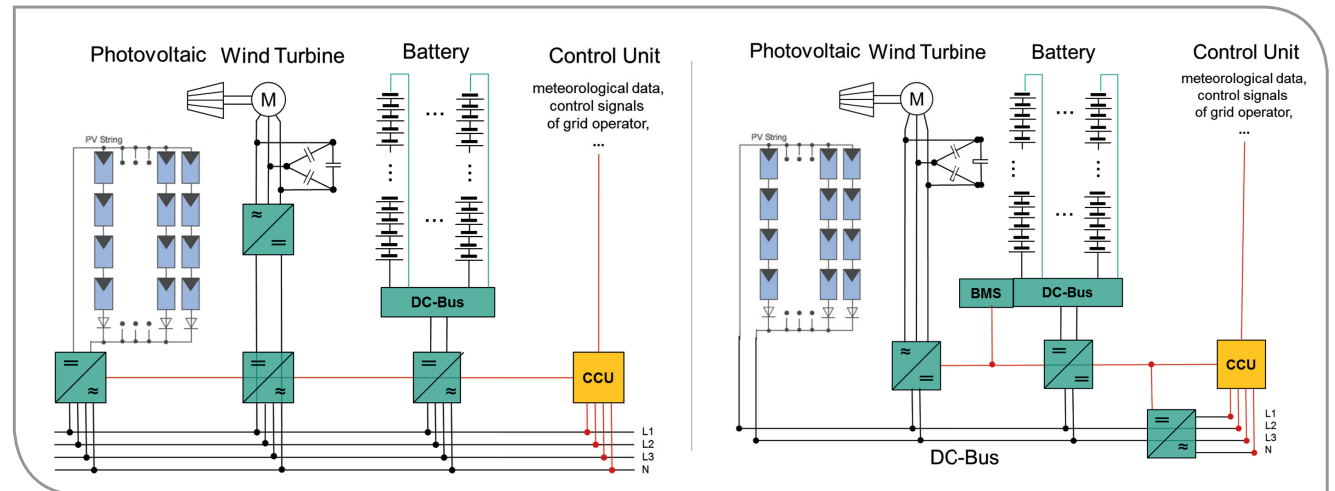
be reduced. One way of doing this is to customise the PV installation by installing arrays at different orientation angles and, if appropriate, by additionally integrating a wind turbine. Indeed, the wind turbine/PV-battery combination makes sense with regards to the balance of energy between day and night as well as between summer and winter. In larger projects the system dimensioning is especially important; in this case it is necessary to perform a detailed analysis of the relationship between load profile, renewable energy generation potential and current cost structure of the local energy supply, all the while taking the customer's expectations into account.

System design determines economic efficiency depending on the given application.

From a technical perspective there are in principle two distinct ways to couple the energy sources and storage devices to each other. In an AC-coupled system all renewable energy is fed directly into the AC-grid, whereas in a DC-coupled system the energy is first fed into a DC-bus via voltage transformers or rectifiers, and the battery is coupled to the DC-bus with DC/DC converters. There are pros and cons to both configurations with regards to efficiency, costs and system integration. Hybrid solutions are also possible.

Storage 2.0: Outdoor storage system and new mounting concepts for solar modules as examples of innovative and economic home solutions.

Whereas most commercially available home storage systems have to be installed in the dry and temperature-controlled environment of the home, KIT presents a solution for storage installation in the backyard, garden or carport. This outdoor concept saves valuable space that can be used for other purposes. In particular, a simple energy supply for weekend cottages and summer houses



Energy systems with renewable energy sources and storage devices in AC- (left) and DC-coupling (right)