GUIDE BATTERY STORAGE · 7 MIN.

Battery storage in industrial plants: self-consumption, peak shaving and the fire protection consequences in an existing building

A commercial storage system pays for itself through self-consumption and peak shaving. In an existing building, however, it changes the fire protection situation. What has to be settled for siting, thermal barriers and permitting.

Situation

The business case is usually calculated quickly. A storage system raises the self-consumption of the company's own photovoltaic installation, shaves load peaks and thereby reduces demand-based grid charges. The more revenue streams a system serves, the shorter the payback. The decision is therefore often taken in energy or production management, without fire protection being involved at that point.

The installation location then follows from availability: a free area in the hall, an ancillary room next to the transformer station, a zone beside the warehouse. What is obvious operationally is often the least favourable solution in fire protection terms. The storage system then stands in a fire compartment designed for production use and brings in a fire load that behaves entirely differently.

A lithium-ion storage system differs fundamentally from a classic fire load in the way an event unfolds. Thermal runaway releases heat and flammable gases over an extended period, can propagate between modules and can be influenced only to a limited extent by cooling. For the existing building this means a load that the fire protection concept in place never considered.

In building law terms, the storage system is a change to the structural installation or to its use. Separating walls to the rest of the building have to meet a requirement that follows from the applicable Landesbauordnung (state building code) and, in industrial buildings, from the rules applying there. Anyone who installs the storage system and settles the question afterwards risks a prohibition of use and discussions with the property insurer about the scope of cover.

Our approach

Settle the installation location in fire protection terms before you fix it operationally. Installation outdoors or in an attached, self-contained structure is generally the simpler solution, because it keeps the fire load out of the production area. Where that is not possible, the storage area is formed as a fire compartment of its own. This decision largely determines the cost and the permitting route.

For indoor installation, form a complete enclosure, not just a separating wall. A thermal barrier only becomes effective once wall, ceiling, floor, doors and all penetrations are considered together. The European classification distinguishes here between space-separating and load-bearing function. Which fire resistance duration is actually required follows from the building, its classification and the fire protection documentation.

Treat the penetrations as a trade in their own right. A storage system in an existing building brings power cables, control lines, cooling lines and ventilation openings with it. Each of these openings breaches the enclosure. EN 1366-3 is the relevant test framework for penetration seals on cable and pipe penetrations. Without a register that assigns every opening to a tested system build-up, the enclosure exists on paper and is open in practice.

Take gas release into account when planning the enclosure. Thermal runaway produces flammable gases that can accumulate in an enclosed space. The structural solution therefore has to fit together with the concept for venting and deflagration protection. Venting openings are functionally necessary and must nevertheless preserve the thermal barrier to the rest of the building.

Draw on the test data of the system offered before you put the construction work out to tender. The UL 9540A report supplies the temperatures and the propagation behaviour, EN IEC 62619 the safety requirements for cells and battery system. Those figures show what thermal load the enclosure has to take. Without that basis the fire resistance duration is estimated rather than derived.

Sequence

1. Review of possible installation locations

Together with your plant engineering team we assess the locations under consideration on the works site. Outdoor installation, an attached structure and indoor installation with a fire compartment of its own are compared. For each variant, effort, interference with operations and permitting route are set side by side, so that the location decision rests on a solid basis.

2. Survey of the building

At the chosen location the existing components are recorded: walls, ceilings, floors, existing fire compartment boundaries and all penetrations already present. These are compared against the building's existing fire protection concept. That shows which components have to be upgraded and which already perform.

3. Design of the enclosure

From the test data of the storage system and the requirements of the Landesbauordnung (state building code) and the fire protection documentation, we derive the build-up and fire resistance duration of the enclosure. Wall, ceiling, floor and opening closures are planned as one coherent system. Gas venting is considered from the outset, not added afterwards.

4. Coordination with the authority and the insurer

The documents are prepared so that the building supervisory authority, the fire protection department and the property insurer all receive the same basis. The siting logic to NFPA 855 and the property insurers' requirements to VdS 3103 are drawn on to give a traceable justification for the protection objectives. Conditions are settled before construction starts rather than at acceptance.

5. Execution during ongoing production

The construction work is divided into sections that fit into your production times. Low-dust methods and separated working areas keep interference with manufacturing to a minimum. Every penetration seal is documented before it is closed. At handover you receive an evidence file that can be filed directly into your building documentation.

Frequently asked questions

Does a commercial storage system in the hall need a fire compartment of its own?

That depends on size, building classification and use, and has to be settled in the fire protection documentation under the applicable Landesbauordnung (state building code). As a principle: the greater the stored energy and the more sensitive the adjoining use, the more likely a self-contained enclosure will be required. A blanket answer without reference to the specific property regularly leads to rework.

Is outdoor installation in a container the simpler solution?

Often yes, because the fire load is kept out of the building. That does not remove the need for fire protection, however. Still to be settled are the separation distances to buildings and plot boundaries, the lining of the container and the separation of the units from one another. Here too, the test data of the system determine what structural separation is required.

What changes for the company's property insurance?

The storage system introduces a new fire load into the existing scope of insurance and therefore has to be notified. Property insurers assess the installation location, the structural separation, monitoring and the emergency organisation. If these points are agreed and documented before installation, conditions and questions of cover can be settled in advance rather than after a loss.