# THE RIGHT SOLUTION FOR EVERY APPLICATION

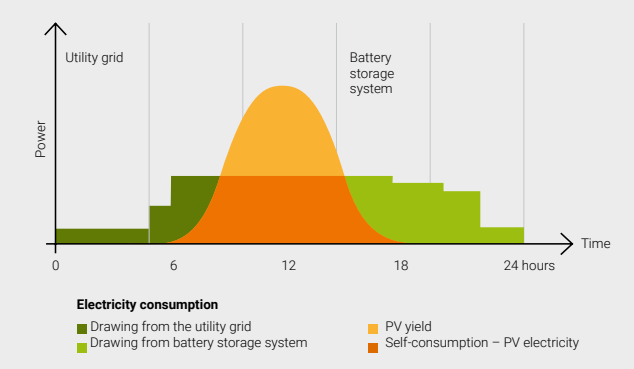
Battery storage systems for agriculture, commerce and industry

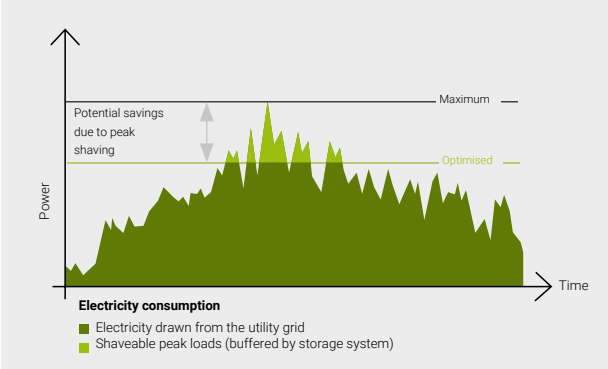
THE ENERGY STORAGE EXPERTS

# PAY OR DO IT YOURSELF?

## Use battery storage systems to profit from the energy transition and minimise risk

The transformation of the energy market has made long-term planning security for energy costs all but impossible. Yet every change also brings opportunities. Many have already taken advantage of the energy transition to tap into an attractive business with secure revenue streams with photovoltaic installations, biogas generation and wind power. Now battery storage systems offer the next big opportunity: secure yourself against uncertainties while earning money, and avoid the consequences of potential power outages with back-up power.




Self-consumption optimisation

### SELF-CONSUMPTION OPTIMISATION

If the solar yield is greater than the current electricity consumption, the excess is fed into the battery storage system. If the solar yield dips below power requirements, the storage system kicks in and delivers the needed electricity. When it runs out, electricity is drawn from the utility grid. In this way, the self-consumption share can be boosted to 80% or more.

**Potential users**
Operations with a photovoltaic installation or a suitable roof, such as carriers, agriculture, workshops, factories

Physical peak shaving

### PHYSICAL PEAK SHAVING

Consumers with load profile measurement primarily pay for the utilised power. Costs are based on the moments when power consumption is the highest, i.e. the peak loads. Battery storage systems can provide stored electricity during peak loads and reduce utility grid consumption. This reduces the connected load and can save thousands of euros per year.

**Potential users**
Operations with high power consumption and load profile measurement, such as quick charging stations, agriculture, workshops, manufacturing

Multi-use

## MULTI-USE APPLICATIONS

Multi-use allows you to combine operational management strategies, such as self-consumption optimisation (SCO), peak shaving (physical or dynamic) and Time of Use (ToU). A storage area can be defined for each of the selected applications depending on specific requirements. For maximum service life and economic efficiency.

Charging station control

## THINK PEAK PERFORMANCE, NOT PEAK LOADS

It doesn't take long for the grid connection to reach its limits – especially when it comes to larger charging parks or the upcoming expansion work to the electric vehicle charging infrastructure at apartment buildings, supermarkets and commercial enterprises. This is where you stand to benefit from the Energy Manager's charging station control.

**Potential users**
Trade, manufacturing, industry

Back-up power

## INEXPENSIVE BACK-UP POWER

Battery storage systems help ensure a reliable power supply. You can also optimise or completely replace a diesel generator with a battery storage system. In case of a power outage, your battery storage system takes over the power supply and your operation keeps running without interruption.

**Potential users**
Operations that depend on a reliable power supply, such as livestock farming, cold stores

Off-grid

## RELIABLE POWER SUPPLY WITHOUT THE UTILITY GRID

You need electricity but there's no grid connection available? In conjunction with a power source such as a photovoltaic installation and/or a CHP, battery storage systems enable the creation of an off-grid system. Battery storage systems can also optimise the consumption of diesel generators.

**Potential users**
Properties that need electricity but lack a grid connection

# DIVERSE BUSINESS MODELS

## Further potential applications with storage systems

Depending on the inverter used, such as the integrated TS-I HV series inverter, the SMA Sunny Tripower TS HV series storage, or the low-voltage SMA Sunny Island, Laibach battery storage systems are suited to a wealth of potential applications and business models.

No matter what your industry or commercial sector – Laibach is always the right choice.

Load control

### SYNCHRONISATION FOR BUSINESS OPTIMISATION

If your own energy production is low and the battery storage system is empty, loads that are not urgently needed are simply switched off, including the charging station for the electric car, which only has to be ready for use again in eight hours. Actively switching loads on and off brings production and consumption into sync and optimises the economic efficiency of entire systems.

**Potential users**
Operators of larger battery storage systems with a grid connection

Generation control

### FOR GREATER INDEPENDENCE FROM ENERGY SOURCES

Actively switching generation systems on and off optimises the economic efficiency of entire systems. This effect is compounded through additional control options for generators, such as combined heat and power plants.

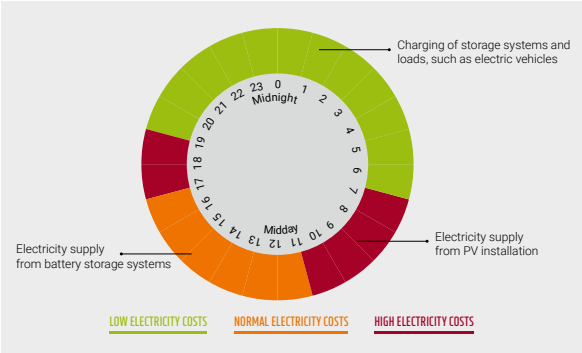
**Potential users**
Operators of entire systems with a grid connection and generation systems

Power quality

### PROTECT EXPENSIVE PLANTS AND MACHINERY

During the operation of production facilities, the mains voltage experiences fluctuations that can also affect the public utility grid. Poor power quality impairs machines, data lines and other plant components and, in the worst case, leads to defects. Adverse consequences could be economic (downtimes, maintenance costs) or legal (manufacturer guarantees, insurance) in nature.

**Potential users**
Operations that depend on a reliable power supply, such as livestock farming, cold stores

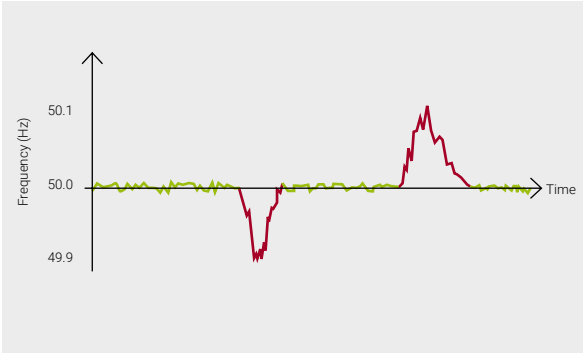



Time of Use

## CUT COSTS WITH TIME OF USE APPLICATIONS

For electricity customers who are subject to variable pricing, off-peak tariff consumption might make economic sense, but it is not always an option. Storage systems can significantly cut consumption at peak tariff times, saving plenty money, with the side benefit that it also evens out and stabilises the load on the public utility grid.

**Potential users**
Operations with variable pricing from grid suppliers, the public sector, ancillary service providers




Ancillary services

## EARN MONEY WITH ANCILLARY SERVICES

To keep the utility grid working at its best, the amount of electricity generated must equal the amount of electricity consumed. This has to happen for each and every second of the day and night. If more energy is fed in than is needed at a given time, or if demand exceeds supply, load fluctuations occur and cause power failures. Grid operators are in a constant balancing act to manage this with system demand control.

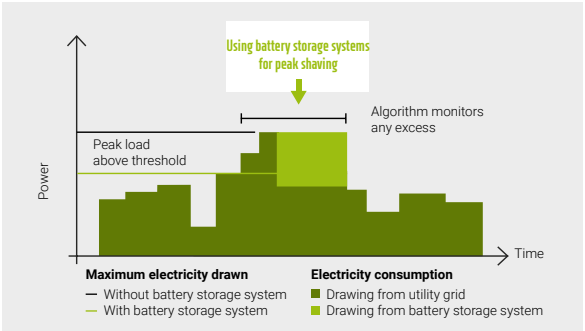
**Potential users**
Operators of larger battery storage systems with a grid connection

Dynamic peak shaving

## DYNAMIC PEAK SHAVING

With physical peak shaving (PPS), every consumption peak that occurs is simply covered by electricity from the battery storage system, while the system involved in registering load profile measurement (DPS) works at 15-minute intervals to ensure greater accuracy and therefore also enhanced efficiency.

The consumption peak maximum that the supplier tolerates is circumvented, because the amount of electricity consumed is registered over a period of 15 minutes to permit short peak loads. The Energy Manager only kicks in when the average consumption threatens to exceed the maximum tolerated peak value within the 15-minute interval.




**Background:**
Where annual consumption exceeds 100,000 kWh, the energy supplier charges a kilowatt-hour rate and a demand rate. The kilowatt-hour rate is calculated for each kWh, while the demand rate is calculated based on the maximum average power level (in kW) within 15-minute intervals. If the average power level exceeds the maximum amount within a single interval, the consumer then has to pay a higher demand rate. Depending on the billing period, this charge can be incurred for up to one year.

# ENERGY MANAGEMENT SYSTEM

## Control and monitoring made easy

All energy  lows can be recorded, monitored and controlled using our innovative energy management system – consisting of the Energy Manager and the my portal. By setting individual operational management strategies, you can combine a wide variety of applications and thus perfectly adapt the system to the needs of commerce and industry.

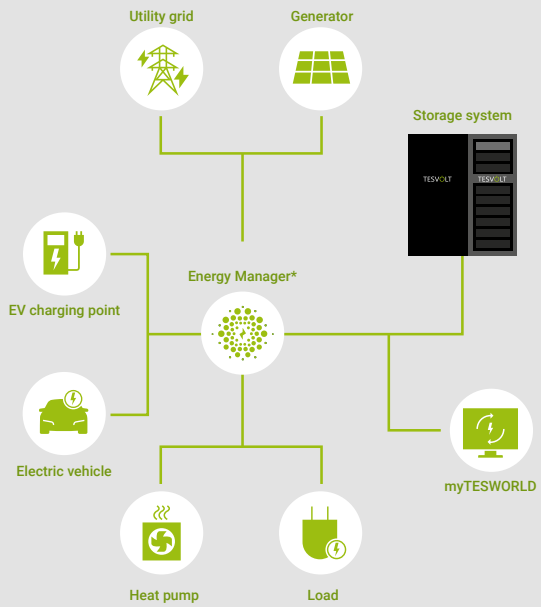
**Test the demo version now!**

### FUNCTIONS OF THE my PORTAL

The **my portal** offers a wide range of functions for monitoring and controlling energy flows. This is available in both a free Basic version and a fee-based Pro version – corresponding to the associated areas of use, with expanded functionality.

- Real-time dashboard
- Overview of power consumption and generation
- Detailed breakdown of consumption and generation
- Energy balance
- Metering data history
- Energy reports and detailed meter readings (may not be used for billing purposes)

Would you like to get to know better? Then simply sign up for test access and get an overview of all of our portal's functions at your leisure. We'd naturally be delighted to help you if you have any questions.




### Energy Manager

- Autonomous energy management
- Data acquisition and optimised energy flows
- Generation, load and storage system control
- Configuration over a user interface with different views for different user groups
- Local integration in the meter cabinet or in the Backup Control Box

### EMS portal

- Real-time dashboard
- Overview of power consumption and generation
- Detailed breakdown of consumption and generation
- Energy balance
- Metering data history
- Energy reports and detailed meter readings (may not be used for billing purposes)

This graphic shows an example of a system structure. See the installation manual for more detailed information.

# WHAT CHARACTERISES A GOOD STORAGE SYSTEM?

### RAPID DISCHARGE (1C)

Essential for high power levels. If the C-rate is too low, the storage system has to be very large to provide the required power. This ultimately makes the storage system unnecessarily expensive.

### HIGH EFFICIENCY AND LOW STAND-BY LOSSES

Some energy is "lost" in each storage process. The storage system efficiency indicates how much of the energy in the storage system can be taken out of it. This value should be well over 90%, while stand-by losses should be no greater than 5 watts.

### HIGHEST SAFETY STANDARDS

For storage systems, make sure the battery is monitored at cell level, as this is the only way to detect the need for maintenance at an early stage. The battery cells should also come from a reputable source. Established manufacturers offer cells that will not ignite even if damaged.

### INTELLIGENT BATTERY MANAGEMENT

Monitoring each individual battery cell is essential to guaranteeing maximum performance, safety and durability. This ensures that all cells are optimally charged and discharged at all times and that potential errors are detected in good time.

### HIGH CYCLE STABILITY AND LIFESPAN

Battery storage systems are subjected to wear with each charge cycle. There is therefore a specified number of full charge cycles for a storage system before it goes below a certain residual capacity. There is also a lifespan in calendar years that specifies the maximum lifetime in years.

# WHAT DOES THAT MEAN, EXACTLY?

**DoD**
Depth of discharge – indicates a storage system's maximum discharge depth. Many storage systems cannot be fully discharged, which means that not all of the energy in the storage system is available for use. Good storage systems have a depth of discharge of 100%.

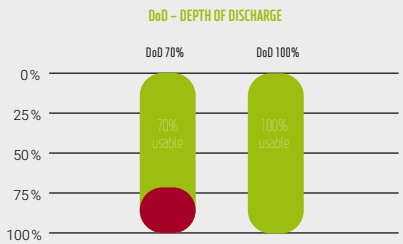
**Full cycle**
A full cycle is a single instance of complete charging and discharging of a storage system. In practice, this involves totalling partial charges and discharges. One of the ways the lifespan of a storage system is specified is with a number of full cycles.

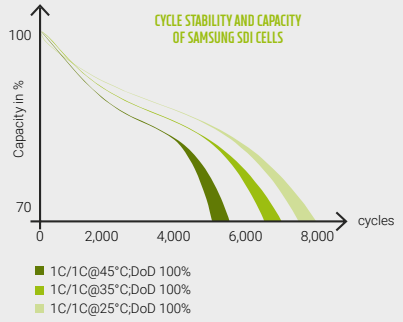
**C-rate**
This indicates how quickly a storage system can be charged or discharged. 1C means that a storage system can be fully charged or discharged within an hour. A storage system with 0.5C requires two hours for the same, while for 2C it takes just half an hour.

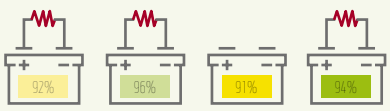
**LCOS**
Levelised cost of storage – describes the cost for a kilowatt hour of energy charged into a battery storage system and drawn back out of it. The lifespan and number of cycles, the maximum depth of discharge and the system efficiency are the determining factors here.

**Li-NMC**
Lithium-nickel-manganese-cobalt-oxide – abbreviated as Li-NMC, is a cell chemistry characterised by high energy density, high performance and long lifespan.

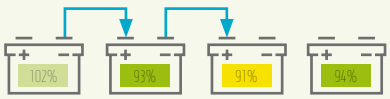
**SoH**
State of health indicates the health of the battery as well as the percentage of the initial battery capacity that is still usable in the current charging cycle. How fast the battery ages depends in part on the quality of the battery, as well as the balancing process used.



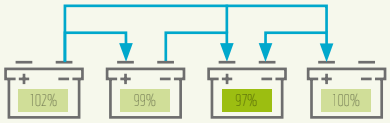




PASSIVE BALANCING
Efficiency: 0%, balancing current: 0.05 A
High losses




UNIDIRECTIONAL BALANCING
Efficiency: 70–90%, balancing current: 3.0 A
Moderate losses




ACTIVE BALANCING
Efficiency: > 90%, balancing current: 5.0 A
Low losses

## HOW DOES BALANCING WORK?

Cells age at different rates. These differences between the cells have a negative impact on the battery's charging and discharging behaviour. Cell balancing attempts to minimise these differences as much as possible. In passive balancing, all cells are brought to the level of the weakest cell by having the stronger ones burn off energy. In contrast, the **Battery Optimizer** uses the heated energy for active fan operation to increase the efficiency of the entire system and the rate of **balancing currents**. In unidirectional balancing, stronger cells charge any weaker subsequent cells. The **Active Battery Optimizer** uses active balancing between all battery cells within the battery module and even between the different battery modules.