

DISTRIBUTION ENERGY STORAGE



Versatile container-based
energy storage **DES**

AERS
ADVANCED ENERGY STORAGE

Versatile container-based energy storage DES

ALL IN ONE | 328 kWh | 150kW | INTEGRATED TRANSFORMER | ISLAND MODE

Economic benefits

- ❖ Reduction in reserved capacity
- ❖ Utilisation of the difference in prices between different time periods (On-peak / Off-peak)
- ❖ Ensuring of the highest possible level of energy self-sufficiency
- ❖ Peak-shaving (e.g. when charging electric cars)
- ❖ Balancing of asymmetric consumption
- ❖ Optimisation of electricity costs

Option of financing from grants



The universal concept of DES energy storage aims to:

- ❖ Provide a strong and stable source of electrical energy
- ❖ Enable efficient storage and subsequent use of energy from renewable resources
- ❖ Deal with the emerging challenges of electromobility and enable fast charging
- ❖ Shave consumption peaks of entire buildings (industrial and residential)
- ❖ Create a backup source of energy in 'island mode'

DES gives second life to batteries originally used in electric vehicles. These batteries:

- ❖ Meet the strictest quality and safety criteria
- ❖ Offer an unbeatable capacity/price ratio
- ❖ Generate no negative CO₂ load
- ❖ Guarantee the same length of warranty as new batteries
- ❖ Allow the payback period to be reduced to as low as 4 years, depending on how the battery storage facility is used

Mounting lugs

for easy handling

Active cooling

fan

Safety system

sensors, fire extinguishing system

Battery section

328 kWh, expandable

Adjustable supports

pad slope compensation



Inverter / rectifier with filter

150kW, expandable

Control electronics

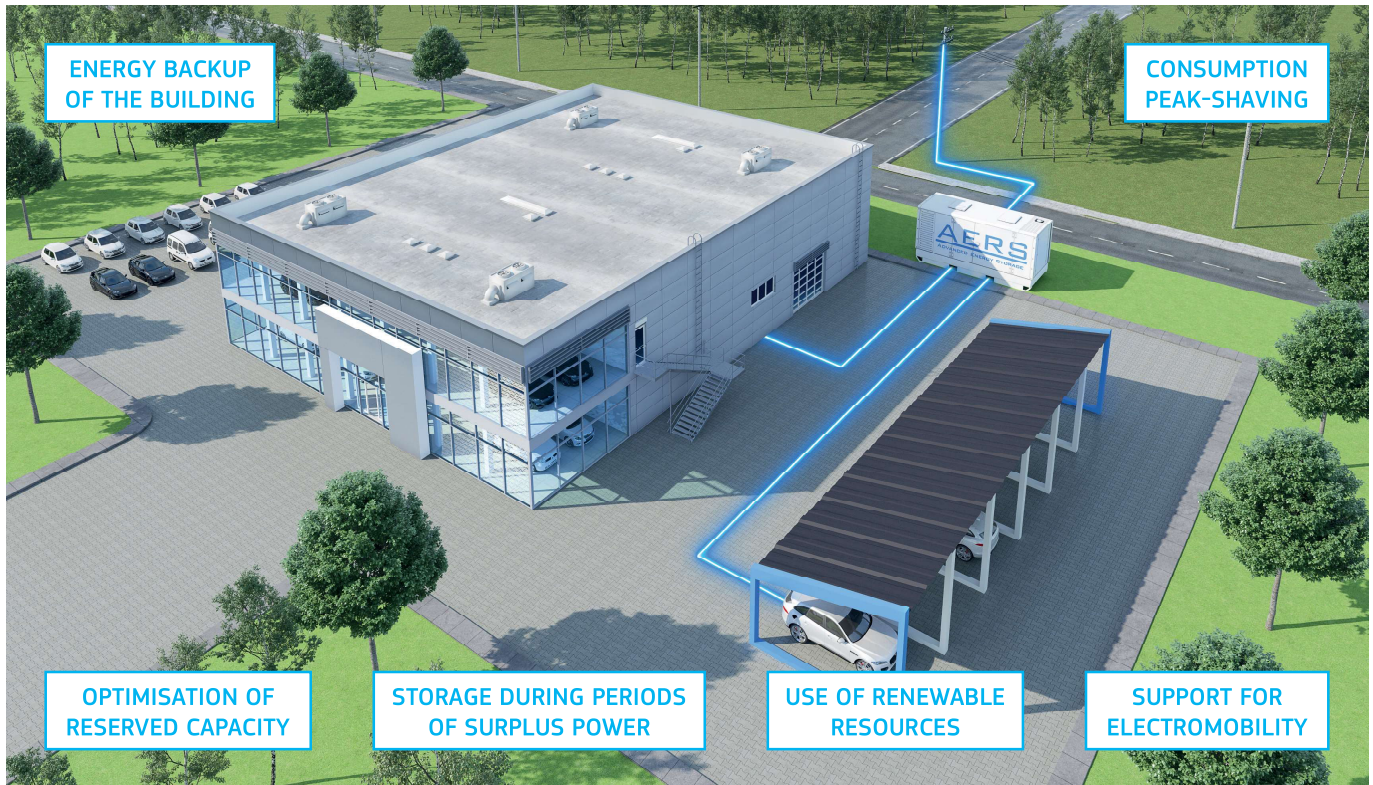
PLC; fuses; contactors; ...

Transformer

150kW, expandable

Battery section / We use battery modules previously used in ŠKODA electric cars. In each of the two sections there are 24 series-connected modules in a suspended system that allows quick replacement and ensures optimal circulation of cooling air. The battery sections are constantly monitored. Each section can be shut down separately, and so some of the batteries can be replaced without the need for a total shutdown.

Power section / The power section is based on an inverter by Danfoss, the world's leading inverter manufacturer. The performance of the inverters is scalable and they are a proven, highly efficient and reliable solution for battery storage applications. The power section also contains control and communication components, sensors, DC and AC protection, monitoring devices and a transformer.



Case study

Initial situation

The operator of a site with established operations wants to purchase a 150kW fast charging station and thus enable the public charging of electric cars. They currently have their own transformer and pay for reserved capacity of 120kW from their electricity supplier. The operator of the site has not yet experienced a situation in which their consumption peak exceeds the reserved capacity. When all appliances are used together, the maximum consumption is 100kW. The initial electricity costs may vary according to the conditions of the energy supplier. In the Czech Republic, the standard price is approx. 7.35 EUR per 1 kW. $120\text{kW} \times 7.35 \text{ EUR/kW} = 882 \text{ EUR per month}$

Description of the problem

The site operator installs a 150kW charging station. The following situation may therefore arise:

- When all devices are in operation, the consumption peak will increase from the original 100kW → 250kW (including the charger)
- The reserved capacity won't be enough and if the distribution system can handle it, the power taken will be 130kW over the reserved amount

This situation will result in a fine from the electricity supplier. The demanded sum depends on the level of excess power and the duration of the increased consumption!

Solution No. 1

A new contract with the electricity supplier and *an increase in the reserved capacity by 130kW*. $130\text{kW} \times 7.35 \text{ EUR/kW} = 955 \text{ EUR per month} = 11,429 \text{ EUR per year}$ (not considering the growing cost of electricity, or the option of investment in a more powerful transformer)

Solution No. 2

The use of a DES system, which will supply the necessary energy above the set 120kW of reserved capacity.

When making use of a grant, the investment will have a pay-back period of 5–7 years. When using renewable resources, it will be 5–6 years.

WHAT DOES THE INSTALLATION AND OPERATION OF AN ENERGY STORAGE SYSTEM INVOLVE?

- ✦ **How much space does the storage system take up? Do I have to prepare the subsoil?** The footprint of the device is 2×2.5m, and the weight is 3.8 t. The installation requirements are minimal: the subsoil should be adequately reinforced so as to be able to support a load of at least 500kg per m² and not subside. In the building's main distribution panel, it is necessary to ensure there is enough space for the installation of power meter and breaker.
- ✦ **How much does Energy Storage cost?** The price depends mainly on the required storage capacity and the performance requirements of the station. However, we believe that our Energy Storage system ranks among the most advantageous options on the market. Return on investment – depending on use and the options for financing from available sources of subsidies – can be achieved in less than 5 years.
- ✦ **What is included in the price? And what isn't included in the price?** The price includes the supply of a complete DES system, including control software, ExWorks. The price doesn't include the actual installation, studies, design work and transport costs. Energy assessment of the location is extra.
- ✦ **What about maintenance? How much does maintenance cost?** A fire inspection must be carried out by a specialist technician once every six months. Additional maintenance is included in maintenance packages that are presented individually.
- ✦ **How long is the warranty and the expected lifespan of the batteries?** The basic battery warranty is up to 8 years. If an older second life battery is used, the warranty may be shorter. Upon mutual agreement, the shorter warranty will be compensated with a favourable price for any battery replacement.
- ✦ **Can certain grants be used for financing?** Several different grants provided by the Ministry of Industry and Trade, the Ministry of the Environment and the Ministry of Transport can be used individually to finance the DES. If you are interested, we will help you identify the relevant grants.
- ✦ **Can the device be rented?** Currently, we do not offer rental option. DES rental may be included in our portfolio in 2023.
- ✦ **Can the DES system be used as a backup energy source?** Yes, DES Energy Storage systems can be operated in island mode, which will ensure energy security in the event of a power outage.

TECHNICAL SPECIFICATIONS

General information

Number of ESS units	1 pc
Rated power (long term)	150 kVA
Peak power (minute)	165 kVA
Rated power (long term)	150 kW
Peak power (minute)	165 kW
Overload for apparent power (1 minute)	0,1%
Rated capacity	164 or 328 kWh
Maximum power from the basic design	up to 400 kW
Maximum power (1 unit)	up to 2 000 kW
Number of units in parallel operation	unlimited kW
Rated voltage (AC)	400 V
Voltage range (AC)	360 to 440 V
Rated frequency (AC)	50 Hz
Frequency range (AC)	47 to 53 Hz
Power factor	-1.0 to 1.0
Island operation support	optional
Dark start support	optional
IP Code	IP 54
Basic operating temperature	-15 to +40 °C
Operating temperature with optional air conditioning	-25 to +50 °C
Humidity	<90% non-condensing
Altitude	< 2000 m. above sea level
Dimensions	2550×2020×2200 mm
Weight	approx 3,8 t

Transformer

Type	encapsulated, dry
Placement	indoor installation
Number of	1
Voltage (primary/secondary)	400/ 317 V
Connection type	Dyn5

Inverter

Manufacturer	Danfoss
Type	two-way island operation 4-quadrant operation 3-phase
Cooling	air
Option of water cooling	yes
Number of units	1
Rated power (long term)	150 kVA
Peak power (minute)	165 kVA
Overload for apparent power (1 minute)	10%
Rated voltage (AC)	317 V
Voltage range (DC)	500 to 768 V
Efficiency	>96%
Phase imbalance	up to 100%

Battery system

Battery manufacturer	LG Chem
Battery chemistry	NMC
Number of racks	1 or 2
Cycle efficiency	>96%

Safety

Manufacturer of BMS	AERS
BMS levels	3
Safety concept	passive and active elements
Temperature sensors	yes
Smoke sensors	yes
Fire sensors	yes
Fireproof insulation	yes
Fire extinguishing system	yes

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