

Case study | VACON® NXP

Alfen energy storage enables the energy grid of the future

On- and off-grid
energy storage
systems rated up to

100 MW

Electrification and hybrid solutions are now booming. One of the first pioneers was the Dutch based energy storage manufacturer Alfen B.V., which has used Danfoss power conversion equipment since the early days. Alfen is a system integrator of smart plug-and-play energy storage solutions (ESS). Equipped with an integrated micro-grid and energy management system (MEMS), Alfen systems are suited to both on- and off-grid containerized solutions with stackable units with capacity up to 100 MW.

Alfen and Danfoss Drives have installed numerous ESS solutions around the globe. Typically, these ESS sites are located off-grid, supporting production processes in parts of the world without stable electricity grids or powering temporary sites such as festivals. Other common applications are load balancing and energy trading. Let's take a closer look at some of these projects.





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POWER TO ADAPT

Storage - Solar Global, Czech Republic

The Czech solar PV company Solar Global selected Alfen to supply a 1 MW energy storage system connected to its Prakšice solar PV farm. The system was delivered in the fourth quarter of 2017 as the first large scale storage system in the Czech Republic.

Prepared for the future with storage

Solar Global develops and services solar photovoltaic (PV) farms and rooftop PV installations, and currently has some 100 MW capacity under service. As Solar Global wants to play an important role at the forefront of the energy transition, it is investing in an innovative energy storage solution that initially will be used for energy trading. As the local market further develops, the system is also ready for other applications, such as providing grid stability services.



Energy storage supporting solar PV farm.

This project is supported by EU Regional Development Fund.

EV peak shaving storage - Stedin and Mistergreen, the Netherlands

A project in which a rapid charging station for electric vehicles was equipped with solar panels and a

local energy storage battery system was started in 2016. Project partners Alfen (energy storage systems), Stedin

(grid operator) and MisterGreen (EV lease) have evaluated this pilot to be a success: peak loads decreased, maximum flexibility in offering variable price rates was attained, and the charging station itself became even more sustainable.



Electric vehicle charging station.

The number of electric vehicles is rapidly expanding, creating a need for more charging stations. In 2013, MisterGreen built the rapid charging station 'Haarrijn' at the A2 highway between Amsterdam and Utrecht. The pilot station with solar panels and local energy storage was commissioned in 2016. These solar panels provide the charging station with energy. If no vehicles are connected, the generated energy is diverted into the energy storage system, to be used when electric vehicles do connect to charge. This enables maximum usage of sustainably generated energy. Should the solar panels and battery run out of energy, the system can of course always fall back on the central grid.

What are the **benefits?**

What do these seemingly different installations have in common? They share the need for cost-efficient energy production. Hybridization provides significant benefits to local power utilities:

- **Reduction or deferral of capital expenses (CAPEX)** by avoiding over-dimensioning a system or by deferring investment in infrastructure. In over-supply situations, the hybrid system can store the surplus energy. When demand levels are high,

the stored energy can provide an additional source of energy.

- **Reduction of operating expenses (OPEX).** Hybrid systems can increase system efficiency, achieve better power quality, offer black start capability and avoid power outages caused by grid instability. Fuel and maintenance costs are lower than conventional power generation systems.
- **Less noise and lower emissions** due to less diesel power generation.

How does it work?

Danfoss equipment converts energy from the battery to grid and vice versa, seamlessly cooperating with a grid management system to achieve peak

shaving for incoming power, time shift for production, and back-up to avoid outage situations.



Peak shaving

Optimize the energy flow between the incoming supply and local storage to meet spikes in demand without disrupting the supply grid. Store excess energy when demand and costs are low.



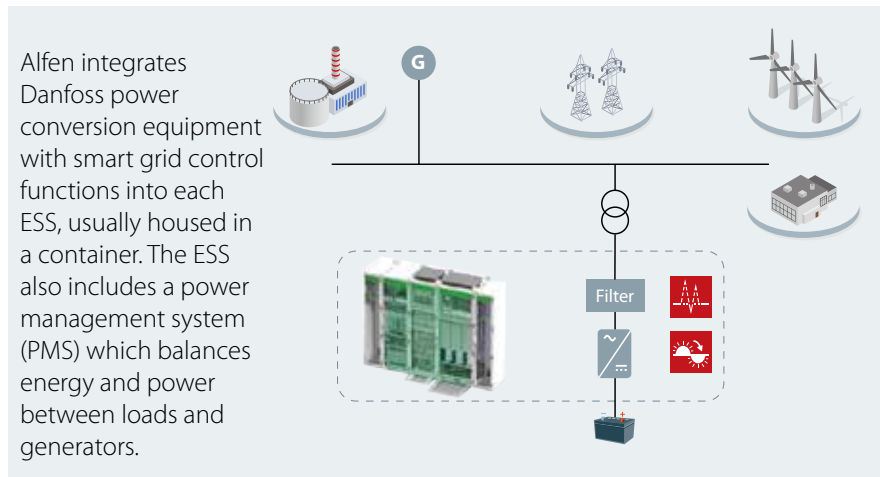
Time shifting

Store energy during excessive energy production or when energy costs from the grid are low, and supply energy from the storage medium when energy costs from the grid are high.



Back-up power

Draw on energy storage for back-up power during outages, maintaining the ability to continue operation for a defined period.



Alfen integrates Danfoss power conversion equipment with smart grid control functions into each ESS, usually housed in a container. The ESS also includes a power management system (PMS) which balances energy and power between loads and generators.

Why **Danfoss?**

Danfoss hybrid solutions help you to:

- **Reduce procurement costs** with air- and liquid-cooled drives, AFE, NFE, DC/DC Grid Converter, DC modules and components available from one source
- **Reduce variants** with solutions serving applications over a wide power range from kW to MW
- **Increase flexibility** with the ability to integrate a wide variety of common battery bank voltages using a DC/DC converter
- **Upgrade easily** with low additional investment, using simple-to-extend VACON® NXP platform
- **Scale up easily** to meet future energy requirements: new energy sources, additional storage or increasing demand
- **Reduce service investment** Using the same VACON® NXP hardware configurations, service teams require little to no additional training
- **Go to market faster.** An open approach with a wide range of application solutions available provides the foundation for building tailored solutions
- **Benefit from common interest** System integrators collaborate with a vendor who has a vested interest in their success. We never compete with you for projects

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