Energy Storage Systems

New solutions for a new energy environment

saft

Facilitating the integration **of renewable energy**



The increase in the quantity of electricity produced by renewable sources is creating new challenges for energy grids that are already stressed. Today's electricity systems must balance supply and demand at any time, enable more flexible grid management and ensure optimised levels of energy efficiency.

Saft can help

Saft's Li-ion energy storage systems have been purposefully designed to facilitate the effective integration of both small and large sized renewables, the optimised use of transmission and distribution assets, streamlined smart grid management and greater options for end user energy management.

With our storage systems on your side, you can de-link supply from demand, all while noticeably improving the quality and reliability of the grid. Saft makes it easier for you to successfully manage the challenges of renewables.

With Saft energy storage solutions, you get…

- Easier integration of large renewable generation plants
- Greater stability for transmission grids
- Stress relief for loaded distribution grids
- New options for local energy management

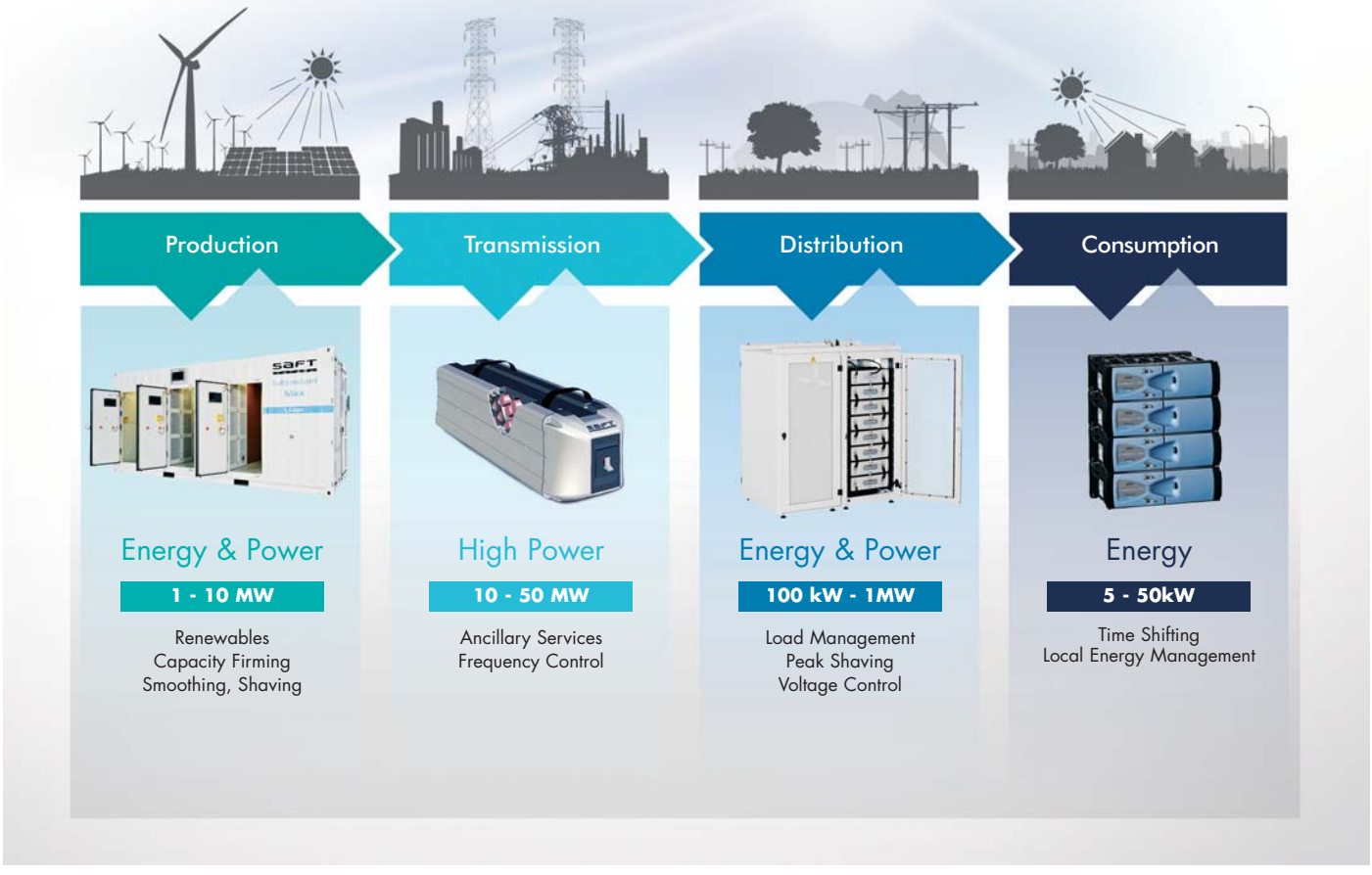
When it comes to innovative, robust and reliable batteries, no one can match Saft. Building upon on decades of experience, Saft can offer energy storage solutions to meet power and energy needs of any size, from kilowatts to megawatts. Our world-class technology is backed up with world-class manufacturing facilities, including one of the sector's most technologically advanced lithium-ion battery factories, located in Jacksonville, Florida (United States).

Solutions
from kilowatts to megawatts



Saft has a wide range of battery systems to meet every on-grid energy storage need, no matter where or when it is needed – from grid stabilisation in electricity production, transmission and distribution networks to local energy management in individual homes. Saft's wide offer of storage solutions presents benefits to actors across the entire energy supply chain.

Storage solutions for every step of the value chain



Renewable energy generation **becomes grid-compatible**

- Smooth out the intermittent nature of renewable energy generation
- Reduce ramp rates
- Make energy production predictable

Wind and solar power are subject to significant peaks and troughs in output. Saft energy storage systems smooth out this sort of intermittent generation and reduce ramp rates for medium and large solar and wind power plants, ensuring a stable level of power output.
Our higher-energy systems also provide capacity firming, making renewable energy a predictable component of a grid operator's electricity mix.

The stabilisation of wind farms and solar arrays results in very dynamic charge/discharge behaviour at variable depth-of-discharge. Saft's Li-ion technology has proved its suitability for such demanding cycling applications, offering just the right combination of energy and power output. Our high performance solutions have a lifespan exceeding 10 years and can be scaled to meet a wide range of power needs.

Two Saft Intensium® Max 20E containerised energy storage units are part of a renewable energy storage system on the Big Island of Hawaii in the United States designed to increase the Hawaiian grid's ability to integrate more renewable energy. They will help reduce output power volatility and optimise power performance for an expected service life of 15 years or more.

Saft Intensium® Max, 1 - 10 MW ▶

A stable grid
to face the challenges of tomorrow

- Make immediately available synchronised reserves with no fuel consumption
- Offer frequency and area regulation
- Provide dynamic voltage support

Transmission and distribution grids are already stressed by increasing power demands, especially during peak periods, power flow fluctuations and other disturbances. The growing penetration of intermittent renewable energy sources is adding a significant new source of instability.
Saft's high-power Li-ion modules are the building blocks for multi-MW, kV-level energy storage solutions.
Load levelling, peak shaving and other types of dynamic and rapid support are easy to provide once such storage systems are in place, enabling electricity utilities to successfully manage the introduction of intermittent renewable resources.
Our energy storage systems also offer a range of ancillary services that improve the stability, reliability and capacity of power networks.

Saft 230 V, 7kWh/70 kW Li-ion unit

Saft high-power systems can be part of a variety of storage installations designed to optimise the smooth integration of renewable energy into the grid, such as ABB's DynaPeaQ® system which is helping compensate for the intermittence of the energy being produced by a wind farm in eastern England.

A de-stressed grid allows operators
to defer investments

- Reduce feeder congestion during demand peaks
- Provide voltage support
- Enable black start and islanding

If a substation is operating close to its peak capacity, network operators may feel forced to build a new substation and reconfigure their distribution feeders, especially if renewables are added to the mix.
Saft can make it possible to defer these sorts of major capital investments, or even eliminate them altogether. By installing robust and reliable Saft energy storage systems at strategic points in the network, Distribution Network Operators can relieve their capacity constraints and increase their renewable hosting capabilities.
Energy storage can represent a significantly more cost-effective and immediate approach to adding capacity, and can provide return on investment in as little as 2 to 3 years.
Compact and easy to transport, Saft solutions also provide additional benefits such as dynamic voltage support and the ability for intentional islanding.

Saft, 700V, 60kWh Energy Storage Unit

Saft solutions were a key element of the European Union GROW-DERS (Grid Reliability and Operability with Distributed Generation using Flexible Storage) project that successfully created a transportable flexible storage system and assessment tool for distribution network management. Field tests of two 50 kW Li-ion batteries showed the benefits of energy storage and the grid operators involved were positive about the opportunities.

Energy storage enables cost savings **for homes and businesses**

- Maximize local consumption of PV production
- Time-shift availability of PV energy to when it is most valuable
- Power critical loads even when the grid is down

More and more frequently, electricity providers are encouraging their customers to adopt "storage behind the meter" schemes as a contribution to the robustness of the overall energy system. Storage behind the meter also enhances cost savings and creates a more optimised management of local energy production and consumption in homes, buildings and industrial sites.

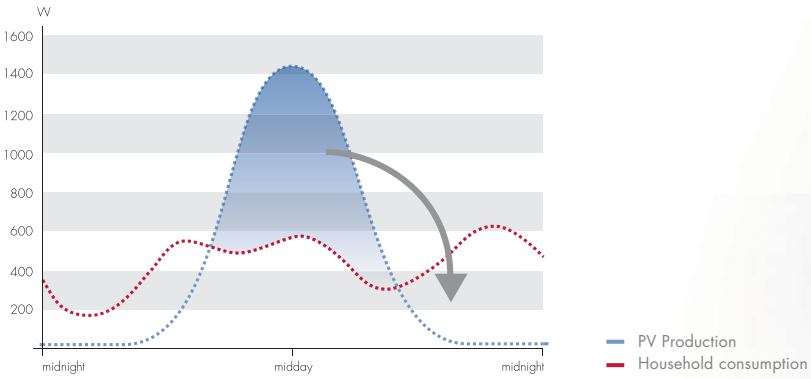
Peak power reduction and time-shifting are some of the ways spending can be optimised thanks to demand-side management of energy. Residential owners of a photovoltaic (PV) system might be remunerated for their surplus energy at a higher tariff during peak demand periods. Industrial customers can use energy storage as a cost-effective approach to peak demand reduction and an alternative to using diesel generators.

Saft's highly modular energy storage solutions are already playing a crucial role in the development and roll-out of distributed residential and small commercial renewable energy solutions like these. Our battery kits fit a wide range of user configurations and needs.

Saft is powering the California city of Sacramento Municipal Utility District's (SMUD) photovoltaic (PV) storage pilot program at Anatolia–III, a high penetration PV community. Saft's battery system provides efficient energy storage so solar power can be time-shifted to support SMUD's "super-peak" hours from 4 p.m. to 7 p.m. Our Li-ion technology met the project's need for 20-year battery life in a range of demanding environmental conditions.

▼ *Saft 48 V, 2.2 kWh Synerion® module*

Time-shifting capabilities



Li-ion: the right choice for energy storage



Saft has over 15 years of experience using lithium-ion technology in a very wide range of industrial applications. Our Li-ion batteries offer many valuable features for energy storage systems, including:

- High energy density (135 Wh/L)
- Very short response time, limited only by power electronics
- High power capability both in charge and discharge (800 W/L)
- Excellent cycling capability
- High round-trip efficiency (better than 95%)
- High charge retention
- Long life (20 years with daily deep cycles)
- Maintenance-free and self-diagnosing
- Significantly lower environmental footprint than other technologies, thanks to their high recyclability

System integration from Saft: more than just a battery, get a completely customised energy storage system

Beyond merely providing a Li-ion battery, Saft integrates its technology into complete energy storage systems that can include battery management, temperature management and safety functions, as well as power management and power conversion functionalities. Furthermore, Saft experts provide project qualification and pre-testing services at the early stages of your project, turnkey installation and commissioning, and ongoing maintenance.

Don't waste your budget on unexpected costs or improper components: by choosing a full-service contract from Saft, you benefit from a seamless and fast deployment, optimised for your specific application, as well as extremely high levels of certainty in your project's timing, cost and proper functionality.

Saft is committed to the highest standards of environmental stewardship

As part of its environmental commitment, Saft gives priority to recycled raw materials over virgin raw materials, reduces its plants' air and water releases year after year, minimizes water usage, reduces fossil energy consumption and associated CO_2 emissions, and ensures that its customers have recycling solutions for their spent batteries.

Regarding industrial nickel-based batteries, Saft has had partnerships for many years with collection companies in most EU countries. This collection network receives and dispatches our customers' batteries at the end of their lives to fully approved recycling facilities, in compliance with the laws governing trans boundary waste shipments.

Saft has selected a recycling process for industrial lithium-ion cells with very high recycling efficiency. A list of our current collection points is available on our web site. In other countries, Saft assists users of its batteries in finding environmentally sound recycling solutions. Please contact your sales representative for further information.

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