



# High performance of Li-ion unlocks major savings for data centres

François Danet | Saft

**T**oday's data centre operators are now putting plans in place to adjust their architectures to support 5G, online streaming, autonomous vehicles and the connection of ever-more devices to the Internet of Things (IoT). This growth in data demand reflects society's increasing reliance on data – which in turn increases demand for reliable, always-on electrical power.

As a result, data centre UPS systems are central to the economy today as they protect the data that keeps businesses, transport, finance, education and security systems running. The cost of data centre power outages are in the region of tens of thousands of dollars per minute, with one example from 2016 being Delta Airlines, which incurred losses of \$150 million due to lost data.

At the same time, data centre operators are coming under greater pressure to increase

power density and efficiency to make the most of their available footprint.

Lithium-ion (Li-ion) battery technology has the potential to bring value when integrated into UPS systems. Traditionally, data centre operators have used valve-regulated lead acid (VRLA) batteries. Li-ion batteries have high power density (up to 6 times more than VRLA), offer a long lifespan (around 20 years), highly reduce maintenance, can withstand high temperatures and offer faster recharge times to recover quicker.

## Savings from high performance

Looking at a Li-ion battery system, the most obvious differentiator is to offer one third of the size and one sixth of the weight of VRLA batteries. As a result, an operator can dedicate more space to server racks or other services and can reduce land take and civil engineering costs. This can represent huge savings, particularly when square metres and infrastructure costs matter.

A Li-ion battery can also offer low Total Cost of Ownership (TCO) thanks to a long calendar life and reduced maintenance requirements. These also support sustainability thanks to requiring less materials and logistics along the lifetime of the equipment.

Another crucial value brought by Li-ion technology is the opportunity to operate at full performance up to 40°C. Data centre operators benefit from HVAC downsizing and/or energy savings.

An additional benefit is the charging capability – and therefore recovering system availability. Following a full discharge, a Li-ion battery can be fully charged in up to 75 minutes.

In addition, Li-ion technology integrates accurate and smart monitoring of key battery parameters. For data centre operators, the advantages are monitoring and predictive maintenance, and providing the data to

improve backup operation with the capability to optimise battery sizing and/or anticipate potential extension or expansion.

### Compact system for Total's Singapore HQ

Opened in December 2019, Total's new Singapore headquarters is equipped with servers to support corporate IT systems such as oil and gas trading activity. It is based in a city-centre office tower where space is a premium.

Therefore, a compact and lightweight Li-ion battery for UPS has enabled it to make the most of the available floor space, as well as the load-bearing capability of the floors. Another major advantage of Li-ion is the technology's advanced communication, which enables integration with Building Management Systems (BMS) to monitor critical equipment.

Saft worked with an UPS manufacturer to deliver a turnkey integrated Flex'ion Li-ion system with the capability to deliver 360kW over 10 minutes. Saft supported on-site installation and commissioning.

### Connectivity and hot-swappability for Total supercomputer

Total also adopted a UPS and Li-ion battery solution, supplied by Saft, in 2018; the purpose was to back up its High Power Computing (HPC) data centre in Pau, southern France, one of the world's largest industrial supercomputers which carries out 3D visualisations to help engineers optimise oil and gas fields.

These computations require a constant and well-regulated power supply and the customer required a hot-swappability and integration of accurate monitoring systems.

To achieve this, Saft and its UPS OEM partner worked together to integrate Flex'ion



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Li-ion battery system and UPS solution. Both components are modular for scalability and can be hot swapped. It is sized to deliver 2 times 550kW for up to seven minutes over a life of 15 years.

Total also wanted to consider the opportunity to use the system as a grid connected UPS and battery, which was one of the tested capabilities of the turnkey solution.

The electronic communication between the Li-ion battery and the UPS controller enables onward communication via protocols such as Modbus, TCP/IP or CANopen. As a result, Total can monitor the battery's key performance indicators in real time, such as state of charge (SOC), state of health (SOH), temperature profiles, and set up alarms.

### Safety and short lead time for German banking group

Another operator adopted Li-ion battery technology: the German banking group Sparkasse. Saft worked with another UPS manufacturer to provide systems to provide high reliability and operational safety, as well as meeting a short project lead time.

The UPS systems are able to provide more than 2MW for 15 minutes over a lifetime of 15 years.

### The future of data centre UPS systems

Today's state-of-the-art Li-ion battery systems can provide up to 140kW from a standard cabinet footprint of 0.3m<sup>2</sup> and a weight of 380kg – and this is the best choice to address mission critical backup in applications where power density, safety, energy efficiency and advanced monitoring are valuable.

In terms of development roadmap, Saft have plans in place to introduce a 200kW version from the same size of cabinet. Looking further ahead, Saft are working towards introducing the first generation of solid-state batteries within five years. These should provide 250 or even 300kW power from the same cabinet.

#### About the author:



**Francois Danet** is Li-ion Business Development Manager at Saft for the Data Centre/Big Data within industrial markets. He is based in Levallois-Perret, France at Saft's headquarters. After working for SKF Group

as an Application Engineer, he launched and monitored International tools for Citroen vehicle manufacturer as After Sales Manager. He joined Saft in 2007 first as Railway Sales Engineer and Sales Manager. Today, he prescribes and develops channels to market, builds high level relationship with key players, supports strategic product development, potential partnerships and investments.