



# TotalEnergies installs France's largest energy storage system

TotalEnergies has deployed a Saft lithium-ion (Li-ion) battery energy storage system (ESS) at Dunkirk, Northern France in a frequency response project that will serve as a model for other sites.

## Q OVERVIEW

The 25 megawatt-hour (MWh) facility at Dunkirk is the largest ESS in France and is part of TotalEnergies' strategy to develop a portfolio of low-carbon electricity operations. Its primary use is to provide capacity support and frequency regulation services to French transmission system operator RTE, by serving as a stand-by capacity reserve during the cold winter months and, throughout the year, by quickly injecting and absorbing energy in reaction to frequency variations on the grid. As owner and operator of the ESS, TotalEnergies

participates in the French "Frequency Containment Reserves" (FCR) market through its subsidiary TotalEnergies Flexible Power Solutions, who trades four-hour blocks of FCR on a day-ahead basis.

As the electricity market evolves, TotalEnergies will also use the installation to provide additional services. For example, the participation in the European market for automatic frequency restoration reserve (aFRR) is currently being studied.

## 🎯 THE CHALLENGE

The Dunkirk project emerged in early 2020, when TotalEnergies won 103 MW out of 253 MW capacity support contracts under the first round of RTE's long term tender AOLT (appel d'offres long terme). Through seven-year contracts, TotalEnergies and other successful bidders provide capacity service to the French electricity grid during winter peak periods.

The Dunkirk ESS thus became TotalEnergies' first storage system to contribute to the AOLT scheme. The system is expected to earn about 30% of its revenue from the AOLT contract and 70% from the FCR market. Its architecture needs to be future-proof and flexible to serve as a blueprint that TotalEnergies can roll-out at all other sites. In total, four storage plants with different power ratings are currently planned at locations all over France.

## Key requirements

- Fast deployment before the end of 2020
- Modular design to meet requirements for any site with minimal re-engineering
- Cost-competitive solution to participate successfully in merchant grid services markets
- Optimized availability and reliability to secure revenue
- Robust and exhaustive safety concept that meets requirements for refineries and industrial sites
- Flexibility to adapt its operational profile as the market evolves

## THE SOLUTION

Saft worked with partner Omexom to deliver a turnkey ESS connected to the 90 kV substation at the Flandres Center in Dunkirk's port district.

Saft supplied 11 [Intensium® Max 20 High Energy](#) containers, while Omexom delivered power conversion systems (PCSs), medium-voltage transformer, power management system (PMS), SCADA, civil works and cabling. Saft sized the ESS to provide the required power at any State of Charge (SOC) and throughout its operational lifetime.

### Control is the key to future performance

Saft's control architecture and battery management system (BMS) are important aspects of the design. They are based on decades of experience in operating Li-ion technology in the field. Saft has deployed its CUBE control system, which it developed to form the backbone of large, modular ESS systems with multiple strings and containers connected in parallel. This data-driven approach, consistent through all layers of the ESS, supports safety, performance and lifetime and gives Saft confidence to back up its systems by extensive performance guarantees.

Saft can integrate additional containers in the future if required. The resulting higher energy capacity may enable additional revenue generation in longer-term markets, such as grid congestion management.

The installation was designed in groups, each of which has its own PMS, PCS and three or four ESS containers. These groups form standardized building blocks that TotalEnergies can use as the basis of systems to roll out at other AOLT sites and elsewhere.

The control system also provides the flexibility to deliver multiple energy storage services. This will enable TotalEnergies to provide additional services as the market evolves. To achieve this, the design anticipates a more intensive use of the battery when multiple services are stacked.

In addition, a sophisticated, high-efficiency cooling system ensures consistent temperature across the entire system under any operation pattern, which is essential for predictable long-term performance.

### ESS key benefits

- ✓ Control of project risk with factory-qualified and certified battery containers
- ✓ Fast-track completion of site works
- ✓ High level availability – TotalEnergies reported 100 percent availability throughout February 2021
- ✓ Designed to stack multiple services



« Energy storage is an important element in achieving TotalEnergies' ambition to become the responsible energy major. Our goal is for low-carbon energy operations to account for 15 to 20 percent of our sales by 2040. Saft is helping us deliver that with technology that is scalable and flexible so we can deploy it where and when we need. However, the most important factors over the long term are safety, reliability, availability and flexibility. Saft's performance guarantees give us confidence that we will deliver frequency regulation successfully today – as well as services such as aFRR tomorrow. »

**Jean-Henri Culerier**, VP Storage TotalEnergies Renewables, TotalEnergies

Want to know more about Saft's Intensium® Max 20 High Energy?

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