

EPFL

Smartgrid Project

Lausanne, Switzerland - 2015



EESS with LTO technology to test the
integration of Energy Storage within
the electrical grid

The Challenges

■ Dispatching renewable distributed energy to match demand:

Many electricity distributors (DSO), such as **Romande Energie**, face the challenge of integrating an increasing share of intermittent renewable energies. The grid operator bears the risk of imbalance between production and consumption, leading to grid instability.

■ Creating a Smart-Grid architecture:

Another major challenge is to manage the energy flows at a smart-grid level, with numerous energy sources.

The solution shall:

- Integrate intermittent renewable energies
- Provide a seamless and reliable power system
- Smoothen short term variations in the energy production due to rapid changes in weather conditions
- Simulate an off-grid electrical system including solar PV and storage system.

Did you know...

The EPFL installed a total of 2.2MWh of solar PV with five different technologies. With the addition of a containerized battery energy storage system and a dedicated grid, EPFL became a major energy center to experiment and monitor the future of energy distribution.



The Solution

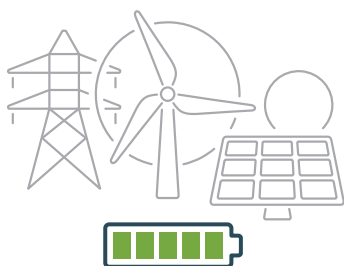
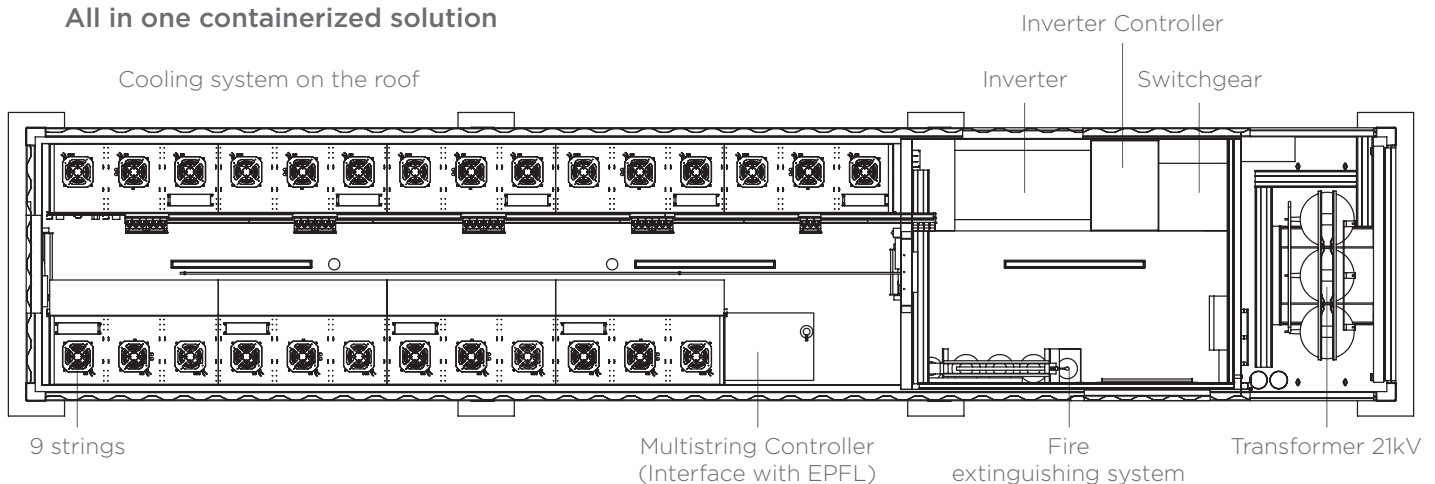
The BESS operating at the **EPFL Smart Grid Innovation Center** proves that renewable energies can be controlled and dispatched as conventional power. Thanks to the BESS, electrical grids can integrate an increasing share of renewable energy while maintaining system reliance. At the same time the battery system helps to smoothen short term variations in the energy production due to changing weather conditions.

Key facts:

- 500 kWh lithium-ion LTO battery system
- Cells up to 15'000 cycles warranty at up to 4C charge / discharge
- Ultra fast reaction grid management system
- Postponement of investments in grid assets
- Reduction of operational cost by better use of renewable energy in the supply mix
- Reduction of CO₂ emissions.



All in one containerized solution



**STATIONARY
SOLUTIONS**



The Inverter

- 630 kVA
- 729 kVA max for 1min

The Grid connection

- 300 V AC on inverter side
- Grid side Transformer 21kV / 34 A triphase

The Battery Energy Storage System (BESS)

- 8100 LTO cells: 2.33 V - 30 Ah - 70 Wh
- 135 modules: 20S3P - 60 cells each - 46,6 V - 90 Ah - 4,2 kWh
- 9 strings: 15 modules each - 700 V - 90 Ah - 63 kWh
- Container: 565 kWh - 700 V nominal - 150 A max per string.

The Partners

"Connected to the local grid, the BESS enables load profile management and allows both congestion management and economic optimization of the consumption at local level."

Pierre-Alain Urech,
CEO Romande Energie



Romande Energie is the largest energy generation and distribution company in French-speaking Switzerland, specialized in green energy generation.

Romande Energie installed and operates a 2.2MW solar park on the rooftops of the EPFL based on different technologies and a laboratory for future energies.



The EPFL project received the financial support from the framework program of the Canton of Vaud:

«100 millions pour les énergies renouvelables et l'efficacité énergétique».



"You can discharge the battery cells in 15 minutes 15'000 times and, after all this amount of cycles, still have 80% of their original capacity."

Mario Paolone,
Chair EPFL Distributed Electrical System Laboratory

The Swiss Competence Centres for Energy Research (SCCERs) have been established in 2014. These competence centres are the scientific arms of this energy strategy aiming to ensure seamless transition from a centralized nuclear-based power system to a decentralized renewable sources-based one. They bring together key industrial and academic institutions from all around Switzerland, providing the critical mass in terms of technological and market knowledge and experience required for the development and implementation of innovative solutions at a national level transition. SCCER-FURIES is one of the 8 SCCERs established covering the entire value chain of the energy sector.



Leclanché is a fully vertically integrated battery energy storage solution provider. It designs, manufactures and delivers a wide range of turnkey energy storage solutions for electricity grids, residential, commercial and industrial applications.

Leclanché also provides battery solutions for land based and electric marine transport systems.

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