

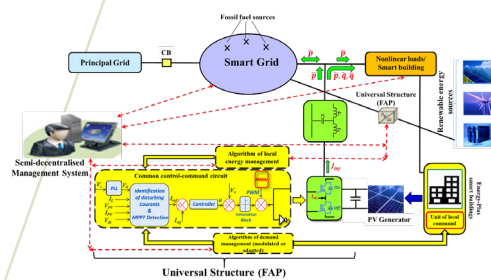
# OPTIMAL ENERGY MANAGEMENT OF SMART GRIDS: ACTIVE PHOTOVOLTAIC COMPENSATOR OF SMART ENERGY-PLUS BUILDINGS

Semi-decentralized and optimal energy management in smart grids and/or energy-plus buildings, based on a parallel active compensator with renewable generation (photovoltaic, wind...), connected to the main grid, to the micro-grid or to embedded systems.

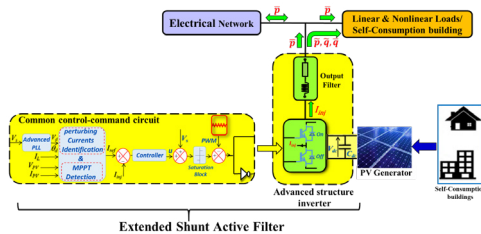
## PRESENTATION

Smart micro-grids represent an alternative to main and interconnected electricity grids, being able to intelligently manage the actions of all stakeholders while securing access to reliable (uninterrupted), ecological and economical energy.

The solution falls within this framework and aims to develop an advanced structure of a parallel active filter connected to a photovoltaic generator to reduce perturbations in real time and optimize energy management and production.



*Shunt active filter with renewable energy generation within a smart grid*



*High switching frequency shunt active filter & renewable energy generation*

Renewable energies - Uninterruptible power supply  
Active Photovoltaic Filter/Compensator - Smart energy-plus buildings  
Smart micro-grids

## APPLICATIONS

- Solving problems of perturbations (harmonics, reactive, unbalance, etc.) in industrial, commercial, administrative, medical, residential areas, including charging stations for electric vehicle, etc., to make electrical networks safer.
- Maximizing power production of renewable energy sources...
- Smart energy-plus building energy optimization
- Smart micro-grids and embedded networks (ships, planes, trains, cars, etc.)

## COMPETITIVE ADVANTAGES

- A greatly reduced footprint and a lower cost than the conventional shunt active filter, associated with a heavy, bulky and expensive L-series inductance, on the market thanks to the use of the LCL output filter with advanced nonlinear controller
- A simplified and lower cost structure with renewable energy systems without DC/DC converter and a combined device of a shunt active filter and renewable energy generation system.
- Increased compensation quality with respect to LCL grid connected shunt active filters thanks to a robust nonlinear control

## DEVELOPMENT PHASE

- ✓ Implementation of the platform FAP was launched to build and install a prototype of 15 kVA at ENSEA and CY Cergy Paris Université.
- ✓ Advance inverter based parallel active filter associated with first order output filter at minimum constraints (in going): - Two FAP structures recently deposited in two Soleau envelopes to ascertain the date of the inventions.

## INTELLECTUAL PROPERTY

Alali M.A.E., B. Shtessel Y., Barbot JP. ACTIVE ELECTRICAL COMPENSATION DEVICE, Patent, EP 3591784 A1; PCT International WO 2020/007884 A1, January 2020

## CONTACT

+33 (0)1 44 23 21 50  
industriels@erganeo.com  
Ref. project : 511