# Optimized Microgrid Management

Marta Tolós Rigueiro

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# What is a Microgrid?

A microgrid is a system that aggregates generator devices, consumers (passive equipments or loads), energy storage devices (batteries) and hybrid devices such as electric vehicles (EV) which are able to both produce and consume energy

A small scale “smart grid” that incorporates smart measurement devices (smart sensors), control methods and communication systems

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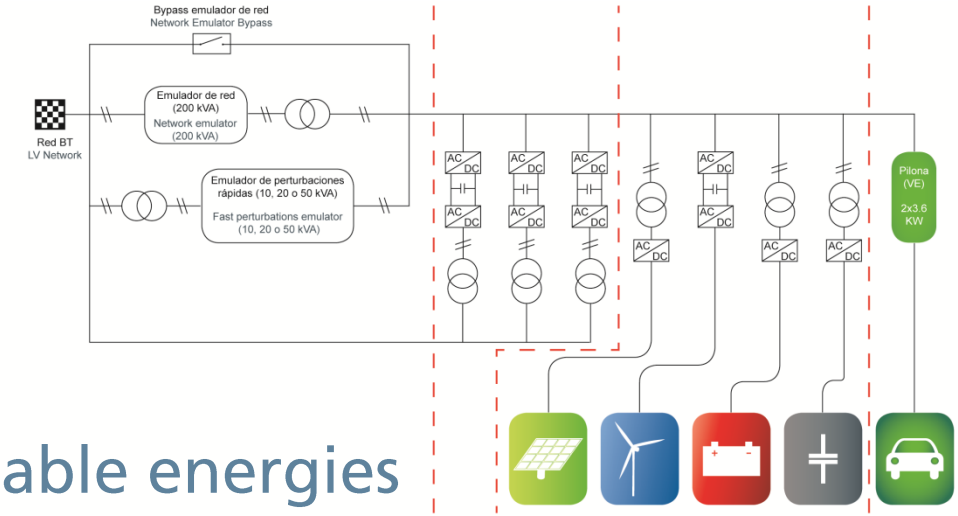
# Optimized Microgrid management

Efficient coordination of the different components in order to produce electric and thermal energy in a sustainable and safe way




## Benefits

- ✓Energy cost reduction
- ✓Increased use of renewable energies
- ✓Greenhouse gas emission reduction

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# Optimization criteria

**Technical criteria** to provide **safety** and **efficient operation**

- Current state of the inner devices
- External information: Weather conditions and forecasts

**Economical criteria** to maximize the **microgrid saving**

- Energy prices

Provide **support to the electric distribution network** in case of a contingency

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# DER IREC 22@ MICROGRID Project

An industrial research project focused on the creation of new products and services in the domain of Distributed Energy Resources (DER) and the Electrical Vehicle (EV)

## Experimental platform

A 40 kW low voltage microgrid located at the Catalonia Institute for Energy Research (IREC)

## Partners

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# Technical criteria

## Steady state regime study

- Renewable generators: domestic wind generator, photovoltaic array generator
- Energy storage
- Electric Vehicle: different models/charging curves
- Loads, three generic types:
  - Adjustable loads: adjustable consumption level.
  - Programmable loads: defined by fixed consumption cycles (interruption points)
  - Accumulative loads: a mix of the previous loads

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# Economical criteria

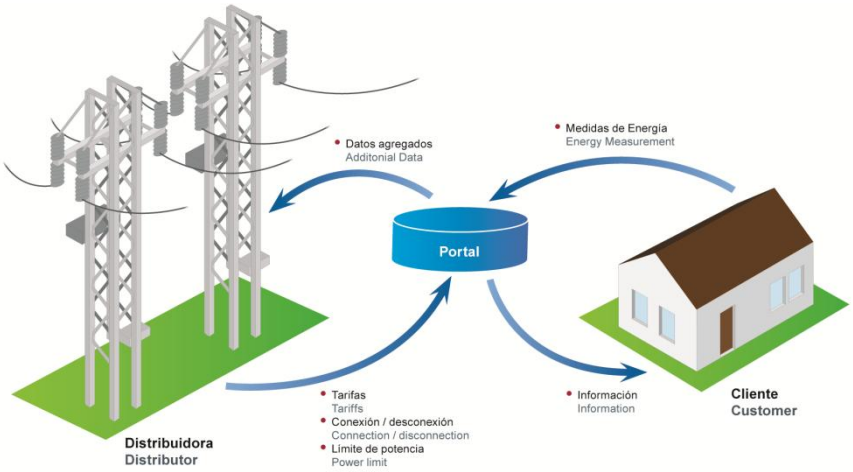
## Market interaction: Energy prices

## Renewable generators

- kWh cost based on ROI
- Wasted renewable energy penalty

## Energy storage

- kWh cost exchange based on ROI
- Ohmic losses cost
- Minimal SOC penalty cost




## Loads

- Adjustable loads: A regulation cost scale
- Programmable loads: Penalty costs: no activation, cycle interruption,..
- Accumulative loads: Minimal SOC Penalty cost

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# Thank you for your attention

## Any Questions?

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