Institut de Recerca en Energia de Catalunya
Catalonia Institute for Energy Research

Optimal management for a smart energy building

From EMS to BEMS

Barcelona, Mayo 2016

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RESEARCH AND TECHNOLOGICAL AREAS

- **Advanced Materials**
  - Functional Nanomaterials
  - Catalysis
  - Materials for Solar Systems
  - Nanoionics and Fuel Cells
  - Energy Storage and Harvesting
- **Bioenergy and Biofuels**
  - Thermochemical Conversion
  - Biorefinery and Microalgae

Research Units

- **Energy Efficiency: Systems, Buildings and Communities**
  - NZEB (Net Zero Energy Buildings and Communities)
  - Integration of Renewables.
  - Smart Grids and Microgrids
  - Green IT
  - Electric Mobility
  - Lighting
  - Economic analysis and regulation
- **Offshore Wind Energy**
  - Wind resource assessment at see
  - Electric Machines and Control Systems
  - Grid Integration

Technological Development Units

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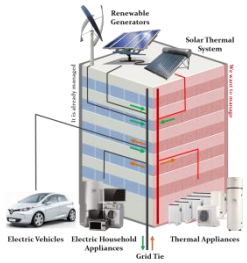


A **Net Zero Energy Building** is a building with **zero net energy consumption**, meaning the total amount of energy used by the building on an annual basis is roughly equal to the amount of **renewable energy created on the site.**

IREC has developed an **Energy Management System** (EMS) based on an **optimal supply/demand planning** of energy and with an energy balance in **real time**.

The system considers a set of inputs to run its algorithms: weather forecast affecting renewable energy generation, energy prices forecast or demand forecast to plan the correct balance of the system.

What we have already?

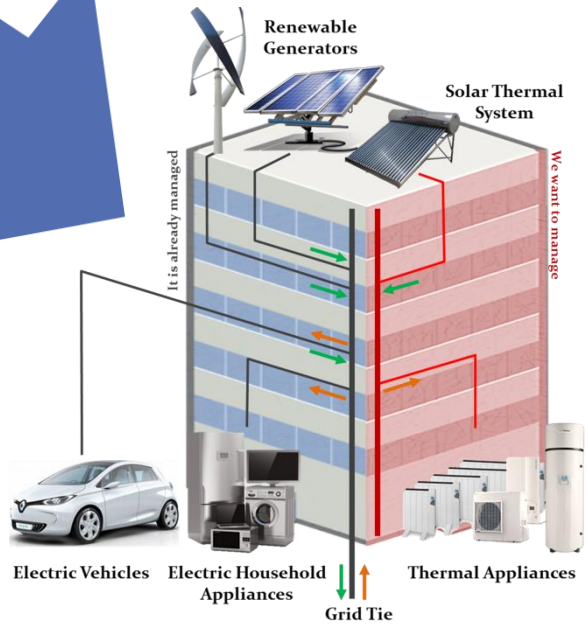
Electrical energy management

Theoretical and experimental development

Registration of the **intellectual property**

Implementation and **validation** in IREC SmartEnergy Lab

Adaptation and deployment for two **real demo sites** in client facilities



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What would we like to have?

Electrical energy management

Theoretical and experimental development

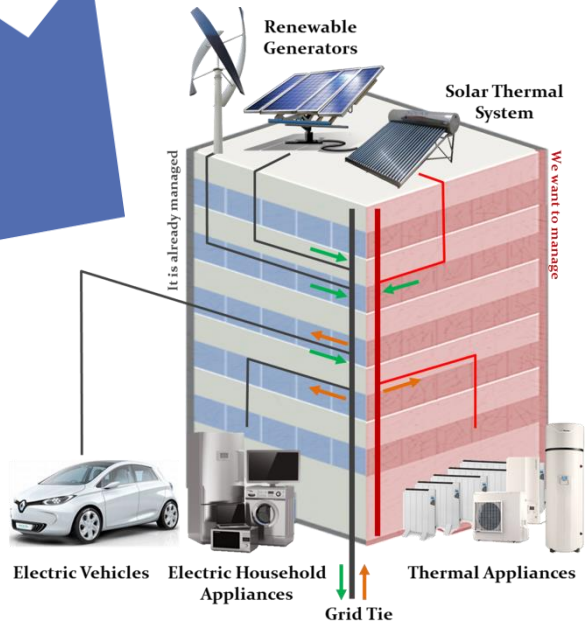
Registration of the **intellectual property**

Implementation and **validation** in IREC SmartEnergy Lab

Adaptation and deployment for two **real demo sites** in client facilities

Thermal energy management

Theoretical and experimental development



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Main taks

Theoretical and experimental development

- To study the thermal models existing in the literature
- To analyse the BEMS approaches existing in the literature
- To propose a thermal model to be included in the current Optimization Module
- To implement the thermal model in our current EMS.

- To develop a methodology for calculating and analysing annual indicators of the BEMS behaviour.

Expected results

- A MSc thesis.
- A scientific paper.

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