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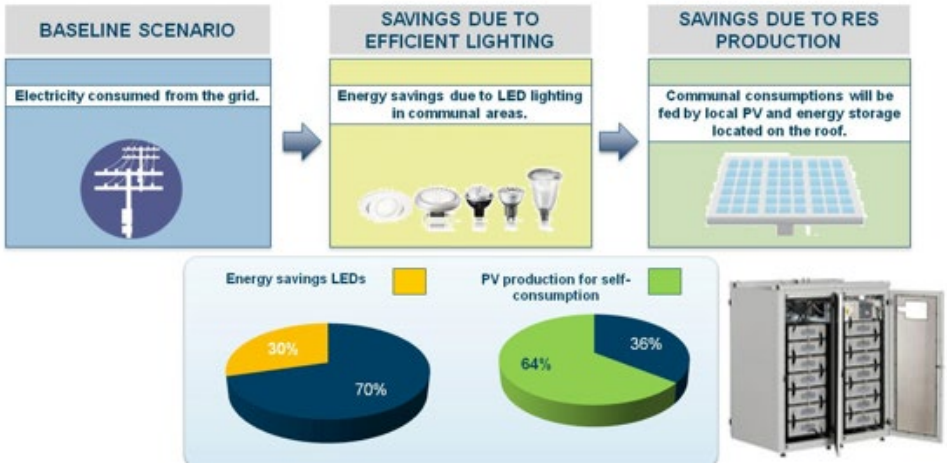
Transforming cities for a smart, sustainable Europe

FACTSHEET

Smart energy and self-sufficient block

PART OF SMART SOLUTION 4: SMART LOCAL ELECTRICITY MANAGEMENT



LOW ENERGY DISTRICT

- Photovoltaic generation coupled with the use of storage batteries allows optimisation of the relationship between generation and consumption even in low solar production instances.

- Achieves sustainable economic development goals by promoting human interaction and small-scale collaboration. Achieves sustainable economic development goals by promoting human interaction and small-scale collaboration.

Barcelona

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What is the solution?

The smart energy and self-sufficient block will be formed of buildings with residential and tertiary uses. For residential buildings, photovoltaic power plants with energy storage will be installed in order to supply community residential consumption.

The production and consumption of the systems installed in the buildings will be managed "virtually" in order to analyse possible scenarios for the electric grid at island level, particularly in cases of complementary consumption profiles.

The "smart" concept of this solution, particularly the management of photovoltaic generation and consumption, will be developed virtually, because according to the new law RD 900/2015 of 9 October 2015, present conditions of electricity self-consumption and feed into the grid which are not economically attractive.

For the implementation of this solution, a restricted zone within Barcelona has been chosen, which includes tertiary and residential blocks.

How does it work?

Services offered to residential blocks are:

- Electric renewable generation from photovoltaic power plants (1.5 – 6 kW photovoltaic power + Li-ion battery, depending on each community) to cover community consumption.
- Optimisation of community lighting consumption by installing LEDs

Information coming from the Building Energy Management System of refurbished tertiary buildings, thanks to the smart solution "Efficient and smart climate shell and equipment refurbishment", will be included in a virtual control software, integrating the block's energy demand, RES, and energy storage systems, that will balance production and storage capacity versus consumption needs.

Through the aggregator, these blocks provide virtual services to the grid, reducing the load during peak congestion and injecting power to the local grid.

The impact on the local grid will be analysed and the use of RES will be optimized. The variation of the energy price will be considered when combining Demand-Response with photovoltaic generation, which can change considerably according to the customer's demand during peak or off-peak times.
A platform will be developed to visualise energy data of residential and tertiary monitored buildings at island level.

Expected Impact

Improving quality of life:

The possibility of replication and improvement of this measure in multiple islands of the city will enhance the energy independence of small communities, promotingpositive and active interaction by the communities on energy efficiency.

Reducing environmental impact:

The use of the storage battery allows the use of all the renewable energy produced by the photovoltaic system even when there is no contemporaneity of generation and consumption. The use of HEMS with alerts will allow the identification of problems in the monitored systems, giving the opportunity to prevent un-necessary consumption.
Renewable energy generation and balancing generation and consumption in buildings with complementary consumption profile will reduce emissions for electric generation, leading to better air quality

Promoting sustainable economic development:

The measure allows cost reduction and optimised generation and consumption, promoting human responsibility, interaction and small-scale collaboration.

Potential for replication

Pre-conditions of replication in other European cities:

- Existence of blocks with minimal requirement for a photovoltaic installation such assurface, orientation, high electric consumption for common zones.
- Existence of island with blocks thathave complementary profiles ofconsumption (for the applicationof “smart-grid” and “demand-response” concepts)

Organisational resources and knowledge required within the public administration:

Public administration should promote the use of renewable energy for electricity self-generation and feed into the grid.

Stakeholders to be involved:

- Owners of communities and owners of tertiary buildings
- Administrators
- Public administration and promoters
- Utilities
- Facility Managers
- Manufacturers of RES (Renewable energy systems), HEMS (Home energy management systems), BEMS (Building energy management systems)

Potential barriers:

- Large number of stakeholders involved
- High payback
- Public administration. For example, in Spain the new law RD900/2015 of 9th October, presents conditions that are not economically attractive