D5.3

Description of executed pilots and results obtained (M24)

Santa Cruz de Tenerife, Spain

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Dissemination:	Confidential
Contributing to:	WP5
Date:	08/02/2018
Revision:	

Executive summary

Based on the energy profile of the building and taking into consideration the high energy consumption due to cooling, lighting and especially equipment, the energy and cost effectiveness of the measures below aiming to combat the aforementioned were investigated on an individual basis. From the Green building studio simulations, the most energy efficient measures were the occupancy control, the improvement of the lighting efficiency and the natural ventilation, whereas the CO2 emissions were impacted more by the installation of PVs on the roof.

On the other hand, along with members of WP2, a list of desired parameters to be measured was drafted and considering the specifications of the probes, temperature and illuminance are the key parameters to be measured within this use case. As a result of the collection of data, dashboards were obtained drafting the performance of each parameter.

Finally, an energetic analysis of the SUI was performed. At the left, the block where the Innovalia building (green watermark) is situated. At the right, a picture of the Innovalia building.

The core building of the Santa Cruz de Tenerife SUI is the Innovalia building. On the aerial image of the block regarded as the SUI, this building is on the left lower corner, marked with the number 1. The total estimated demand for the Tenerife SUI, according to the specifications of the above Table are approximately 314 000 kWh per year. Based on the energy statistics and the distribution of operation hours a synthetic load profile was created which leads to an average daily demand of about 860 kWh in total, and a peak demand of ~68 kW in the summer season and ~ 50 kW in the winter season. Two scenarios were developed: 1. Electricity self-supply on available rooftops on the SUI Area (two variants: a) 108 kW peak and b) 80 kW peak) and 2. Electricity self-supply on available rooftops on the SUI Area including storage batteries.

As a result of these studies, several conclusions were obtained. Regarding bioclimatic design, different measures were suggested to be implemented: occupancy control, improve lightning efficiency, natural ventilation and PVs in the roof. All these measures have different payback times where occupancy control and PVs in the roof have payback times that are considered too long. CARSA leans on payback times less than 8 years as they will provide stimulating results to continue further implementing bioclimatic measures. As a matter of fact, the first measure to be applied shall be the one that counts with the lower return of investment and so on, in case the results obtained are of interest for the owner.

Regarding the mini-network concept, different scenarios were investigated attending PV power capacity and the installation of storage. Again, the simulations allowed the opportunity to know better ways to supply the energy demand both in sustainable and cost-efficient ways. For instance, if we consider the scenario 'variant B: 80 kWpeak' of electricity self-supply without storage equipment, the results show a reduction of 34% of energy with a return of investment lower than 6 years. Then, if storage batteries are added to this scenario, energy savings increase four points (38%) but the payback time slightly exceeds 9 years.