Project GReSBAS, initial installation of a test site

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Abstract

The GReSBAS project is a European project that aims to achieve a set of consumer responses through serious games between homeowners or users of a single building using the last technologies.

The main objective is to make users aware of a more efficient use of electricity while maintaining the same levels of satisfaction and comfort. This can be achieved either by reducing consumption or by relocating it to other periods. These periods may be when energy is cheaper (in case of purchase of energy in the market) or for a period in which there is a surplus of electric energy (for example in the case of micro-generation).

Three test sites will be created for this project, one of which is located in the headquarters building of INESC TEC (replicating a service building) and other two locations in Turkey, more precisely in Istanbul (representing a residential building and a set of germinated houses).

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1. Introduction

The testing site in Portugal consists of two contiguous buildings built at different heights, which despite having a similar structure, have different technologies.

Both building have six floors, one of which is below ground. In this concrete floor, we can find some laboratories of the centers associated with the institution. In the floor of architectural quota are the entrances and two auditoriums (one in each building). In the newer building, we can also find a bar/cafeteria. In the four upper floors, we can find most of the 400 employees that make daily use of INESC TEC installation to develop new solutions and new technologies.

In order to obtain a better plan of the energy costs of the building, several consumption meters have been installed that allow the obtainance of a set of information in a predefined time frame. These devices are measuring all the differentials and some more relevant circuit breakers. To safeguard this information, a server will be installed that will allow this data to be stored in a persistent and more accessible way to be used in the various activities of the project. In order to perform the communication between the meters and the server there was necessary to acquire gateways, to make use once the system is fully operational.

2. Materials and Methods

Due to the electrical panels being three-phase, it was necessary to acquire an equipment that makes it possible to collect this information. To do so, the sub-metering equipment uses a set

of three current transformers (one for each phase) that are connected directly to the meter. This way, the gateway will collect this information (throw the various meters) and forward in to the server where it will allow storing the information in a persistent way.

The meters communicate with gateways using PLC (all being in phase R) and later will communicate with the server through TCP/IP in its own VLAN and separated from the other networks communications already existing in the building.

About 170 meters, 12 gateways and 1 server compose the measurement system. Theoretically, the system would work with only one gateway, however, to allow the equipment to communicate its information at most 5 times per second, there was a need to put a more comprehensive infrastructure bottlenecks.

The server will run a MySQL database and a JAVA plugin that communicates with the gateways an also will run a virtualization software to take better advantage of features and ensure more security and redundancy in the date.

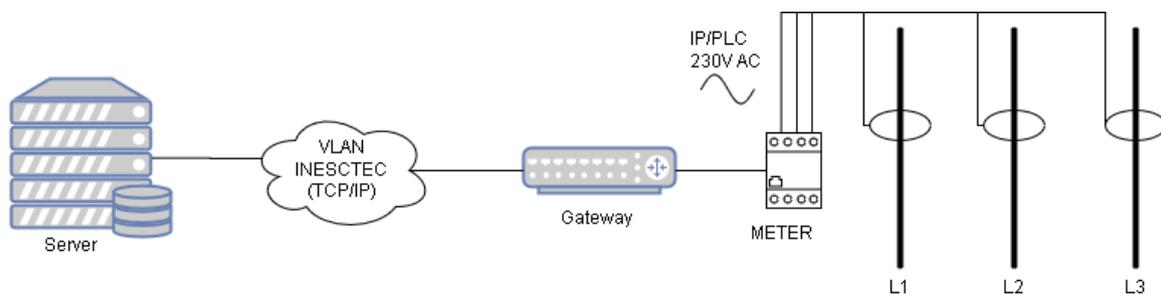The following diagram (Figure 1) represents the assembled system.

Figure 1: Diagram representing the sub-metering system

3. Expected Results
At this moment, there is no possibility to present actual results because the system is not completely assembled (we are currently working in the software of gateways). However, the information collected is expected to achieve two objectives. The first (and most important in the project) is to create a baseline to be able to have a starting point. The second is the possibility that the building managers can have a more real image of what the building consumes and can act to improve its efficiency.

4. Conclusions
In energy efficiency projects have a great focus on hardware and the possibility of consuming less energy. However, consumers and their behavior carry out an important part of consumption and this is where this project tries to be differentiating in order to alerting and educating the users to the importance of changing habits and cultures for a sustainable energy market.

References
More information can be found at www.gresbas.eu