

The renovation of Mercado del Val

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The advanced average age of a large part of the architectonic patrimony existing represents a problem, both from an energy and environmental point of view.

Buildings erected in the previous decades and centuries, in fact, have not been, in any way, designed with the purpose of saving energy nor to contain the harmful emissions, that is to say, necessities that have really established themselves only starting from the Seventies. It is, however, evident that in a continent so rich of history as Europe is, it is not possible to think about demolishing everything and start from zero in the name of efficiency, but it is, rather, necessary to work in harmony with the historical and architectural contest of the different cities.

The rule is also valid for the world of retail, as demonstrated by the case of **Mercado del Val** of Valladolid, involved in the European project **CommONEnergy** (Seventh Framework program Grant Agreement no: 608678). Mercado del Val is a local market situated in the historical center of the Castilian city, which dates back to the end of the 19th century, restored to preserve the historical patrimony but – at the same time – to make it an innovative building, able to satisfy the modern needs of commercial and environmental sustainability.

This important requalification is inserted in a larger project by the municipality of Val-

adolid, which aims at becoming a true intelligent city through the decrease of energy use and carbon emissions as well as the increase of the quota of renewable energy. But, to return to the project in question, here are, in a closer view, the interventions that have been implemented in a quite long-time frame (23 months), with the reopening of the market which took place on November 2016, thanks to an investment of about 11,1 million Euro.

First of all, it is necessary to highlight that the new Mercado del Val was envisioned to remain open seven days a week for an extended time slot. Inside, the new market presents 44 stands with a surface of 2.000 square meters and a lower level where is located the supermarket part of the chain **La Plaza de Dia**.

For this reason, the new building presently presents a mezzanine where the market's offices are located along with a restaurant and another multifunctional areas for recreational, cultural, educational and train-

ing activities. Obviously, architectural changes were implemented: the most striking one is the demolition of the brick walls that originally surrounded the market, while the shutters have been replaced by windows to increase the availability of natural light during the daytime hours, thanks to a multifunctional modular façade, but we will speak of this in detail further on. Relevant is also the presence of the geothermal heat pumps, which satisfy the demand of heat, cold and hot water while the roof skylights offer a suitable natural ventilation.

The energy requalification

It is easy to realize that all these solutions have important impacts from a point of view of the requirements;

according to the first results obtained from the monitoring systems, the energy consumption has been reduced from 760 to 246 kWh/m² yearly, with a saving of 68%.

The period of return on the investment, estimated by the designers is not even excessively long (seven years). Without taking into account that the heat generated by the refrigerators will be utilized and re-employed by the heating system.

Finally, the market has available its own refuse treatment plant and a system of disposal of the refuse in collaboration with the municipal services. To all of the above, it is added an advanced system of energy management and monitoring (iBEMS), developed by the project's partner, **Schneider Electric**, which allows an optimal monitoring of all technologies, taking appropriate decisions in order to reduce the energy consumption.

Basically, Mercado del Val can in a legitimate way, place itself on the scene of the European retail as a pioneer in the use of renewable energies and in the natural use of light. And it is exactly on this last point that researchers of the European project **CommONEnergy** have been able to provide their contribution: in Valladolid, in fact, have been developed and implemented a multifunctional modular functional system whose characteristics have



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been personalized according to the local climatic conditions, to the construction functions and the existing obligations.

The façade includes a glass optical system which allows to let natural light enter and to regulate it. The automatic sky-lights located on the roof coupled with the openings on the façade provide natural ventilation, guaranteeing the air quality and the comfort of the market's users. As, in fact, describes **Annamaria Belleri**, researcher for **Eurac Research**, scientific coordinator of the project, «In the tertiary sector, in particular in the shopping centers, the casing has always been somewhat neglected. In the sense that, the existing shopping centers, from a point of view of the external casing have very mediocre performances. This is because the majority of the usage in shopping centers is due to lighting, which produces an internal heating load for the building. This ensures that, typically, the fundamental need in these environments is always that of cooling: it is not by chance that in shopping centers it begins to cool in February and it ends in November.

Therefore, the casing has never been considered because we have always been able to count on this very elevated endogenous heating load. More than the restyling of the lighting system done in the classic way, in the **CommONEnergy** project, we keep into consideration the interactions amongst the different solutions implemented ». In fact, the first step that is undertaken along the path of the efficiency, is that of working on the lighting system, changing from the traditional systems to the led systems.

The latter, in addition to definitely consuming less from an energy point of view,



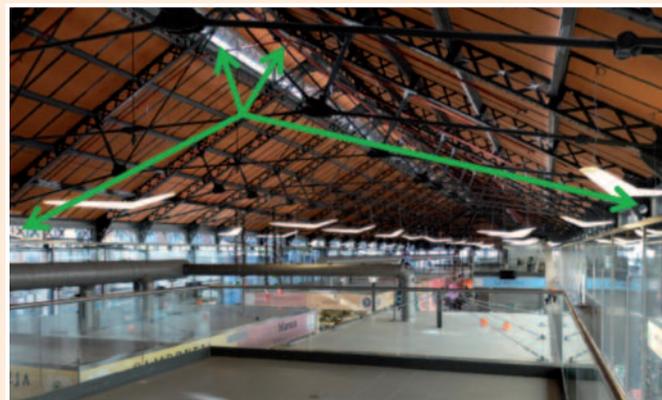
dissipate a definitely lower heat quantity towards the outside in comparison to the incandescence systems.

Result: theoretically but also practically, in the winter months, commercial centers can count, from the get-go, on a lower quantity of thermal heat. As a whole, though, we will never spend more because the need for heat increases but the need for cooling decreases.

The function of the casing

«We have analyzed what this change entails, also through a simulation environment that we developed within the project. We discovered that with a lighting restyling, we diminish the cooling requirement by 20-30% in function of the climate; in the same way, though, the requirement for the building heat increases

by 30-40%, because of the absence of the internal heating load. Therefore, in this perspective, the casing acquires a fundamental role on the level of energy performance. In **CommONEnergy** we have developed some passive technologies which regard the architecture and the cover of the building. One of these is the multifunctional facade (Climate adaptive multifunctional and modular), adaptable to any type of shopping center and that has been applied in the case of Valladolid. We speak of climate adaptive in the sense that the configuration of the façade and its components, can be chosen by a catalog: one can select the type of glass, of screening and the technologies to be integrated (for ex. openings, solar screening, photovoltaic panel, green). The façade, from a structural point of view, has been designed by the



Spanish partner **Acciona** and the structure has been thought so as to be able to integrate different features, obviously adapting it to the particular contest of the historical center of the city. In particular, this façade is able to combine both a system of natural ventilation, which means the automated openings, and the solar screenings, fixed or mobile and various glass components which can have different characteristics, according to the climate. As a general rule, in a very warm climate, it is possible to choose more performing glass from a point of view of solar control.

In a colder climate, preference is given to glass systems able to provide solar gain by utilizing the solar screening to avoid glaring phenomena. In the configuration adopted in the Spanish city, the façade is divided into three parts, with a geometric design that evokes the wall as it was originally. The central part has a solar screening system with rolling sheets, controlled both in function of the heat comfort and of the visual comfort in the inside environment, keeping into account also the natural lighting. The high part, instead, presents automatic openings that are utilized to facilitate the natural ventilation, exploiting the architectonic characteristics of the market.»

Basically, the casing has been one of the key items in the requalification of Mercado del Val which, thanks also to the contribution of the European project **CommONEnergy**, has demonstrated how it is possible to conciliate the energetic-environmental aspects with the care for the historical and architectonic contest. A lesson that, precisely as it is in the intentions of the European project **CommONEnergy**, will be able to be repeated also in other contests.