

# The challenges of integrating new energy-saving systems in occupied buildings

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It can be extremely challenging to integrate technologies using renewables sources such parabolic trough solar collectors (PTC), a biomass boiler, a cogeneration unit based on the organic rankine cycle (ORC), an absorption chiller and a cooling tower. But this challenge is even greater when these energy reduction systems need to be coupled to an existing and occupied building.

This is what the European project BRICKER is trying to achieve at its demo site in Cáceres (Spain), a complex accommodating the administrative offices of the Ministry of Agriculture, Rural Development, Environment and Energy of the Government of Extremadura.

Industrial engineer Juan Jacobo Peralta, researcher at the Department of Research and Development of CEMOSA, a company specialising in materials, design and work control, outlines the renovation strategies.

## **What's the role of your company in the project?**

In the initial phase (before refurbishment), we designed monitoring systems to collect the necessary data. We also worked on pre-designing the new heating and air-conditioning facility to make it compatible with the Bricker system.

Another task that we have completed concerns the foundations used for

securing the parabolic trough [solar collectors](#) to be placed on the building roof. Since we're dealing with large-dimensional structures, we had to make a structural calculation to evaluate the building resistance to the additional weight. We then designed the anchorages needed to secure these structures to the foundations, without affecting the safety of the building.

## **What would you say are proving to be the most difficult challenges?**

Our first challenge was actually integrating the new Bricker system. We had to partially replace the existing heating and air-conditioning system which wasn't 100 percent compatible with our Bricker system, and there were difficulties in finding enough space to install everything.

We are subject to RITE – the Spanish standard for thermal installations in buildings – and we discovered that we were required to install heat-recovery systems.

Such systems consist of an appliance similar to a fan-coil unit, which needs additional space, and also the cost is higher.

Furthermore, we had to visit the site a number of times to study the layout of the ducts and pipes, and to check where the existing appliances were positioned. During these visits, we looked into what the best strategy would be for replacing the existing cooling equipment with the new system, while avoiding any disruption to the normal use of the building.

## **This poses an even bigger challenge, doesn't it?**

Yes, it does, because the building is used almost 365 days a year, from

Monday to Saturday. This means we have to carefully identify when the least disruptive times are.

We have to go from floor to floor in a strategic way to avoid making any noise, and the heating and air-conditioning system needs to keep functioning, if only partially.

The ideal months for work have been found to be April and October, when energy demand is at its lowest.

What do you think the Cáceres demo site will contribute specifically to the Bricker project?

This demo site is a great opportunity to see how these systems interact—the solar collector system, the biomass boilers, the organic ranking cycle and an absorption cooling system as well as an additional heat pump—and also to detect possible problems in their installation and commissioning.

We are set to contribute invaluable knowledge about tri-generation systems adapted to buildings.

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