

Multifold challenges for districts level retrofitting

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Retrofitting a district is quite different from retrofitting a single building: the technological challenges involved are far greater.

The Cuarto de Marzo district of Valladolid, Spain, is an area spreading over 21,000 square metres with 166 residences. It is now the focus of a retrofitting project, called [R2CITIES](#), funded by the EU. Its objective: a 60% reduction in energy consumption in individual buildings and in the district as a whole. One of the project partners is a company called [Onyx Solar](#), specialist in integrating photovoltaic glass in buildings, referred to as building-integrated photovoltaic (BIPV). Rubén Robles, research and

development project manager for Onyx, talks to R2Cities about the viability of implementing facades equipped with photovoltaic glass at an entire district level.

Have such challenges been addressed in other buildings before?

Nobody has yet taken the leap to using these technologies to retrofit an entire district, which is a much greater challenge. As part of the project, we are putting together a series of packages of energy efficient measures that can be applied to any retrofitting projects. We will create a catalogue of solutions so that any architect or construction company can adopt the most suited for their own project.

The innovative aspect of the project is that all of these technologies—namely conventional photovoltaic, BIPV, solar thermal, new technologies systems—have until now only been applied to single buildings or to newly-constructed buildings. In particular, the BIPV technology that we developed has been successfully tested in newly constructed buildings. There, we have complete control over the design of the building. The challenge now is to apply this technology to the ventilated facade. This type of facade is a multi-layered building envelope consisting of an outer layer made of different materials and connected to the existing inner layer using a ventilated air gap, which constitutes the thermal insulation. Up until now we have only used it in a different type of constructions, as skylight.

How does such technology challenge compare with those in other parts of the project?

One of the other sites in the project has adopted different technological solutions. In the Kartal showcase site, in Turkey, for example,

SOLITEM, one of the partner company, is integrating novel systems to make maximum use of available heat. Their approach is based on solar thermal energy. This means heating up a fluid by absorbing the heat from the sun. This is a completely different solution from ours.

The advantage of our technology is that it improves thermal performance, in addition to producing electric energy. In the ventilated facade, for example, we are going to achieve a 20% improvement by thermally insulating the building. In other words, it is like another layer of skin, another protection for the building.

But technological solutions implemented depend on the climate too. In the showcase based in Genova, Italy, for example, the heating requirements are not as demanding as for Valladolid. This is because it is a coastal Mediterranean city. Apart from installing insulating systems similar to ours, they are also including a hidden photovoltaic system to produce electric energy.

Is the cost of technology an important factor?

To adapt to the budget of each resident of the district, we have put together different packages of measures at different costs. Each resident can choose the right one for them. The most economical set of measures includes merely insulating the building and connecting to district heating systems with biomass boilers. The most expensive option includes BIPV installations. The difference is €30 per square metre, which covers the electrical consumption of all the communal areas and the lifts at a reasonable price.

We believe that these are economically viable solutions because they can be financed by bank loans or ESCO (Energy Service Companies) loans with attractive conditions. Also huge savings can be made on electricity bills, bearing in mind how expensive electricity is in Spain. There is

nothing more economical than consuming energy, which you have generated yourself.

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