

Modular facades for tailored retrofitting

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Credit: Felipe Javier Mata visits the Merida demo building Image credits to: Acciona Infraestructuras

Innovative solutions are required to improve the energy efficiency of the existing residential building stock in Europe. But combining such innovation with better management and new business models creates unique retrofitting opportunities. The EU funded project MeeFS, begun in 2012, aims to meet this opportunity. It is developing an innovative multifunctional facade system for residential buildings.

"The flexible design of our system enables it to integrate photovoltaic cells, ventilation and a various range of insulation types, even with living vegetation," says project technical advisor Felipe Javier Mata, an expert in eco-efficiency and comfort at Acciona Infrastructure in Madrid, Spain. "Applying innovative technologies, we want to create dynamic facades that are adaptable to several climate situations, using solar reflection and energy different storage systems, including phase-change materials technology," he tells youris.com.

Construction works on the demonstration buildings are due to start late summer of 2014. Until then, the project team is working on all technical documentation necessary to release the production order of all components.

But the demo building may not be the best example of energy saving due to its own constraints. "The demo building's thermal insulation behaviour is more or less acceptable. Due to its recent –2002– construction date, a large energy improvement isn't possible," explains Mata. However, this does not impinge on the primary objective of the project. "Using advanced simulation software, we will obtain the necessary adjustments in energy saving data and find out the range of savings the project can reach for older buildings," notes Mata.

Mata is convinced MeeFS is a globally applicable system. "For their perfect adaptability to different building typologies and different European climate conditions, the new facade modules will be based on non-intrusive installation technology," he explains. This allows personalised configurations for any façade typology, orientation and local climate conditions. He adds: "Its flexibility in the distribution of the different technologies within different compositions enables compliance with the energy requirements demanded by every individual building."

One expert outlines the challenges the project faces. "The challenge for the MeeFS-developers is to offer architects the freedom to make an aesthetic design and to meet also the functional requirements on energy demand, indoor air quality, thermal and visual comfort," comments Wouter Borsboom, business consultant at Energy and Comfort Systems at TNO in Delft, Netherlands. "The development of the new low weight constructive element can make it possible to make each facade unique by choosing different surfaces. This opens the door to a global applicable system," he says.

Another interesting aspect is the monitor and control system of such a facade, Borsboom believes. He points out: "It is very important that the use of the different functional modules is intuitive and simple, otherwise the risk is real that residents or other users will bypass the system and that the energy reduction is not achieved."

Another expert believes there are some remaining issues to consider. "Even after a building research tradition of about forty years, there still are no standard dimensions for building modules. Every architect follows his own views about dimensions," says Hugo Hens, professor-emeritus and former head of the building physics section research team at the KU Leuven, Belgium. He believes that the project should ensure that details such as balconies and irregular windows are taken into consideration.

Aware of such issues, the project partners have been studying the various types of facade data from various EU countries, in order to identify the most important set of façade parameters and create the typology scheme for project system, according Magdalena Rozanska, project coordinator who is also working for at Acciona Infrastructure in Madrid, Spain. Besides, she adds, the special structural anchorage element has been designed in a way that it is capable to assume the differences in dimensions, between project and real on-site

measurement.

Hens is also pointing to the need to be aware of the aesthetic acceptance of the modules. "I'm convinced they can become popular in Eastern European countries with a tradition in facade wall panels," he notes, "But I'm afraid they won't flourish in for instance Belgium, with its brick tradition and in Germany with its plastering tradition."

Hens also expresses concerns that there is a lack of focus on humidity problems. "How will an existing façade behave with a long history in taking rain behind composite based retrofitting modules?" he wonders. However, project coordinator Rozanska explains that a specific design and innovative paintings has been developed as to avoid problems related with the coating protection of the structural material as well as whether conditioning issues.

Provided by Youris.com

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