

## 2 Industrialized Sunspace Prototype with Solar Heat Storage. Assessment of Post-Occupational Behaviour in Adaptive Facades.

► SAVIArquitectura Research group. University of Navarra (Spain)

### ► Information of SAVIArquitectura Research Group

#### Main Research Topics

- Eco-design of industrialized and sustainable components for building envelopes
- Energy and sustainable rehabilitation of buildings
- Performance-based design for buildings envelope rehabilitation
- Materials and Waste Management
- Lifecycle analysis, LCA
- Environmental Building Certification
- Simulation and monitoring of buildings
- Adaptive Facades

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#### Team

Ana Sánchez-Ostiz (Director), Purificación Gonzalez-Martinez, Juan B. Echeverría Trueba, Aurora Monge-Barrio, Germán Ramos Ruiz, Joaquín Torres Ramo, Carlos Fernández Bandera, Silvia Domingo-Irigoyen

#### Synergies

- School of Architecture. University of Navarra (Spain) (<http://www.unav.edu/en/web/escuela-tecnica-superior-de-arquitectura>)
- MDGAE. Master Degree in Environmental Management and Building Design. University of Navarra (<http://www.unav.edu/en/web/master-en-diseno-y-gestion-ambiental-de-edificios/home>)
- PHD Programme on Environmental and Technological Design in Architecture. University of Navarra

#### Industrialized sunspace prototype with solar heat storage

The thermal performance of two passive solar components has been investigated. An attached sunspace with horizontal heat storage and another one with vertical thermal storage were designed in order to optimize the use of solar gains and its storage and distribution in an industrialized component. These sunspaces have been tested under real conditions, comparing their thermal performance with two commonly used components in residential buildings in Spain: a window and a double window making up an attached sunspace. Different series of experimental measurements were conducted in two test-cells exposed to outdoor conditions in Pamplona (Northern Spain). As a result, nine scenarios during winter 2011 and six during summer 2012 have been carried out, comparing all of the prototypes two by two with different use modes.

Results show that a sunspace with heat storage takes advantage of the solar energy and improves the indoor thermal performance of the adjacent room during winter in a better way than a window or a simple sunspace, and that it also offers better performance in summer. The best results in winter and summer were obtained when an appropriate use of the component was performed, in concordance with outdoor conditions. Several thermal control keys for the use of these components are suggested.

#### Assessment of post-occupational behaviour in adaptive facades

Research in adaptive facades located in Spain and in Southern Mediterranean areas, looking for truly efficient energy and thermal performance, and for occupants evaluation (through comfort and use surveys), to validate the design and optimization of adaptive facades.

Collaborators: María Martínez Ruidiaz, Miren Juaristi

#### ► Involved person in COST Action: Prof. Dr. Aurora Monge-Barrio

► Time span: 2007 - 2012, 2015 - 2016

► Contact data: amongeb@unav.es

#### ► Associated Publications:

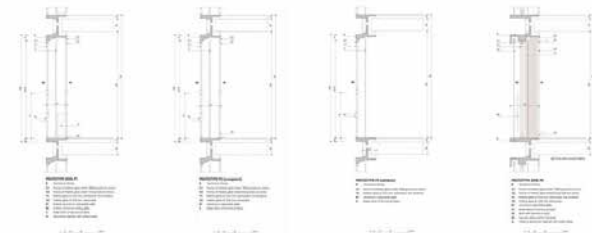
1. A. Sanchez-Ostiz, A. Monge-Barrio, S. Domingo-Irigoyen, P. Gonzalez-Martinez, Design and experimental study of an industrialized sunspace with solar heat storage, *Energy and buildings* 80 (2014) 231–246.
2. A. Monge Barrio, A. Sánchez-Ostiz, S. Domingo Irigoyen, P. Gonzalez Martinez, Sun-space: industrialized element for energy saving, *Conference Proceedings of the Energy Forum. Solar building skins*, Bressanone, EF Economic Forum, 2012.



► Fig. 1: P4 Prototype. Sunspace with vertical solar heat storage. Images of University Campus in Pamplona (Spain).



► Fig. 2: P1 Prototype. Sunspace with horizontal solar heat storage. Images of University Campus in Pamplona (Spain).



► Fig. 3: Vertical sections of the prototypes monitored, including a window and a double façade to be compared with P1 and P4 prototypes.



► Fig. 4: Barcelona Growth Centre in Barcelona (Spain), previously named MediaTIC. Case study in Post-Occupational Behaviour Research in Adaptive Facades.