

Integration of active thermal solar components in building facade elements

Pierre MICHEL
pierre.michel@entpe.fr

Some of the key issues (in France)

- Aesthetics perception (architects...)
- Technical integration
- Installation cost
- ...

Main objectives of the project

- To help the development of thermal solar energy and the dissemination of thermal solar products in buildings
- To provide technical and architectural solutions for the integration of thermal solar components in the building envelope

Partnership



Manufacturer (HBS group)

Coordinator



Manufacturer



Architects



Energy and environment experts



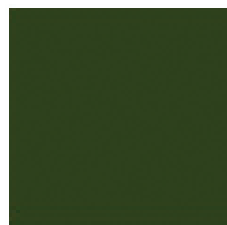
R&D lab



R&D lab

Basic principles

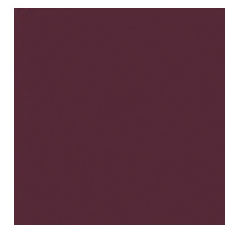
- Let's accept a lower performance if architectural and technical integration becomes easier
- Solar collectors have to be considered as building facade components to help and improve integration.
- The absorber and component colour is a supplementary and key aspect of architectural integration.
- Let's have a systemic approach not to forget key aspects as modularity or maintenance.



RAL 6007



RAL 5020



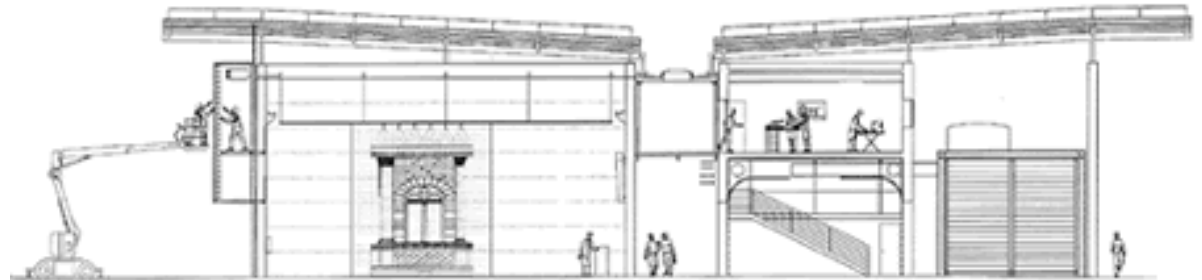
RAL 3007

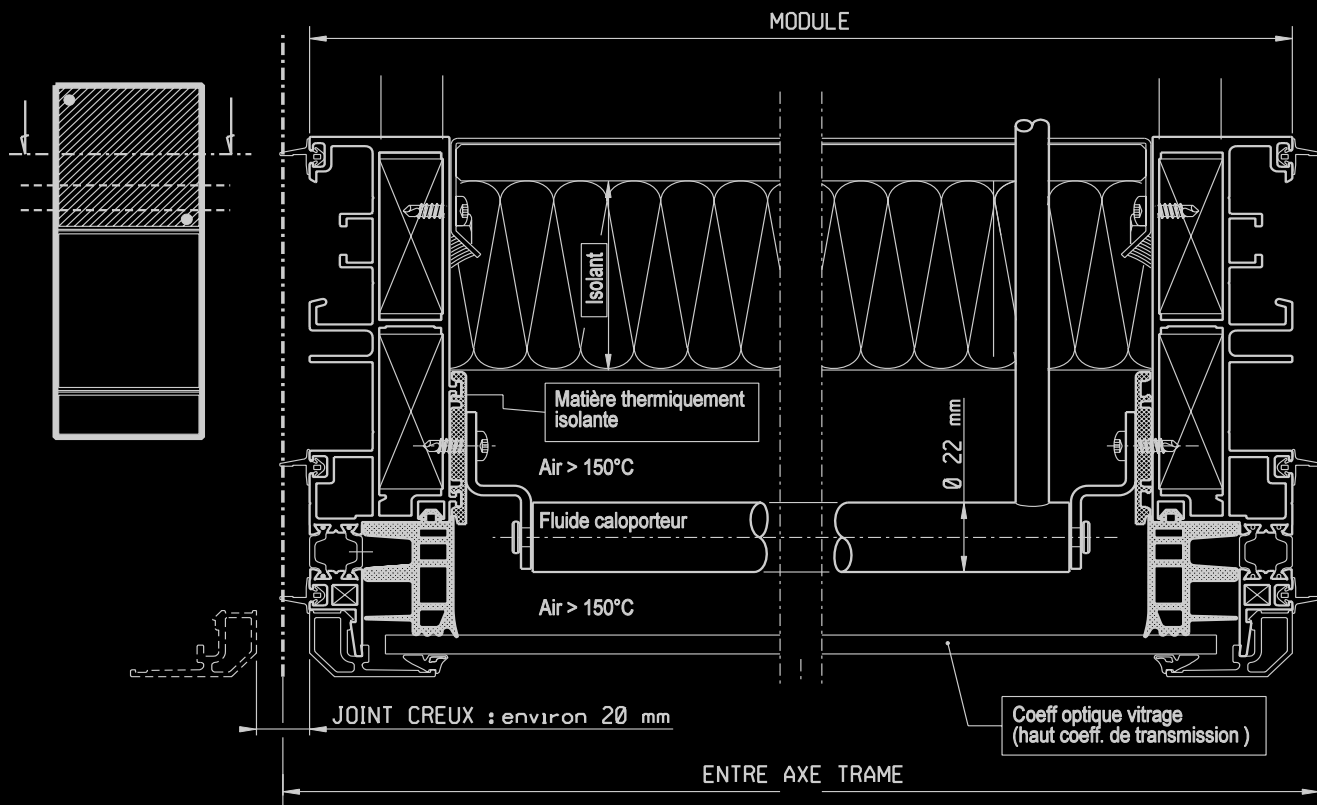
α	64.6	61.3	82.5
ε	79.0	71.7	78.8

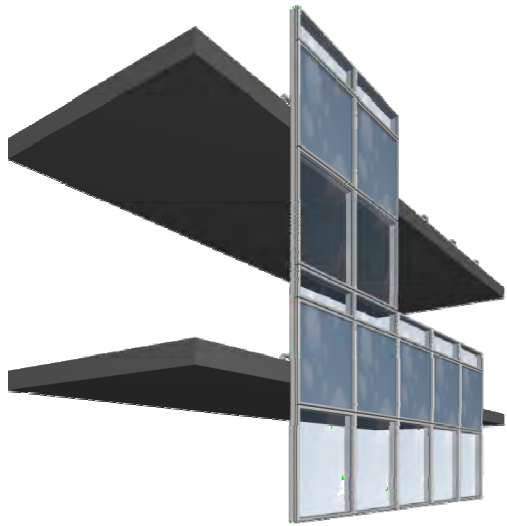
Methodology

- Surveys (architects, investors...) about key issues
- Design principles based on a systemic approach
- Experiments on a real-size building (~ Lyon)
- Standard testing of the solar collectors (Sophia-Antipolis)
- Thermal modelling, using TRNSYS
- Sensitivity analysis : orientation, climate, absorber colour, urban shading effects...)

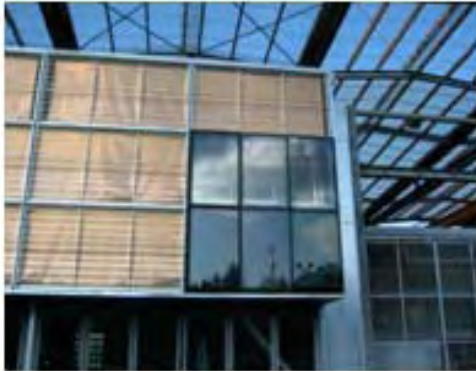
A real-size building for experiments



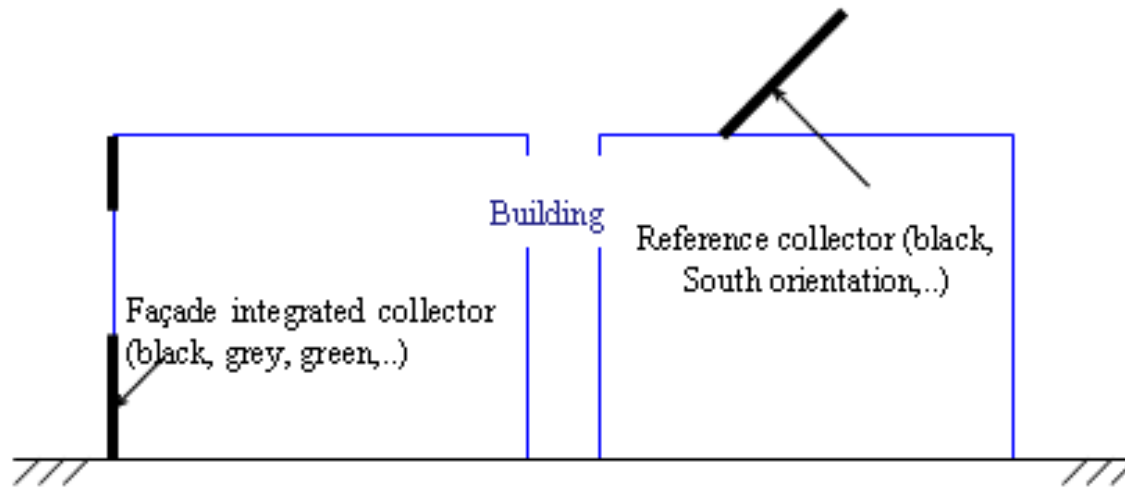




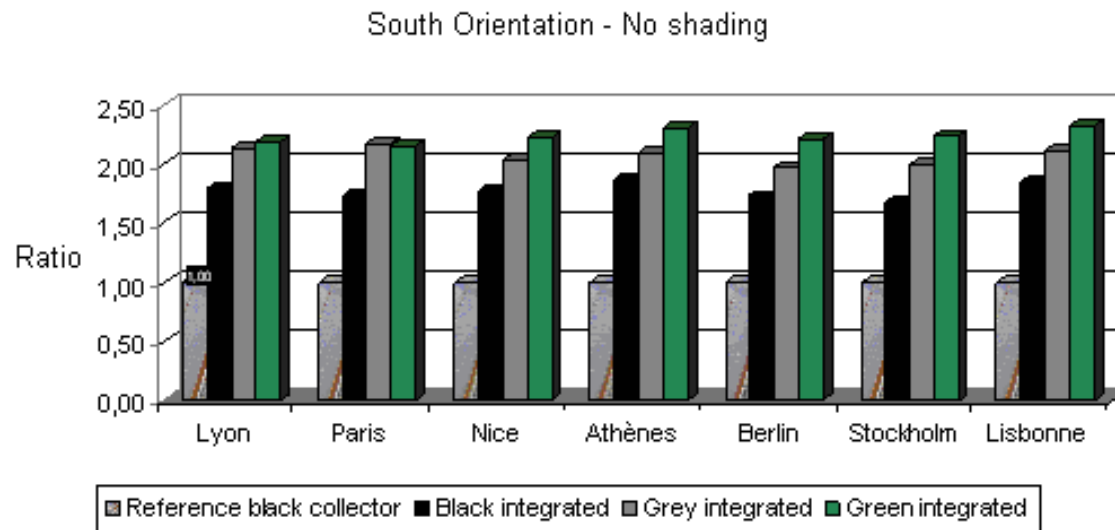
A DHW experimental installation



Integrated vs reference collectors



Collector area x 2



Synthesis of the main results

- Architects are waiting for varied, efficient and aesthetically improved solutions for the integration of thermal solar collectors.
- Coloured absorbers are quiet efficient.
- South oriented collector area in the facade is twice the reference one (roof, $\sim 45^\circ$ tilted...)
- Important areas are available for integration in building facades.
- Estimated over costs seem to be very low.

Present developments

- New experimentation, operating since july, 2007
- Improved model
- Work in progress :
 - Larger field behaviour
 - Impact on indoor comfort
 - Impact on outdoor microclimate

Further developments

- Industrial products
- Solar components adapted to :
 - various types of new as well as retrofitted buildings
 - different construction principles and materials
- Combinations of architectural integration solutions (colours, materials...)
- Use of collected energy in complex systems (solar heating, solar cooling, combine systems...)