



SOLUTIONS FOR BIOCLIMATIC FAÇADES

Case study:  
Garigal

somfy®



### Garigal Sustainable Strata Office Building

Located on Sydney's Northern Beaches, Garigal is proof that it is not just high profile CBD projects that can be environmentally friendly. Early in the design process of Garigal, named after the adjacent Garigal National Park, the Glenside Group's David Hawes decided that Garigal would not be connected to the main Sydney Water sewer system and that by reducing the planned energy consumption of the design it would not require an electricity substation.

One of the most striking design elements of the building are the large overhanging balconies with their external sunscreens. These balconies have been used to aid the flow of natural ventilation through the building. Each strata office has operable louvre windows on the external facade and also on the internal windows facing the central corridor. By utilising cross ventilation and exhausting the air from the building along a central corridor and through heat chimneys at each end of the building the building's occupants can take advantage of natural ventilation. This design solution is made possible by the use of the automated external sunscreens. By positioning these sunscreens away from the windows they can be lowered to reduce heat loading and glare whilst still allowing for air-flow needed for cross ventilation.

Controlling the external solar shading package is Somfy's **animeo IB+** Premium Façade Management System. Sensors automatically lower the blinds when the light level is exceeded whilst the screens are protected by a wind sensor that retracts them on windy days to prevent damage.

The Somfy **animeo IB+** package is an independent, off-the-shelf, control solution that constantly monitors the environmental conditions ensuring the blinds are always in the correct position. It has many features including a built in sun-tracking algorithm and timers that can easily be configured during commissioning to manage the reaction of

the façade at different times during the day and on different days of the week, reflecting occupancy levels within the building. The **animeo IB+** system can also receive inputs from a building's management and HVAC systems as well as giving users overriding control of the blinds in their local area. A powerful tool for architects is the **animeo** system's building reset function ensuring a uniform look to the facade.



#### Project Details

##### Location

Sydney, Australia

##### Type of Building

Commercial Office  
6,000m<sup>2</sup>

##### Development Manager

Glenside Group

##### Architect

Turner and Associates

##### Builder

St Hilliers

##### End-products

200 Helioscreen External Sunscreens  
powered by Somfy

##### Somfy Solution

**animeo IB+** Premium  
LT50 motors

##### Project Manager

Somfy / Helioscreen

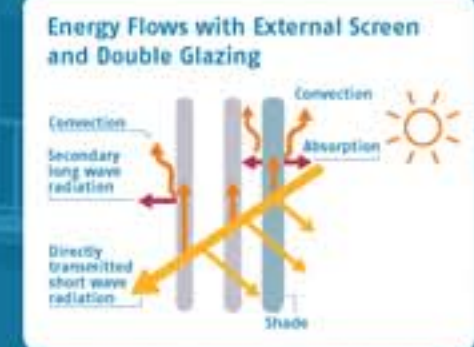


### External Shading Solutions: an overview

The primary objectives of a solar shading solution are to manage glare and heat load on the building to reduce energy consumption and improve the indoor environmental quality for the occupants. The choice of solar shading solution in buildings is determined by many factors and whilst different solar shading solutions all offer quantifiable performance gains, the selection of the preferred solution may come down to more emotive factors such as aesthetics, ease of operation, design trends and the capital investment required. This document aims to shed some light on the performance characteristics of external sunscreen solutions as used on the Garigal project.

#### Energy Flows

External sun screen solutions have many advantages due to the way energy flows are distributed through the combined shade and window solution. By reflecting a large amount of the shortwave solar radiation before it hits the glass in the window external screens are reducing the amount of directly transmitted solar radiation entering the building. In addition external blinds also absorb some of the energy of the sun which is then released either as long wave radiation which cannot easily pass through the glass or as convected heat which is easily dispersed.



#### Effect of Fabric Colours

The colour of the material or fabric chosen for an external blind has an impact on the performance of the blind. There are three elements of the incident solar energy to consider:

- Solar Transmission** – darker fabrics will let less energy through the fabric. This is in an approximate ratio of 2:1 when comparing a black screen to a white screen.

- Solar Reflection** – lighter fabrics will reflect a higher amount of energy. This is in an approximate ratio of 6:1 when comparing a white screen to a black screen.
- Solar Absorption** – darker fabrics will absorb more energy. This is in an approximate ratio of 8:1 when comparing a black screen to a white screen.

It should also be noted that a lighter coloured fabric will generally transmit more light and give a higher visual transmittance for a given openness. The performance difference between a white screen and a dark screen can be seen when a simulation is done using the Somfy DISC tool on a room using an external fabric screen.

	External Blind Black	External Blind White
5-5% Openness	5.5%	6.4%
Cooling Demand	945 kWh/year	1,259 kWh/year
Heating Demand	609 kWh/year	554 kWh/year
<b>Total</b>	<b>1,554 kWh/year</b>	<b>1,813 kWh/year</b>
Cooling Load - Max	1,590 W	1,590 W
Heating Load - Max	528 W	523 W
Cooling Load - Max	1,590 W	1,590 W

Parameters: Floor size – 14,1m<sup>2</sup>, Façade size – 8,1m<sup>2</sup>, Window size – 7,0m<sup>2</sup>, Window to wall ratio – 85%, Single pane glass U=4,3 g=0,87, Location – Sydney, Façade Orientation – North, Control Strategy – Sun protection.

#### Control Strategies for External Shading Solutions

Sensor based control of external blinds falls into two areas. The first are the security functions; wind and in some cold parts of Australia, frost. Wind protection, to assist in preventing damage to external blinds is easily achieved through the use of wind speed and wind direction sensors. Frost is a function of moisture and temperature and is managed through the use of outside temperature and rain sensors.

The second group of functions are the performance functions; sun and temperature. The use of façade orientated sun sensors is now well accepted however control can be taken even further with the use of internal and external temperature sensors. Presence detectors in office areas can also be used to automatically alternate between users having local control and the building operating automatically when areas are unoccupied. It is also possible to use internal and external blinds in perfect symmetry to allow for changing weather conditions which bring stronger winds. On modern façade management systems any of these functions can be easily activated during commissioning.

### Somfy animeo IB+ Premium – Garigal Control Strategy

**animeo** is an off-the-shelf façade control package with a high level of built-in features and flexibility. Designed to marry the challenges of occupant comfort and energy management **animeo** uses a zone based or individually addressable motor control solution.

A zone is usually made up of like products in a similar geographic area of the building whilst higher performing KNX or LON based solutions allow individual motors to be uniquely controlled.

Garigal uses an **animeo IB+** Premium package and is divided into eight zones, one for each façade. The automated blinds in each zone are programmed to operate using the following control strategies.



**Wind Control** – using wind speed and wind direction sensors the blinds in each zone are managed to prevent damage to the blinds in high winds.

**Building Reset** – at a specified time each day the blinds in the building will all revert to a pre-determined position.

**Software** – the animeo system is configured using a software package. This allows control over the finest detail but is easily reconfigured or refined by a trained user should the need arise. Additionally the system will log and report faults or scheduled servicing requirements.



**Sun Control** – when the solar level is above a set threshold the blinds will lower to prevent thermal gains. Sun sensors are placed on the roof of the building and are linked back to the animeo building controller.



**Energy Management** – per zone and per day the system strives for Energy Saving by reducing or using thermal energy as the building requires. In this manner the building can be naturally warmed by the sun in winter, out of hours, by raising the blinds.

