

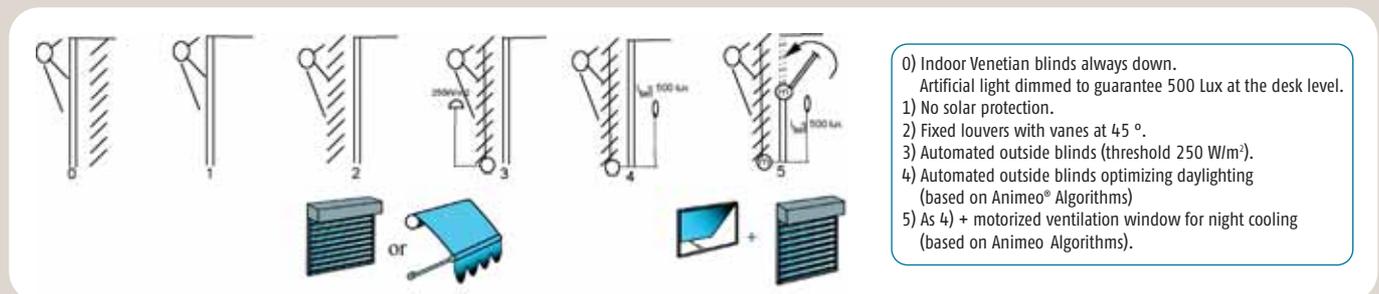
Summary of Benefits of various types of shading and night cooling by vent windows*

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The ROI of solar protection and automated solution has been evaluated thanks to Enerk. "Enerk is a computer program to design HVAC systems in close connection with the façade and its solar

shading devices."

Except for the solar protection and its automatism, the same room has been simulated.



- 0) Indoor Venetian blinds always down.
Artificial light dimmed to guarantee 500 lux at the desk level.
- 1) No solar protection.
- 2) Fixed louvers with vanes at 45 °.
- 3) Automated outside blinds (threshold 250 W/m²).
- 4) Automated outside blinds optimizing daylighting (based on Animeo® Algorithms)
- 5) As 4) + motorized ventilation window for night cooling (based on Animeo Algorithms).

Figure 1. Alternatives considered for analyses.

The calculations are carried out for a medium weight building, facing south and for internal loads (heat generated by people, machines and lighting) of 20 and 40 W/m².

The study shows a significant reduction in terms of energy consumption and watt peak for cooling. Therefore the cooling system can be downsized what means relevant savings on the first cost of the installation. By doing so, the HVAC answers the real needs

of the building and the automated solar protection is virtually free as the savings made on the HVAC pay for it.

Advanced algorithms such as Animeo® ones, provide even more energy savings. Not only the first overall investment is reduced but also exploiting the building is cheaper. Coupled with natural ventilation the benefits are even higher.

1) INTEGRATED DESIGN. CAPACITIES OF HVAC ARE REDUCED IN ACCORDANCE WITH THE WINDOW SYSTEM.

Facade specialist is involved in an early stage of the design process. (Internal heat 40 W/m²)

Window system No Type	Costs HVAC + shading + vent (€)	Extra costs ref. to type 0 (€)	Energy costs / year (€)	Energy saving ref. to 0 (€)	Pay back in years
0 Inside blinds. No control	5962	0	144	0	0
1 No blinds	5675	-287	127	17	0
2 Outside blinds, down	4375	-1587	129	15	0
3 Outside blinds down Q _{sun} >250 W/m²	5212	-750	118	26	0
4 Outside blinds controlled at 500 Lux	4312	-1650	109	35	0
5 As 4 +night cooling	3512	-2450	91	53	0

If the HVAC is not defined by taking into account the benefits of Animeo®, then the payback can only come from the energy savings. With the assumption of a 10% increase of energy cost, Prof. van Paassen has found a 5 years payback. With a more conservative position (energy remains at its actual price) the ROI is no longer interesting but the building still costs less to

run. Moreover, “the emission of CO2 can be reduced with 18% by applying advanced solar protection systems when compared to the window system with uncontrolled indoor Venetian blinds (figure 4). It can be further increased to 28% when night cooling with motorized windows is applied.”

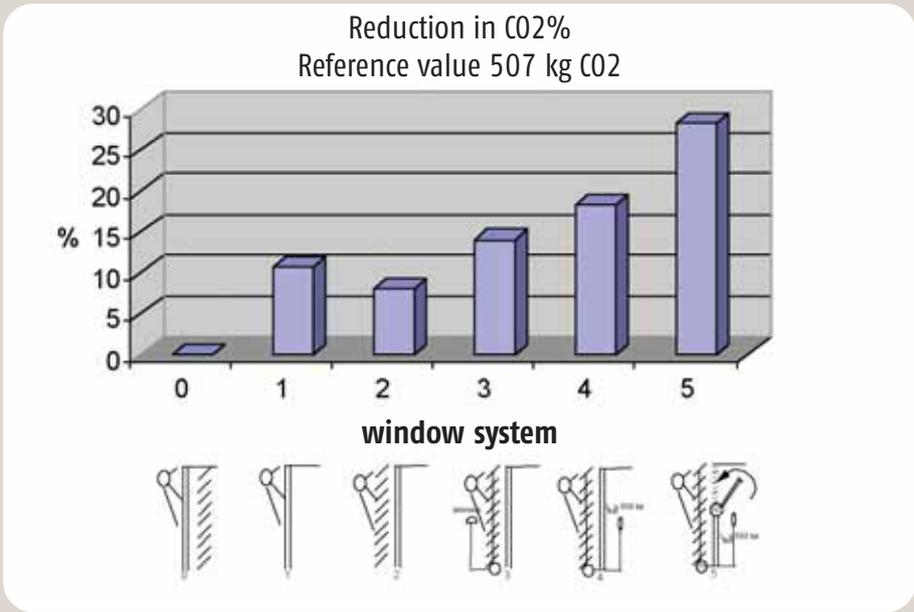


Figure 4. Emission of CO2 per room (internal load 40 W/m2 floor area)

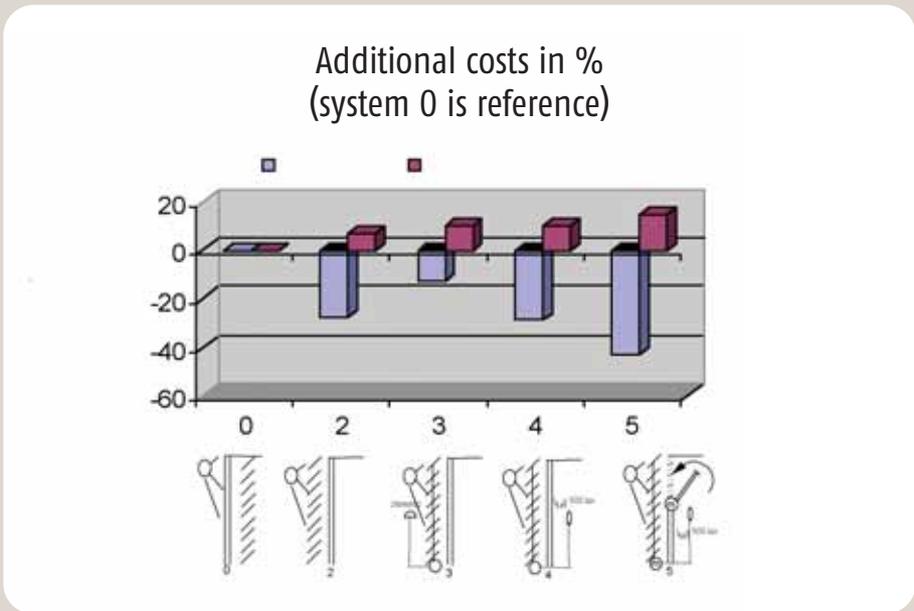


Figure 8. Total additional costs per window system compared to window system 0 for integrated and non integrated design. (Integrated design gives negative values. This should be read as gains)