

SOLAR

SHADING

SAVES

ENERGY



Building modelling proves that HVAC savings of

54% with external blinds &

16% with internal blinds

are possible...

And that's just the start...



Heat Loss & Insulation

Glazing is the weak point in a building's overall thermal performance and a major source of heat loss. Shading insulates a building's transparent envelope. A single glazed window can have its insulation improved by over 50%.



Capital Saving

Solar shading is a self-financing climate control system. An analysis of HVAC systems in three climate zones - Stockholm, Amsterdam and Madrid demonstrated that solar shading paid for itself in less than a year.



Artificial Lighting

Artificial lighting can be reduced by controlling and optimising the amount of daylight with shading. People naturally prefer daylight to other sources of illumination.



HVAC Reduction

Building modelling proves substantial HVAC savings for highly-glazed office space - up to 16% for internal shading and up to 54% for external shading. With optimal integration the need for mechanical space cooling could be reduced by 62% with external shading. Shading systems are not only beneficial to summer periods only but also permit heating related energy savings in winter.



Automation Benefits

Optimal, dynamic performance delivered by automated shading significantly reduces the risk of overheating.



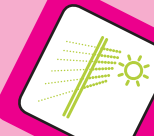
Solar Gain & Overheating

Shading prevents overheating. Solar gain (g_{tot}) with double glazed windows can be reduced from 0.85 to 0.24 with internal shading and to 0.15, or lower, with external shading.



Privacy

Shading offers two way privacy and a functional/visual separation in mixed use buildings.



Daylight Harvesting

Shading allows harvesting of natural light. Shading improves indoor comfort, occupants' well-being and saves money on artificial lighting.



Daylight Exposure

Insufficient daylight affects task performance and can cause visual and physiological disorders e.g. headaches, eyestrain, depression and reduced vitality. Office workers exposed to daylight and contact with the outside world have been found to sleep an average of 46 minutes more every night compared to those in offices with no natural light.



Colour Rendering

Artificial light can be a cause of an inadequate colour rendition with detrimental effects in terms of stress levels and productivity.

Glare Control



Light and glare is effectively controlled by shading. Shading regulates luminance according to varying visual comfort needs.



Productivity

Staff related costs attribute to 80-90% of the total operating costs. Work performance diminishes below 19-22°C and above 23-24°C. Shading systems can contribute to superior work performance, increased concentration and well-being in the workplace.



Indoor Comfort

People in developed countries spend almost 90% of their time indoors. Thermal, visual and acoustic comfort is essential for well-being and triggers positive emotional, attitudinal and cognitive response in an individual. Inadequate visual contact with the outside world has a negative impact on quality of life, sleep and physical activities.



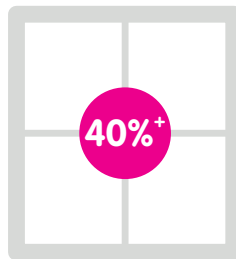
Sustainability

Passive cooling techniques such as shading systems are identified as priorities by the International Energy Agency as non-energy intensive means of reducing or even eliminating the need for mechanical space cooling. The ESCORP/EU25 study quantified that 80 million tonnes of CO₂ could potentially be saved by installing solar shading.

SAVE ENERGY



- Rising energy costs, combined with the effort to reduce carbon footprints, have made energy efficiency a top priority.
- Analysis of high-performing buildings against future climate scenarios has demonstrated solar shading to be one of the most cost-effective solutions to tackle overheating.
- Solar shading significantly reduces the need for mechanical air conditioning, which in any case does not have any effect on radiant heat exchange, and can also negatively impact on indoor air quality.
- Detailed modelling by the National Energy Foundation (NEF) shows that total energy savings can be as high as 48% when external shading is used, and up to 14% using internal shading.

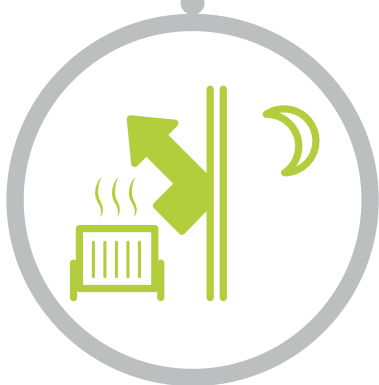


Solar shading saves up to 40%+ of energy use

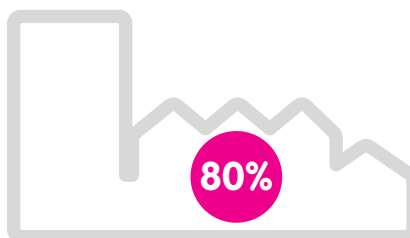


Buildings responsible for 40% of overall energy consumption in UK

REDUCING HEAT LOSS



- Glazing is the weak point in a building's overall thermal performance and a major source of heat loss.
- This is especially the case in many existing buildings. Currently, it's estimated that around 23% of the UK's housing stock is single glazed, while a further 27% features pre-1950 uncoated double glazing. What's more, 80% of existing buildings will still be standing by 2050.
- Although upgrading glazing may be the initial consideration shading should be considered first. There may be constraints on changing glazing too – for example, in conservation areas.
- Shading helps to insulate a building's "transparent envelope".

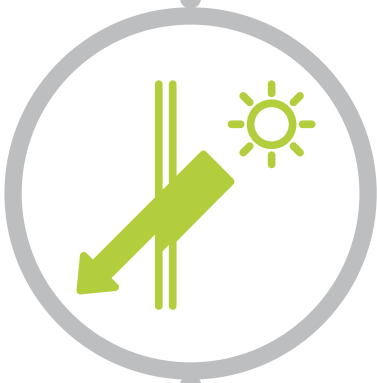


80% of buildings today will be standing in 2050



50% of UK homes have energy inefficient glazing

REDUCING HEAT GAIN



- In the quest for energy efficiency, most modern buildings are highly insulated and 'airtight'. However, these qualities significantly increase the risk of over-heating – it's estimated that around 20% of homes in England currently overheat during the summer months.
- This problem is set to become more significant in the face of global warming, with higher temperatures expected across the UK during the next 30 years.
- It's feared that heat-related deaths in the UK could triple by 2050, attributable to a combination of climate change and an ageing population.
- Appropriately controlled shading can significantly reduce the risk of overheating for building occupants.

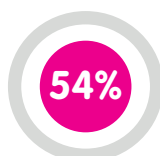


**20% of homes
overheating**

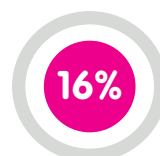
CONTROLLING HVAC



- The ability of blinds and shutters to reduce heat loss during the winter and heat gain in the summer also reduces a building's heating and cooling requirements.
- Air conditioning currently accounts for 10% of the world's electricity use, and that figure is rising.
- Air conditioning can increase a building's energy consumption (and associated carbon emissions) by up to 100%.
- Solar shading can allow for natural ventilation of buildings during warmer times of the year, and in turn help maintain good indoor air quality.
- Solar shading is a sound investment. An analysis of HVAC systems in three climate zones – Stockholm, Amsterdam and Madrid – demonstrated that solar shading installed in each building paid for itself in less than a year.
- Modelling shows external shading can save up to 54% of HVAC energy and internal shading up to 16%



**External shading saves
up to 54% HVAC costs**



**Internal shading saves
up to 16% HVAC costs**

CONTROLLING LIGHT AND GLARE



- People naturally prefer daylight to other sources of illumination. Daylight has a positive effect on the biological rhythms of our bodies, improving emotional and cognitive responses.
- Studies have found a compelling connection between exposure to daylight and performance in students.
- Office workers exposed to daylight and visual contact with the outside world have been found to sleep an average of 46 minutes more every night, compared with those in offices with no natural light.
- Proximity to natural elements such as greenery and sunlight has been associated with a 15% improvement in wellbeing and creativity, and a 6% increase in productivity.
- However, excessive exterior light can be detrimental to visual comfort, and there are regulations requiring the attenuation of light at workstations.
- Solar shading allows the most to be made of natural daylight and unlike solar control glass, which is a purely passive product, shading solutions can react to varying external conditions, especially when controlled automatically.

DON'T JUST TAKE OUR WORD FOR IT...

World Green Building Council - Health, wellbeing and productivity in offices, 2015

"What drives green building – conducive to healthy, productive occupiers – is quite simple:

1. Good design (such as passive solutions, shading, and natural ventilation where possible).
2. Good construction (new technologies, innovation, smart controls).
3. Good behaviour (appropriate clothing, adaptability and engagement with systems).
4. Good location (enabling low carbon commuting and easy access to services and amenities).

When designing for maximum daylight (and views), designers must evaluate and balance a number of environmental factors, including heat gain and loss,

glare control, visual quality, and variations in daylight availability in different seasons and climates. Appropriate interior or exterior shading devices to control glare and reduce solar gain will help provide better visual comfort and reduce the need for additional cooling."

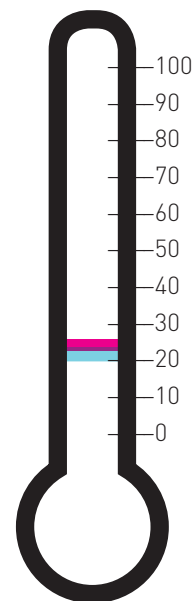
Federation of European Heating, Ventilation and Air-conditioning Associations (REHVA) - How to integrate solar shading in sustainable buildings

"Solar radiation is an important issue in all building projects as it has significant impact on the internal environment and affects the design of HVAC systems. Selection of solar shading should always be one of the first steps in the design of HVAC systems, as the demand for power and the energy consumption are greatly influenced by solar shading. Shading makes it

PRODUCTIVE ENVIRONMENTS



- We spend up to 90% of our time indoors, so ensuring such environments are comfortable is paramount.
- Thermal comfort plays a significant role in productivity. Temperatures which are too low inhibit dexterity in our hands while increases in high temperatures result in perceived lower air quality.
- Higher indoor temperatures can also have health implications, such as increases in stress and blood pressure and facilitate the transmission of infection and diseases – an especially significant risk in healthcare environments.
- Poor visual comfort also affects the performance of tasks – discomfort such as glare and reflections can cause eye strain and headaches.
- Glazing is poor at preventing sound entering our buildings from external noises, such as passing traffic or noisy neighbours. Inside, glazing acts a hard surface reflecting noise around the room. Where a softer furnishing could absorb this sound which negatively affects working environments.
- Shading, integrated into the building's design, can help achieve thermal, visual and acoustic comfort.
- Neglecting these aspects of building design can result in overall reduced productivity, increased costs and more frequent sick leave.



Work performance diminishes below 19-22°C and above 23-24°C

possible to prevent extra solar heat from entering the building and to avoid the need for additional cooling to remove this heat, which costs precious energy. In winter time, however, the free heat from the sun is very welcome to reduce the building's heating cost."

UK Green Building Council - Health & wellbeing in homes, 2016

"Too much glass can lead to internal overheating. Use of solar control coatings is a valuable way to offset this but will reduce light transmission and can impact the colour rendering of glass. Solar control coatings can also reduce the amount of passive solar gain in winter, which would normally contribute to reducing heating loads. Moveable external shading provides the best balance between winter and summer needs."

Zero Carbon Hub - Overheating in homes - The big picture, 2015

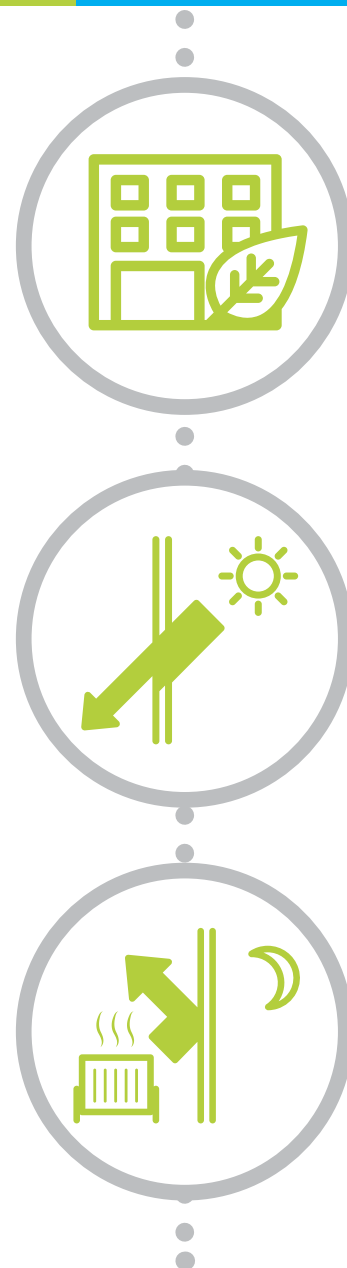
"Double-glazed windows with a low-e coating prevent heat from escaping. Houses with unshaded west facing glass will suffer from higher levels of solar gain in the warmer part of the day."

Glazing Supply Chain Group - Glazing in buildings, reducing energy use, 2015

"In practice an optimal solar control strategy designed to maximise heat gain in winter and heat rejection in summer through use of adaptable shading systems would reduce the UK's housing stock energy use on space heating and cooling."

KEY BENEFITS OF SOLAR SHADING

- Reduced heat gain in summer
- Reduced heat loss in winter
- Control of daylight
- Control of glare
- Improving indoor air quality
- Reducing energy costs (heating, cooling and lighting)
- Buildings compliance
- Privacy and security
- Maintaining views to the outside
- Allowing more glazing to be used
- Reducing emissions
- High colour rendering index
- Improved acoustics
- Improving glass performance (improve don't replace)
- Improving thermal, visual and acoustic comfort improves overall comfort, wellbeing and productivity of staff



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