

## Using LLumar® high-performance window films to help improve health, well-being and productivity

An information note for developers, property and sustainability consultants

### The importance of improving health, well-being and productivity in commercial buildings

The link between human comfort and the output of an organisation is the subject of continued research and debate, but it is generally accepted by designers and engineers that uncomfortable conditions have the potential to impact negatively upon worker well-being and productivity. In 2015 the World Green Building Council (WGBC)<sup>1</sup> highlighted three main sources of discomfort to occupants:

1. Uncomfortable temperature
2. Inadequate lighting
3. Poor air quality

Proper glazing specification or improving glazing performance can help improve two out of three of these areas of discomfort.

#### Source 1: Uncomfortable temperature

Almost everyone has experienced being too hot when inside a building. This can be particularly acute in buildings which contain a large amount of windows and glass. High-performance window films, such as LLumar® window film, can be retrofitted to existing windows and can help reduce solar thermal gain in a building, helping to control temperatures to a comfortable level.

#### Source 2: Inadequate lighting

Poor lighting in a building can increase eye-strain, headaches and migraines among workers, particularly those needing to look at computer screens for long periods of time. Natural light is a key contributor to comfort and research has shown it improves well-being. However, natural light can also lead to glare which affects productivity and comfort. High-performance window films allow the use of large windows facilitating different levels of natural light transmission while also reducing glare. On existing buildings, window films can help to control glare effectively without the use of blinds or shades which can completely block the view to the outdoors. This connection to the outdoors has also been found a key component of building occupant well-being.



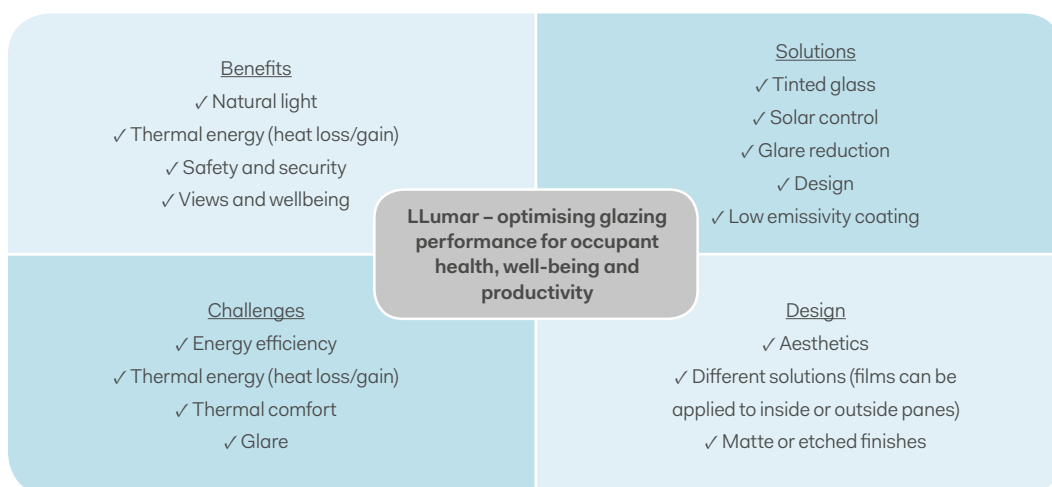
## LLumar window film – improving occupant comfort

One cannot overcome workplace discomfort and the well-being of occupants without considering window design and the properties of glass.

When specifying glass, a standard approach by designers and architects is to look at minimum requirements around g-values or U-Values specified in local building codes – this is particularly the case in the United Kingdom (UK). Shading, a passive design measure, is usually expected to address glare and overheating, or the matter is simply overlooked and/or not properly addressed. However, using window film can be a more cost-effective, long-term solution, without removing natural light in an working environment.

Using LLumar window films, specifiers can design solutions to address the sometimes conflicting considerations around glass. Multiple solutions can be provided to deliver a truly engineered solution to each unique building – see the glazing specification matrix (Figure 1). For example, in Europe a low-e film could be applied to north facing glazing, while anti-glare and low-g film could be applied to the south facing elevations. Both U-Values and g-values can be increased or decreased depending upon a building's orientation and other building characteristics such as building mass, window overhangs, shading, etc. By using building physics software, these issues can all be modelled and stress-tested to support the design process<sup>2</sup>.

**Figure 1:** The LLumar specification matrix, showing the versatility of using high-performance film to address each building's unique challenges.



To learn more about how LLumar window film can help, please contact your LLumar representative.