What is shadow flicker?

The rotating wind turbine blades can cast moving shadows that cause a flickering effect and can affect residents living nearby. Similarly, gloss surface blades flash when they rotate. Although this effect is not seen as an issue in the US, it has been subject to analysis, especially in northern Europe (source: Gipe, 1995).

Why does shadow flicker occur?

Shadow flicker occurs when a particular combination of conditions coincide in specific locations at particular times of the day and year. It happens when the sun is low in the sky and shines on a building from behind a turbine rotor. This can cause the shadow of the turbine blades to be cast onto the building, which appears to flick on and off as the turbine rotates. When this flicking shadow viewed through a narrow opening it is known as shadow flicker. Developers can calculate the extent of this effect using the geome of the machine and the latitude of the potential site. Shadow flicker only occurs in relative proximity to sites and has only been recorded occasionally at one site in the UK.

What are the effects of shadow flicker?

Scientists (Verkuijlen and Westra, Clarke) agree that the frequencies that produce disturbance and nuisance to people lie above 2 hertz. This is true both of the general population and of the 2 per cent who suffer from epilepsy, 5 per cent of whom have exhibited an adverse reaction to flicker effects above 2.5 to 3 hertz. This is well above the maximum frequency effect from turbines, which is usually under 1 hertz, and is therefore well below that considered to be the cause of nuisance.

If a person is stationary in a building, for example, shadow flicker can result in a momentary reduction of the intensity of natural lig If the regular changes in light intensity levels are high, then the shadow flicker may cause a nuisance.

The distance between a wind turbine and a potential shadow flicker receptor affects the intensity of the shadows cast by the blade and therefore the intensity of flickering. Shadows cast close to a turbine will be more intense, distinct and ‘focused’. This is becau a greater proportion of the sun’s disc is intermittently blocked. Similarly, flickering is more intense if created by the area of a blade closer to the root and further from the tip.

When does shadow flicker reduce?

A shadow’s intensity falls with increasing separation distance non-linearly, and more rapidly at first, while the human response to light levels is also non-linear. For example, during a solar eclipse or at sunset, a large proportion of the sun must be blocked befo a perceptible change in light level occurs. This further reduces the perception of shadow flicker.

At a distance of 10 rotor diameters (equivalent to 400 to 800 metres) a person should not perceive a wind turbine to be chopping through sunlight, but rather as an object with the sun behind it. This limits the zone of potential shadow flicker and normally there are no habitable buildings in these zones.