

Lighting powered by the wind



Kielder Skyspace was created by James Turrell, one in a series of sculptures that include Skyspaces in Ireland, Japan, Israel, The Netherlands and France. It consists of a buried cylindrical chamber, which is reached through a tunnel. A circular opening in the roof allows visitors to see the sky and experience changing light at dawn and dusk. At night, fibre optic lights in the floor illuminate the tunnel. Being some distance from a mains electricity supply, it was decided to power the Skyspace with wind turbines. This works very well, especially as the lights are controlled by timers and movement sensors, to avoid any unnecessary wastage of power.

How does it work?

The two wind turbines are situated a short distance from the Skyspace, and can produce 600W each in high winds. Micro generators should not be too far from the point of use, as long cable runs lead to significant losses of power. Whenever the wind is blowing the turbines generate electricity to be used to light the Skyspace. Any excess power is stored in a battery bank to be used at a later time, when there is not enough wind to generate the required amount of power.

The wind turbines produce alternating current (AC) electricity, but the batteries can only store direct current (DC) electricity. An inverter converts AC power to DC power to be stored, then DC to AC when it is drawn down from the battery for use. The inverter also ensures that the electricity is the correct voltage, as not all turbines generate at 230 volts. In fact, this means that the supply from a small independent installation is often "smoother" than that from the mains, which is subject to peaks and troughs in voltage, as demand fluctuates.

Installation and costs

The wind turbines are AIR Industrial made by Southwest Windpower and installed by Winsund. Depreciating the capital costs of the equipment and installation over a fifteen year period, the energy costs for the Skyspace work out at 62p/kWh. By comparison, a diesel generator would produce electricity at a cost of approximately 78p/kWh (at 2007 prices). The Forestry Commission was able

to obtain funding towards the installation of these turbines, so cutting the capital, and therefore the kWh cost of the electricity produced. These turbines are not connected to the main electricity supply network, but one turbine this size, if situated in a favourable position, could save approximately £36 of mains electricity per year.

Environmental impact

One of the wind turbines here will save, on average, 200kgs of CO₂ emissions per year, compared to mains electricity. As this site is off-grid, the most likely alternative to a wind turbine is not mains electricity, but a diesel generator. These two turbines save 640kgs CO₂ compared to a diesel generator connected to a battery / inverter system.

Further information

Visit the other renewable energy sites shown on the map overleaf.

Kielder Castle renewable energy exhibition is open from Easter to October.

www.tynedalerenewableenergy.org.uk
www.kielder.org/art/skyspace
www.winsund.com or 01207 255365

How a wind charger works

