

DFAL Architects

QUICK GUIDE TO SOLAR PANELS

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ROOF SUITABILITY

Three things must be taken into account before you consider installing solar panels.

Structural Loading

The weight of any proposed system must be considered before installation. The roof must be able to support the additional weight of the system and this should be confirmed with structural calculations.

Orientation

The direction your roof or wall faces is critical to the efficiency of your panel system. A south facing roof is best for full sun exposure. The Roof also needs to be clear of shading from trees or other buildings to maximize sun exposure.

Roof type

Pitched

Pitched roofs are generally suitable for panel installation subject to structural loading of the chosen system. Most pitched roofs have sufficient spare load capacity to accommodate a panel system however this should always be checked with structural calculations. East, south and west facing pitched roofs are best for panel systems.

Flat

Flat roofs generally do not have orientation problems as the panels can be installed to face the optimum direction. When installing systems on flat roofs safety must be considered for access, gaps must be left between rows of panels to allow for maintenance and cleaning. Flat roofs without parapets must have some form of fall prevention system installed to protect maintenance personnel.

Walls

Panels can be mounted vertically on external walls subject to orientation. Due to the UK's northerly positions these systems are only suitable on southern elevations with the exception of thermodynamic panels.

SYSTEM TYPES

BALLASTED

A ballasted system consists of either a frame or individual units which the panels are mounted onto, these are then weighed down with appropriate weight to prevent movement during storms. The benefit of a system in this configuration is that it does not require penetrations through the roof in order to fix the system. However the additional weight on the roof can be significant and will require justification checks by a structural engineer. These systems are only suitable for flat roof applications.

The mounting systems generally come at a pre-set angle for the panels. These are often approximately 15 deg from horizontal as it is considered this is the best angle for maximizing the number of panels without creating too much shading.



SYSTEM TYPES

FRAMMED

Framed systems as their name are mounted on a frame which is then fixed through the roof to the building structure. These system have a benefit of being considerably lighter than their ballasted counterparts but require the roof to be penetrated to fix to primary structure. Weather mounted on a flat or pitched roof the framing system should use proprietary penetrations to maintain the guarantee of the roof.



SYSTEM TYPES

IN LINE

In line systems are used for pitched roof and sit in line with the roof finish. These systems are best installed during the original construction of the roof but can be retrofitted. These systems are a specialist framing system which sits between the roof structure so the panels can sit flush with the desired roof finish. This system is usually more expensive than a standard frames system but provides a more aesthetically consistent finish.



PANEL TYPES

SOLAR PHOTOVOLTAIC (PV)

Solar photovoltaic (PV) is a type of panel which takes the energy from the sun and converts this to electricity. These are the most common type of system when people think of solar panels but are not the only type available.

These panels usually operate between 15-20% efficiency and generate around 250W per panel. Larger capacity panels are becoming more available but remain expensive in comparison to the smaller panels. The average UK household uses between 1.8kWh and 7.1kWh per day meaning generally a 3-4kW array or 12-16 panels is sufficient to supply the house during daylight.

The optimum angle for these types of panels to be mounted at is 35 degrees to achieve 95% efficiency however the efficiency drop from laying the panels at a slightly steeper or shallower angle is minimal, meaning panels still achieve 80% efficiency from 0-80 degrees mounting when facing due south. When facing east or west, angles from 0-35 degrees can be employed to maintain 80% efficiency.



PANEL TYPES

SOLAR THERMAL

Solar thermal panels come in two types, both systems require a suitable water cylinder to store the heated water meaning they are not compatible with combi boilers unless a separate cylinder is provided.

Flat plate

At first these appear to be visually similar to a photovoltaic panel however they serve a different purpose. These panels are used to either heat water directly or a transfer medium. These panels are around 55% efficient but also lack insulation meaning they are generally not suitable for the UK climate due to the risk of freezing.



PANEL TYPES

SOLAR THERMAL

Evacuated tubes

Evacuated tube collectors are usually a glass tube surrounding a heating pipe with a vacuum in between for insulation. The pipe then holds a fluid at low pressure which when heated boils and moves up to a transfer manifold at the top of the panel. Water is passed through the manifold to extract heat. This type of panel is generally 65% efficient but can achieve efficiency up to 90% under some circumstances. These systems are better suited to the UK climate but do run the risk of overheating in the summer months.



PANEL TYPES

THERMODYNAMIC PANELS

Thermodynamic panels are a unique system of water heating which utilizes ambient air temperature to heat water. The panel itself is used to collect warmth from the air through a medium and transfer the heat via a compressor to a water storage tank. These panels do not need to be in direct sunlight but are more efficient if they can be placed where they will receive some. The key drawback of the technology is the standard running temperature is only 55 degrees C which is often too low for everything but underfloor heating. This system is also not as well known or understood as the comparable Air Source Heat Pump which means they are often overlooked in their stead.



PLANNING

PERMITTED DEVELOPMENT?

Subject to your properties permitted development rights still being in place, which is usually noted as a condition of any planning approval if revoked. Solar Panels attached to a roof fall under permitted development if:

- They do not project more than 200mm above the original roof line.
- Do not project higher than the highest part of the roof
- Are not on the highway frontage of the building in a conservation area
- Are not installed on a listed building.

Should any of the above be breached, planning permission should be sought for the array. It should be noted that most ballasted systems exceed the above limitations and therefore require planning permission in most cases.

WHO WE ARE

Our core team of staff has experience in residential, commercial and industrial design. Our open plan and collaborative office allows staff to discuss projects and ideas openly, developing solutions that fit both client aspirations and budgets. Our practice seeks to provide clients with practical and cost efficient designs which are both beautifully elegant and effectively buildable.



WE HOPE THIS
GUIDE WAS
HELPFUL. PLEASE
CONTACT US IF YOU
REQUIRE FURTHER
ASSISTANCE.

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