Solar technology explained - the differences between crystalline and thin film, mono and poly etc.

When buying a Solar Power system, it pays to understand the different types of technology on offer. There is a lot of marketing hype surrounding the various panel types – and their benefits, so it pays to know what features really matter, and what is just marketing hype before you go shopping!

There are four common panel types on the market today, they are:

• Monocrystalline panels
• Polycrystalline panels
• Thin film (amorphous silicon) panels
• Hybrid panels (which are monocrystalline with an embedded layer of thin film)

Monocrystalline silicon solar cells
Monocrystalline panels get their name from the fact that the silicon wafer used to make them is cut from a single crystal or ‘boule’ of silicon. Silicon is grown in a laboratory to achieve a high degree of purity and is then sliced very thinly to make wafers.

Benefits

• Monocrystalline cells have the highest efficiency of any cells on the market under standard operating conditions.
• Their high efficiency means they have the smallest footprint for their output, so you can maximize power output when roof space is limited.

Drawbacks

• Due to higher production costs, monocrystalline cells are more expensive than other cells.
• Monocrystalline cells don’t perform as well as polycrystalline cells or thin film under higher temperatures (e.g. 25°C +). All cells are subject to ‘de-rating’ as the ambient temperature increases, and monocrystalline cells tend to produce less at higher temperatures than the other technologies.

Polycrystalline silicon cells:
These cells are cut from an ingot of melted and recrystallised silicon. In the
manufacturing process, molten silicon is cast into ingots of polycrystalline silicon, then saw-cut into very thin wafers and assembled into complete cells. Polycrystalline cells (also known as multicrystalline) are cheaper to produce than monocrystalline ones, due to the simpler manufacturing process. However, they tend to be slightly less efficient for the same size cell.

**Benefits**

- Polycrystalline cells typically offer a lower cost per watt of power produced.
- These cells have a better temperature de-rating co-efficient compared to monocrystalline, meaning they produce more power in hotter weather, which usually more than offsets their slightly lower cell efficiency.

**Drawbacks**

- Polycrystalline cells are slightly less efficient than monocrystalline cells, so they need more roof space to produce the same output capacity.

**Thin film silicon:**

Thin film, or amorphous, silicon cells are made up of silicon atoms in a thin layer rather than a crystal structure. Amorphous silicon can absorb light more readily than crystalline silicon, so the cells can be thinner. For this reason, amorphous silicon is also known as ‘thin film’ photovoltaic (PV) technology.

**Benefits**

- Thin film offers the best shade tolerance of any solar technology.
- When compared with other types of panels, thin film performs best under hotter temperatures.
Drawbacks

• Thin film has the lowest conversion efficiency of all the panel types
• These panels need about twice the roof space to achieve the same power output as a similar crystalline panel.