



## Solar Energy

*“In 90 minutes, enough sunlight strikes the earth to provide the entire planet's energy needs for one year.” - IEA*

Solar power is radiant energy emitted by the sun. In order to reduce our consumption of conventional fuels and minimise our carbon footprint, we can harness this energy and rely on it as a power source. This is mainly achieved through Photovoltaics (solar PV) and solar thermal heating. Solar PV converts the sun's radiation into electricity to help meet the increasing demand for power whereas solar thermal heating integrates a collector and boiler system to heat water and can be used for space heating, hot water and swimming pools.

### What is Solar PV and how does it work?

‘Photovoltaic’ is a combination of two words; ‘photo’, Greek for light, and ‘voltaic’, from ‘volt’, meaning electrical power. The solar cell is the main component of Photovoltaic technology and Solar PV systems use these cells to convert solar radiation into electricity. These solar cells consist of one or two layers of a semi-conductor and the most common material used in these cells is silicon, an abundant element most commonly found in sand. Solar cells can be wired together to form a module (a solar panel) and these can then be connected together to form an array.

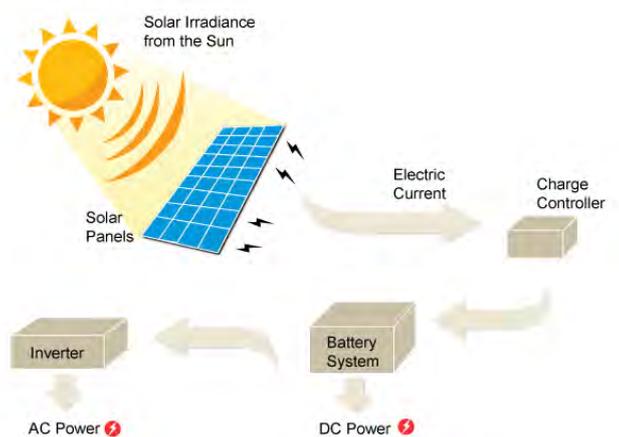


### How do solar cells produce electricity from light?

When light shines on the cell it creates an electric field across the layers causing electricity to flow. The more intense the light is, the greater the flow of electricity. However, PV cells produce electricity in the form of direct current therefore an inverter is required to convert this electricity to Alternating Current which can then be used in your house and exported to the national grid.

<sup>1</sup> <http://www.iea.org/publications/freepublications/publication/name-34725-en.html>

<sup>2</sup> <http://www.totalsolarsolutions.com.au/wp-content/uploads/2013/02/solar-panel-diagram1.png>



Source: Total Solar Solutions<sup>ii</sup>

### Benefits of Solar PV:

#### Reduced carbon footprint

Solar PV electricity is renewable once the installation offsets the carbon emitted during its construction which is usually within 2 years. A typical 2.5 kWp system could provide up to 50% of a household's annual electricity, saving around 1200 kg of CO<sub>2</sub> per year and around 30 tonnes over its lifetime.

#### Lower energy bills

Solar is capable of producing up to 50% of the annual electricity consumed in a typical house, electricity bills could be reduced significantly which would provide protection against rising energy bills.

#### Cost comparisons

Solar PV currently represents the cheapest source of renewable energy technology after wind energy in Ireland. Once installed a solar PV system has a typical life cycle of 30 years and the modules usually come with 25 years performance warranty. With no moving parts there is little ongoing maintenance requirement.

#### How much power can a Solar PV system generate?

PV systems are typically rated in kWp (kilowatt peak) which indicates the combined potential capacity of all the PV modules installed under prime conditions. Roughly speaking, if a 1kW solar PV system faces due south and is installed at an angle of 30° and is unshaded, each installed kWp can be expected to produce around 850kWh (units) of electricity per year in Ireland. A 2kWp system would thus produce



approximately 1,700kWh / year, around half of the annual electricity consumption per average household.

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