

# Solar Photovoltaics

## Practical Guide



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<https://www.gov.uk/government/organisations/department-for-business-energy-and-industrial-strategy>

[www.microgenerationcertification.org](http://www.microgenerationcertification.org)

[www.agrecalc.com](http://www.agrecalc.com)

[www.calu.bangor.ac.uk/energybooklet.php.en](http://www.calu.bangor.ac.uk/energybooklet.php.en)

Solar power refers to energy derived from the sun in terms of either direct heat or daylight. The sun could easily provide all the planets power needs; the problem is capturing it.

Solar renewable systems can be divided into two types; Solar thermal, which relies on heat from the sun to provide heating and hot water, and solar photovoltaics (PV), which converts daylight into electricity.

Incentive payments including feed-in tariffs (FIT) for solar PV installations have been withdrawn for new installations. The government are consulting on future support and payment mechanisms for small-

scale low-carbon generation, which may benefit solar PV and more details are expected to be announced in 2019.

PV can bring savings on your electricity bill through using electricity generated by the PV cells rather than mains electricity. PV works best where there is an on-site demand for the electricity produced that matches the yield profile of PV, for example, powering shed cooling fans that operate during summer days.

A survey carried out by Farming Futures suggests that 80% of farmers would like solar PV on farm roofs.

**This Practical Guide concentrates on the opportunities for producing electricity from solar photovoltaics (PV) on farm, which can supplement on site electricity demand and reduce farm GHG emissions.**

### Top tips for every farm:

- ✓ Carry out an energy audit.
- ✓ Monitor and reduce energy use.
- ✓ Benchmark — how do you compare with others?
- ✓ Assess all opportunities for renewables — for example a mix of renewable technologies such as wind and solar may be best suited to your farm.
- ✓ Compare information from different suppliers.

## Incentive payments

The FIT scheme used to be one of the main incentives for installing solar PV on farms, however the FIT scheme has now closed completely.

The government are consulting on future support and payment mechanisms for small-scale low-carbon generation including Smart Export Guarantee (SEG) which could benefit Solar PV.

The opening up of energy markets, smart metering, battery storage, electric vehicles, future proofing businesses and other emerging markets may all provide various opportunities for solar moving forward.

# Solar Photovoltaics

## Solar Heating & Hot Water

Solar panels for heating and hot water use different technology to solar PV. These systems rely on the heat in sunlight to warm water in special panels or tubes.

The system consists of a roof mounted collector plate, fixed to an unshaded south or near-south facing roof, a hot water storage tank and a pumped circulation system. The most common type of collector units are either a flat plate or evacuated tube design.

Typical supplementary systems can cost from £3,000 upwards and a correctly sized unit can provide 100% of domestic hot water during the summer months.

RHI payments may be available for solar thermal installations.

## Is your site suitable?

- Are there any planning requirements?
- If opting for a large scale solar array at ground level, are you near to a load or grid connection; do you need permission to cross anyone else's land?
- If retrofitting to shed roofs, has your supplier taken into account the additional loading that panels could put on the building, especially taking into account the weight of heavy snowfall?
- Remember hours of daylight are not constant throughout the year, affecting generation potential.
- Assess current energy use. An energy audit will help you identify unnecessary losses and assess energy and heat needs.

## Solar PV opportunities on farm

Solar PV cells convert daylight into electricity, the amount of energy they produce varies depending on the light falling upon them rather than on the air temperature. Solar PV panels can make good use of existing farm roofs, so no additional space is needed to site equipment.

Solar PV systems are normally connected to the National Grid, so power can either be used during the day as it is generated, or sold back to your electricity supply company. Smart Export Guarantee (SEG) is being proposed as a mechanism to partially replace the FITs export tariff. This would see large energy suppliers remunerating eligible small-scale generators for the electricity they export to the grid. More details on this are expected in 2019.

A mix of renewable technologies including solar PV can be particularly useful in off-grid situations, providing light and power to houses and farm buildings. Small solar PV panels are already in use to power pumps to supply water for livestock drinking troughs and to charge batteries used for electric fences.

## Installation and maintenance

Siting is a key consideration to maximise output - solar PVs need to be sited in a south or near-south facing direction. Panels can be retrofitted to building roofs, incorporated into the roof design as tiles in the external layer or, as seen in larger schemes, mounted at ground level in fields forming a bank of solar arrays.

Ideally, a PV array should be connected to the National Grid with an inverter to change power from DC (direct current) to AC (alternating current). This can also allow two-way metering where power can be sold directly to the grid when a surplus of energy has been generated or buy in electricity when the demand exceeds the current level of generation.

Aside from making sure the panels are clean, maintenance requirements are low. Some manufacturers are claiming panel life spans in excess of 35 years if correctly maintained, but performance will gradually deteriorate over time. Inverters may need replacing during the life of the panels, at around 10 years.

Planning permission may not be required, though guidance from the local planning office should always be sought at an early stage.

## Solar PV costs

Solar has seen a massive increase in efficiency coupled with a massive decrease in costs over recent years, making it an increasingly viable option without incentive payments. Solar PV is most cost effective when installed as part of a new build as opposed to retrofitting.

Costs will vary depending on your site and size of scheme and PV in particular benefits from economics of scale. As a rough indication of costs, a 10kWp system covering around 70 m<sup>2</sup> of roof space with 40 solar PV panels, could cost in the region of £9,000. Depending on geographic location, demand and how much electricity you generate and use on site, the payback benefits will vary.

Solar PV technology is improving quickly and new markets and opportunities are emerging which could help offset costs.