



Solar PV

BUYER'S GUIDE

Produced by the Energy Manager's Association



SOLAR MEDIA

Summary

This EMA buyer's guide is designed to give you some basic information and guidance on how to approach the addition of solar PV to your energy management portfolio, assessing how to decide whether or not solar is right for your building, the procurement process and how to tackle any potential issues that might arise. It also looks into potential storage solutions and offers advice on the financial incentives and packages available for solar installations.

For impartial sources of information

Solar Media Ltd provides the most authoritative independent and valuable information for the international solar industry, online, in print and in person.

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WHERE TO START

Assess the potential for savings

When do I use power

All day? Every day? Seasonality? Check your most recent bills.

When can solar help

Solar can offset costs directly. Future peak power charges could make solar and storage even more economical.

How can I pay for it

In short, up front or with no up front costs at all. Consider whether you can access cheap finance through your organisation or its parent.

AVAILABLE TECHNOLOGY

Choosing the right equipment

Rooftop solar power

Modules, or solar panels, have fallen in cost and have improved aesthetics and reduced impact on their host roofs.

Solar for new buildings

New builds offer the chance to integrate PV into the building's fabric and the chance to house inverters and other equipment with minimal impact.

Storage

The use of batteries enables you to maximise the percentage of consumption of your on-site generation. Without batteries any unused electricity that is generated on site will be fed back to the grid.

CHOOSE YOUR SUPPLIER

Making the right choice

MCS

Any installer you use will need to be registered with the Microgeneration Certification Scheme (MCS) if you want to be eligible for subsidy support.

Vendors

Use equipment listed with the MCS for the same reason. Be wary of deals that are too good to be true.

Thinking of the future

Discuss warranties and the operation and maintenance of the system from the outset.

What's my need?

A PV system allows you to generate electricity onsite giving you control over future cost increases and potential varying costs dependant on time of use as the grid reaches maximum capacity.

What's the driver that makes solar, make sense?

PV allows businesses that are lucky enough to have the right roof / available space to generate electricity for free consumption onsite. A well designed and installed system can have a net impact on a business's profitability from month one.

Am I considering Solar for consumption or generation?

Consumption. The benefit of consuming what you produce on site over what you feed back into the grid is the key. A PV design should take note of base loads and add storage to maximise onsite consumption.

Do I understand peak time pricing and how can I use this to my advantage?

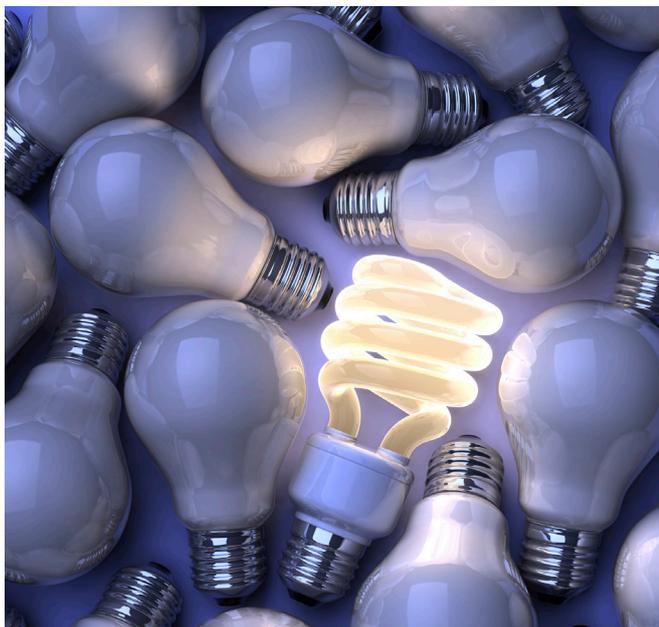
Pricing will vary depending on time of use, helping the grid to control levels of high peak demand. Becoming your own onsite generator allows you to take control of pricing strategy and with storage, shift usage to a lower cost period.

Do I understand my daily demand patterns and therefore best solution from solar?

Without the knowledge of your basic demand patterns answering what, why & when you use electricity you will not take the maximum advantage of a PV installation offering onsite generation.

What is the implication on existing supply contract and can I guarantee continuity of supply?

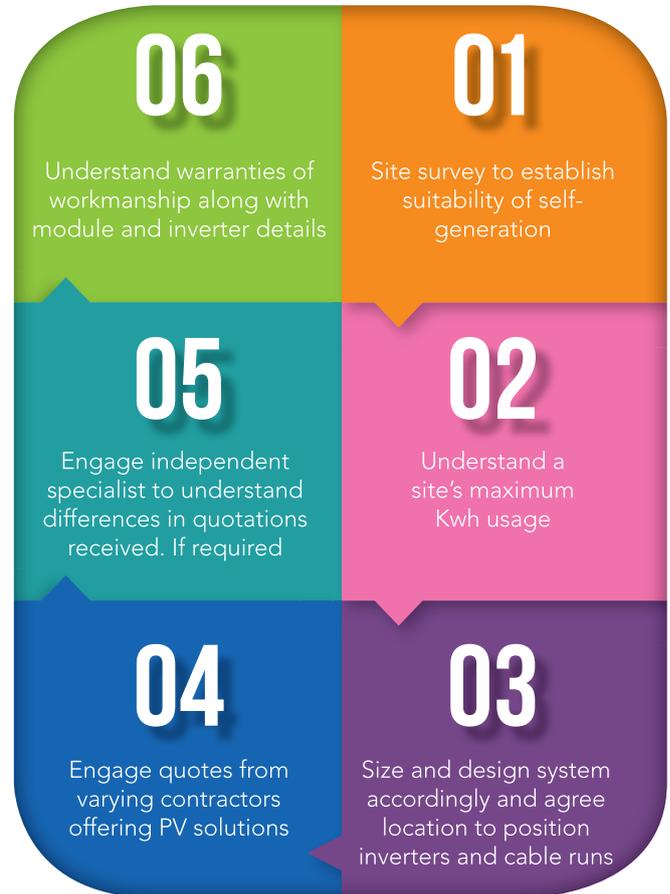
Standard supply contracts will be unaffected. On-site generation simply means less electricity is purchased from the grid when you are producing and when your demand is greater you pull electricity from the grid in the normal.



What is the procurement process?

Key learning is that kWh should be generated from your system for many years. The value price of an installed system against kWh that will be generated over life of the system NOT just against the kWp of a system.

THE SOLAR PROCUREMENT PROCESS



How can I pay for it?

A self-funded system means all savings directly benefit the occupier where the electricity is generated. For a zero upfront option you will need to lease (or sub-lease) your roof and agree to purchase the electricity from the generator under a Power Purchase Agreement (PPA). Always seek legal advice before entering into a PPA.

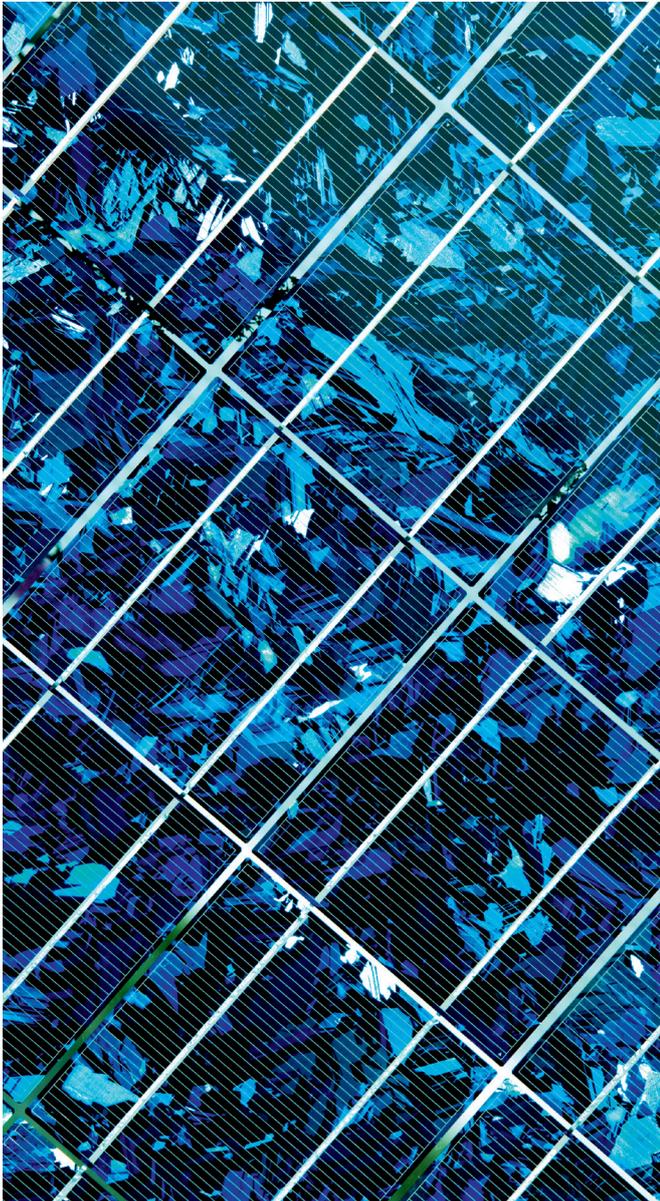
Subsidy/finances – What subsidies are currently available? Do I get any? If so, how does it work?

Subsidies have been available since 2010 making payments to owners of PV systems for the kWh they produce. The amount that is paid had differing criteria depending on size and type of system. The scheme is under constant review each quarter depending on how much is deployed. The cost of installing PV has dropped dramatically as module prices have fallen globally by approximately 70% since the incentives were introduced. The ROI is far easier to calculate with now only one variable – the cost of energy going forward. A commercial decision should be made against electricity cost savings alone.

Small incentives are still available at the time of press but this buyers guide but should not be relied on as any part of your ROI calculation.

What jargon do I need to understand?

- **kWp** = Kilowatt Peak (size of system/panel) watch out for negative tolerance +/- tolerances of kWp. A positive tolerance means your modules will be no less than specified.
- **Peak Power** = Is the max wattage output under set factory conditions.
- **NOCT** = Normal operating cell temperature. A panel, or module's, performance drops off at higher temperatures.
- **Stepped Warranties** = Module Output discrepancies can only be claimed at certain times during this period, usually after 5, 10 & 20 years.
- **Linear Warranties** = Module Output discrepancies can be challenged at any time within agreed period, usually 25years.
- **Polycrystalline Modules (Poly-Si)** = These cells are formed from many fragments of silicon compressed together and usually blue in appearance.
- **Monocrystalline Modules (Mono-Si)** = These cells are formed from a single molten block of silicon usually black in appearance.

**Storage + Solar: are there solutions now?**

When generating your own onsite electricity it becomes important to be engaged with your building's energy usage. If your operation runs five days a week but producing electricity seven days a week storage can play a key part in managing "wrong time energy". By fitting a well-designed PV system (with storage) that is sized on your electricity needs and not just the size of your roof, battery storage can be an easy way of maximising your on-site generation usage and therefore your ROI.

What are the costs of storage?

Costs will vary depending on size of storage required but will be cheaper to fit at the same time as PV installation rather than retrofitting at a later date. Technology in storage has changed dramatically in recent years with a lot of expertise coming from the electric vehicle market. Like the cars, the cost of batteries is coming down as production increases.

What's the difference between the different technologies?

Typically a PV system can be retrofitted to an existing roof sitting just above the original structure. For new builds it is more typical for the PV system to become part of the roof itself, integrating the modules into the roof saves on duplicating the covering.

When does the energy manager need to get involved in the development of new facilities or upgrades to existing one?

It's best to get an energy manager involved with all design stages so that a building is best fit for purpose of the occupants. While the PV system will improve the EPC rating just for having it, the key is for best use of onsite generation with involvement from energy manager.

What is solar thermal?

Solar thermal generates hot water from the heat of the sun while a PV system generates electricity from the light, rather than the heat. PV systems perform better in cooler conditions.

Do I need a grid connection?

Yes, a grid connection is required for any Solar PV installation that exceeds 4kW per phase

What are the risks?

There are a number of project risks to consider. You need a grid connection offer, and you need to be able to afford it. Planning issues can arise although rooftop projects up to 1MW in size are covered by 'Permitted Development' rules and may require no planning consent. There could be structural implications for your building. The technology must be the right specification for your needs and there is always the risk, as with all technology, that it could fail after installation. For that reason, you need to make sure you have a suitable warranty package and that your contractor is not going to go insolvent.

What costs could appear?

There are several costs to be aware of. The grid connection application and DNO costs – it is unlikely that the cost would be more than £1,000 for a 100kWp installation, and in many cases there is no DNO cost. Planning costs, even under permitted development rules, you will need to provide the local authority with plans/layouts and a statement regarding the permitted development rules. Witness testing – the DNO may require the installation to be witness tested prior to issuing a commissioning certificate. Consultant – unless you understand what you are procuring and that you are comfortable with the specification, it may be sensible to engage a specialist to run the pre-construction and procurement process for you. It should save time, and much of the cost should be covered by capex savings and less time required for you to procure.

What impacts grid connection prices?

The size of the installation, the capacity of local network to take the energy generated and the condition of local network.

Is my property suitable?

Ask yourself these questions, do you have any unshaded roof space that faces east, west or south?

How old is the roof and is it in good condition? Depending on the type of roof you have, a rule of thumb is that between 6.5m² on a pitched roof and 12m² on a flat roof is required for each kW of power your system needs.

Where could I locate it?

Most Solar PV is mounted on the roof of the building it supplies, however it can also be ground-mounted and connected into the building's supply if there is suitable available space.

Am I limited by my roof?

Most leases would require the tenant to seek landlord's approval prior to installing Solar PV. Consider how long is left on the lease before making a financial commitment to an installation that has a payback of over 10 years. New rules mean you can move your system, and any related policy support, to a new building.

How long will it take to install?

Each installation will differ but generally the installation is very straight forward once started if proper plans are in place beforehand. Pre-installation agree things like the inverter positioning. Think of space for cable runs between the inverter and the main distribution board. Give consideration to onsite storage of modules for your contractor and easy access to roof space so they can complete the project efficiently.

What are the implications and impacts on my operations?

Your chosen contractor should be able to handle everything for you including the approvals of your installation (planning where necessary) and liaising with the grid connection and hand over. There may be a requirement for a short power outage while the system is commissioned and it then is left self-regulating depending on your generation and demand criteria.

Where do I get the information for the business case?

Once you have discovered you have a good roof to generate electricity the other side of the equation needs to be weighed up. How much are you paying for your electricity and when are you using it? Take at least one full years analysis as your demand will change thorough the seasons. Two years would be better if the details are to hand. By working with savings from your energy bill you can work out exact savings delivered by solar. Remember to build in cost of energy rises (conservative estimate is a 6% rise each year) remembering that your cost to produce will have no further increases other than minimal maintenance costs.

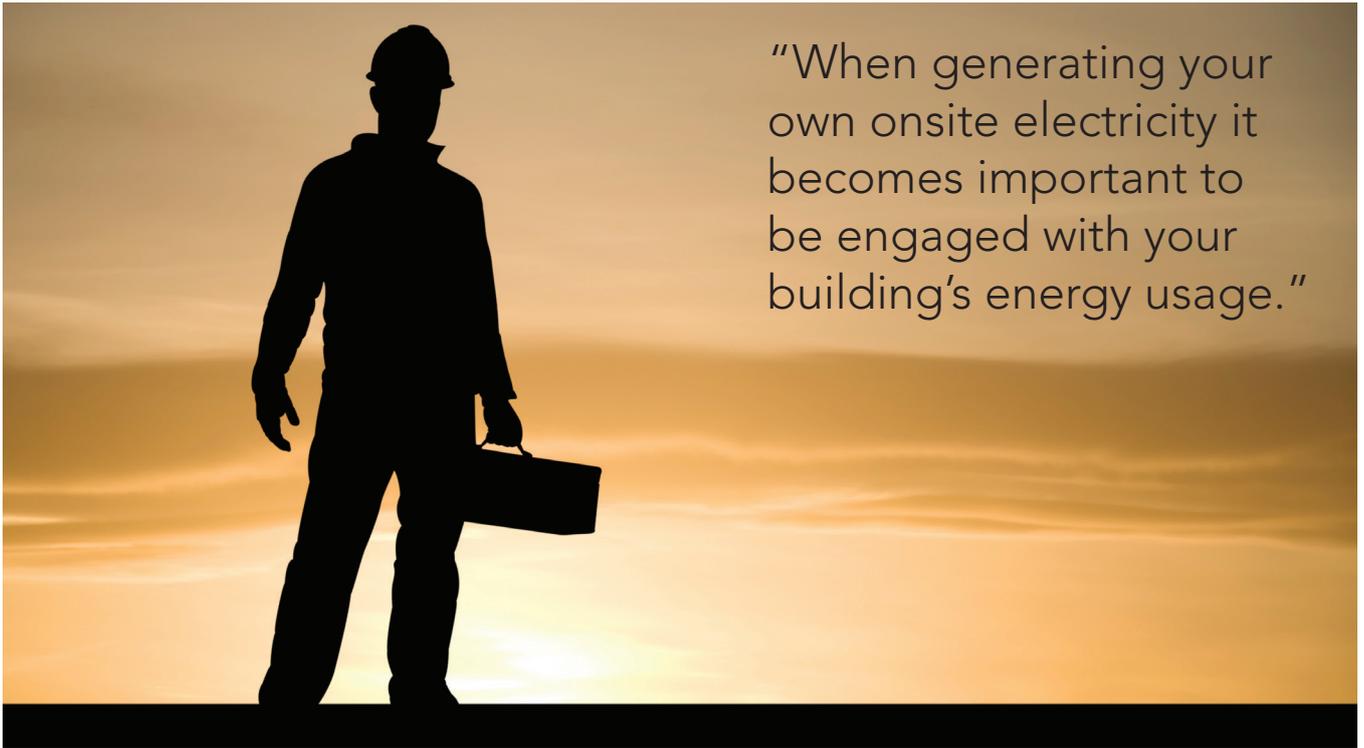
How can I track the performance of and savings from my system?

Simply by monitoring what is being generated you see what you are not buying from the grid. Most systems should come with full monitoring. If not, ask why not. When you can see minute by minute breakdown of generation and usage you are well on your way to understanding your building's needs and assured further savings will become apparent.

Ownership issues

This depends as to whether you are a landlord, tenant or owner occupier. If you are a tenant, and funding the installation yourselves, check the lease terms – you will almost certainly have to get the landlord's consent. Make sure the building's insurers are aware of the installation – whether this affects the cost of the insurance premium depends on several factors, not least whether it is insured under a 'block' policy. In most cases the cost of the installation compared to the reinstatement cost of the building is de minimis and the insurers do not increase the premium. Let the local fire brigade know you have an installation. This is important because in the case of fire, they need to know where the isolators are, but more importantly (because the system will most likely have tripped before they arrive in the case of a serious fire), because they need to know that there is equipment on the roof that may still be live.





“When generating your own onsite electricity it becomes important to be engaged with your building’s energy usage.”

Effect on property valuation/dispute resolution? Who owns what, who fixes what, who pays? Can I get solar if I rent my property?

Who has paid for the installation and what was agreed at the time? If a landlord has funded an installation, it would normally be them that maintains it. If you are occupying a building under a lease, the chances are you need to seek the landlord’s consent to carry out the works. Do this at an early stage. Many landlords are happy to fund installations, and can take a longer-term view on returns than many tenant businesses – consider this route when thinking about funding the project. If you are a landlord, there is evidence that the income streams generated have been capitalised when the asset has been sold. This means that it is very possible that when you sell a property you should consider the value of the energy and any FiT income when selling.

O&M + cleaning: how and costs - what are the benefits?

O&M contracts will vary according to system size, and the no of systems you have. A rule of thumb is between £8/kWp and £15/kWp per annum. Allow for one clean each year at around £5/kWp for installations above 50kWp. Consider access for ongoing maintenance and cleaning when looking at the project specification and location. Inverter replacement is something that should be considered when understanding life-cycle costs. It is prudent to assume that the inverters will need to be replaced every 10-15 years.

Degradation of equipment, what does a warranty cover?

Panels

- Panels make up c.35%-45% of the cost of a project
- Manufacturers typically offer a 25 year performance/output warranty. The industry standard is 20% loss of efficiency over 25 years.

- Consider using only Tier One panel manufacturers, and preferably one with an insurance backed warranty

Inverters

- Minimum five years’ warranty, some manufacturers offer a 10 year warranty
- Only consider major manufacturers

Efficiency of the system, how will this change through the year over lifetime?

Installations that are well maintained and looked after should only experience very modest panel degradation during the first ten years. It is sensible to build in some degradation into the forecast outputs. Your adviser, or the contractor should be able to provide a 20-25year forecast. Dirty panels do not perform as well as clean ones! Efficiency can drop off by over 30% for systems that have not been cleaned. Panels that have very shallow pitch (less than 10 degrees) are likely to need more frequent cleaning than those with steeper pitches (the water runs off the panels at a faster rate and they clean themselves more efficiently).

I was told it’s just ‘fit and forget’ is that true?

Solar PV is a very reliable and mature technology. Sadly it is not a ‘fit and forget’ technology – what is? Running costs should be modest, and certainly preventative maintenance should keep those costs down in the long term. Operating costs should always be factored into the feasibility, and be very wary of any contractor that tells you otherwise. If procuring direct from a contractor speak to them about what is required, if they tell you that no maintenance is required they are probably not the contractor to choose. Most reputable contractors will be happy to offer a maintenance contract. The best time to negotiate the cost for this is before you have contracted them to install the system.

The Energy Managers Association

Aims

Improvement of the stand of the energy management profession and those working within it

Establishment of best practice in energy management

Put energy management at the heart of British business

Objectives

Representing energy managers across industries and protecting their interests

Developing energy management profession

Raising awareness of energy management and promoting energy efficiency opportunities

Promoting the exchange of knowledge, information and best practice

Initiatives to deliver strategy

Training Standards and Programmes:
Low Energy Company (LEC) Initiative;
Energy Savings Opportunity Scheme (ESOS) Lead Assessor;
Schools' Course;
Compliance Course

Utilities Compliance Assurance Body (UCAB): Assurance of Transparency in Utilities' Selling

Energy Efficiency Policy Development:
DECC, BIS, OFWAT, OFGEM, European Commission, Transparence

Membership Engagement:
Members' meetings, Topical Conferences, EMEX, Working Groups

Public Engagement:
Articles, Conferences, Forums

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If you'd like to suggest a question for the guide's experts to answer, or indeed are looking to contact someone in the industry about taking your first solar steps, contact us at buyersguide@solarmedia.co.uk