Frequently Asked Questions on Solar Photovoltaics

If you have any comments on these FAQs please contact info@seai.ie

1. General
   - 1.1. What are solar panels?
   - 1.2. What different types of solar PV panels exist?
   - 1.3. How much electricity will solar panels generate?
   - 1.4. Do solar panels work in Ireland?
   - 1.5. How much do solar panels cost?
   - 1.6. Where are solar panels manufactured?
   - 1.7. What supports are there for research into solar PV in Ireland?
2. Domestic solar PV
   - 2.1. Are solar panels right for my home?
   - 2.2. Who can install solar panels on my property?
   - 2.3. Do I need planning permission to install solar PV on my roof?
   - 2.4. What will be installed in my home if I purchase a rooftop solar PV system?
   - 2.5. How will the solar panels be fixed to my roof?
   - 2.6. How can I maximise the amount of electricity generated that I use?
   - 2.7. What about a battery storage system?
   - 2.8. What supports are there for solar PV in homes?
   - 2.9. Is there a 'feed-in tariff' payment for excess solar electricity fed into the grid by owners of solar PV systems?
   - 2.10. Does my rooftop PV system require maintenance?
3. Non-domestic rooftop solar PV
   - 3.1. Are solar panels right for my business or building?
   - 3.2. Do I need planning permission to install solar PV on my roof?
   - 3.3. What supports are there for solar PV in businesses and other buildings?
   - 3.4. Is there a 'feed-in tariff' payment for excess solar electricity fed into the grid by owners of solar PV systems?
4. Solar farms
   - 4.1. What is a solar farm?
   - 4.2. How much land is required for a solar farm?
   - 4.3. What information is available on planning for large-scale solar farms in Ireland?
   - 4.4. What information is available for land-owners regarding solar farms?

1. General

1.1. What are solar panels?

The term 'solar panel' can refer to a wide range of solar technologies. It is often used interchangeably between the panels that generate electricity and those that generate heat. Solar panels which produce electricity are referred to in the industry as 'solar photovoltaic (PV) modules.' These are panels made from materials which generate DC electricity when exposed to light.

When considering purchasing solar panels it is important to consider whether you would like a system which generates electricity (solar PV panels) or a system which heats water (solar thermal panels). The questions in this document are all in relation to the electricity generating panels.

1.2. What different types of solar PV panels exist?

There are a variety of different solar PV technologies and products. The performance and cost of different products varies greatly. The most common solar PV technologies are:

- Mono-crystalline silicon panels: typically the most efficient commercial solar panels at converting light into electricity
- Multi-crystalline silicon panels: typically slightly less efficient than mono-crystalline panels but often less expensive
- Thin film panels: this encompasses a range of technologies (including those made from cadmium telluride (CdTe), copper indium gallium diselenide (CIGS) and amorphous silicon (a-Si)). These technologies are not as widely deployed but are often favoured because of their appealing appearance.

Silicon-based solar panels are by far the most commonly deployed, accounting for over 90% of the global market. When considering installing solar PV panels on your roof you will typically be limited to the products which individual installers offer. Be sure to ask to see the technical specification for the solar panels they are offering. You can find out more about understanding how to read technical specifications here.

1.3. How much electricity will solar panels generate?

The amount of electricity generated annually will depend on a range of factors including the hardware chosen, size of system, the geographical location and the direction in which the panels are installed. With the most common silicon solar panels typically 1 sq. m of panels will generate ~150W of power on a clear sunny day (that's enough to power a laptop computer). A home solar PV system sized at 20 sq. m (~3kW) would generate around 2,600kWh of electricity a year if well-located, over 40% of the typical annual electricity demand of an Irish home.

1.4. Do solar panels work in Ireland?

Yes, solar PV systems will still generate electricity when there is daylight, so they will still function on overcast days in Ireland. In these conditions they will not be able to produce power at their maximum rated capacity (the figure in kilowatts (kW)), rather at some fraction of this figure. Solar panels will perform at their best in direct sunlight and therefore solar PV systems in Ireland will typically produce less than other, sunnier countries such as Spain. As mentioned above, a home solar PV system sized at 20 sq. m (~3kW) would generate around 2,600kWh of electricity a year if well-located, over 40% of the typical annual electricity demand of an Irish home.

1.5. How much do solar panels cost?

The cost of purchasing and installing solar panels has come down considerably over the last 10 years. The cost of a solar PV system depends on a range of factors including the hardware chosen, size of system, accessibility of the roof or site, and the installer used. Broadly speaking home PV systems should range from around €1,500 - €2,000 per kW installed (ex-VAT), but prices will vary depending on the factors mentioned above.

1.6. Where are solar panels manufactured?

Most solar panels are manufactured in Asia (primarily in China and Taiwan) but there are also some European and North American manufacturers. The components for solar panels and other hardware used in the installation come from all around the world.

1.7. What supports are there for research into solar PV in Ireland?

SEAI's research, development and demonstration programme supports Irish energy research. The programme has supported innovative projects on a variety of solar technologies, committing over €1m of RD&D funding to solar projects since 2005. The programme will be of interest to solar researchers, technology developers and those seeking to demonstrate innovative new approaches to utilising solar technology.

2. Domestic solar PV

2.1. Are solar panels right for my home?

There are a variety of considerations when determining whether or not solar panels are right for your home. Some thought must go into how much of the generated electricity you will use as this will affect how economic it is as a solution for your home. Solar PV systems generate electricity only during daylight hours, predominantly around the middle of the day when you may be at work.

Also, around 75% of the annual energy from a solar PV system is produced from May-September. You need to consider how much of the generated electricity you will use in your home, based on the pattern of generation from the solar PV system, and the pattern of energy usage and occupancy for your house. Without any additional systems, a lot of the generated electricity can be spilled (exported) to the grid, and there is currently no mechanism for homeowners to claim a payment for this (see question 2.9).

You also need to consider if your roof is suitable for solar PV considering the age and condition, the orientation of your house, and any potential shading from nearby trees or buildings. The best rooftops for maximising electricity generation are those that are south-facing, in good condition and with minimal shading from trees or adjacent structures.

Finally, it is worth considering other options to improve the energy performance of your home, such as insulation, draught-proofing, improved windows, boiler controls, or some other renewable generating technology. Speaking to a BER assessor is a good first step.

2.2. Who can install solar panels on my property?

Finding a competent installer is important. There are currently no formal qualifications mandated which installers must hold, but connection of the solar system must be carried out by a Registered Electrical Contractor.

SEAI's advice would be to contact multiple installers or developers to get a range of quotes. A good place to start is the Renewable Installers Register which identifies installers that have received accredited training.

2.3. Do I need planning permission to install solar PV on my roof?

Larger solar PV systems on domestic rooftops will typically require planning permission. Solar PV systems installed in a domestic setting under 12 sq. m (and representing less than 50% of the total roof area) are exempt from planning. Visit the page on conditional planning exemptions for the full details.

2.4. What will be installed in my home if I purchase a rooftop solar PV system?

The main components are the solar panels which will be located on the roof area, and the inverter which will be located within your house or attic. The solar panels convert the light into DC electricity, and the inverter converts this DC electricity into AC electricity for use in your home. The solar system will be connected to your main electricity panel ('fuseboard'). Other optional components are an immersion diverter switch, battery, or energy meter (see questions 2.6 and 2.7 for more information).

2.5. How will the solar panels be fixed to my roof?

There are a number of well-proven solutions to connect the solar panels to your roof. Most solutions fix the solar panels above the existing roof tiles on aluminium rails, but some solutions allow for an integrated, 'flush', connection where the roof tiles are removed and replaced with the solar panels. The most important consideration for homeowners is that the water tightness of your roof is not affected by the installation. Installers should not be permitted to drill into roof tiles to connect the PV panels, as this could lead to future leaks in your roof.

2.6. How can I maximise the amount of electricity generated that I use?

The simplest way to use a higher percentage of the electricity generated is to design the PV system to meet the electricity demand of the house, although this may mean a very small PV system is installed if demand is low during the daytime.

Another simple measure is to install a 'diverter switch' which diverts any unused electricity to heat your hot water in your immersion tank. In this way some of the energy generated is stored as hot water, which you can use later.

Finally, a more complicated option is to install a PV system which does not face south, but faces west or east. This will provide more energy in the morning or the evening when you have a greater demand to use it. However, an east- or west-facing PV system will generate less energy over the year than a south-facing system.

2.7. What about a battery storage system?

This is a more complex way of storing any potential exported electric energy. Adding a battery to your solar PV system means the battery will charge when the PV system is generating electricity which isn't being used, and then discharge when you need it next (normally that evening/night). A battery can increase the percentage of solar PV electricity you use in your house. However, adding a battery to the system will increase the cost of the PV system and some energy is lost in the battery during the charge and discharge cycle.

2.8. What supports are there for solar PV in homes?

- **Domestic Solar PV Grant:** SEAI currently offers homeowners a grant towards the cost of installation of a domestic solar PV system. Full details of this grant can be found on the Solar PV Grant webpage.
- **Home Renovation Incentive:** Some home solar PV systems will be eligible for an income tax credit under the Home Renovation Incentive. Homeowners can avail of a 13.5% tax credit on qualifying expenditure over €4,405 (before VAT) per property.
- **Deep Retrofit Pilot:** SEAI's Deep Retrofit Pilot can provide grant funding of up to 50% for solar PV systems provided they are installed as part of a package of energy improvement measures. This programme requires homeowners to commit a considerable investment towards energy efficiency measures in their home but offers a high degree of financial support towards the cost. More information can be found on the Deep Retrofit Pilot Programme webpage.

- **Better Energy Communities:** SEAI's Better Energy Communities programme can provide grant support to community projects for the installation of domestic solar PV systems provided they are done so as part of a package of other energy improvement measures including energy efficiency. More information can be found on the Better Energy Communities webpage.
- **Building Regulations:** Part L of the domestic building regulations requires a minimum share of the energy consumption of new homes to be provided by renewable sources. Solar PV and thermal systems can meet this obligation and thus their uptake is driven in part by these building regulations. Installation of these systems also improves the overall Building Energy Rating (BER) of the property.

2.9. Is there a 'feed-in tariff' payment for excess solar electricity fed into the grid by owners of solar PV systems?

There is currently no obligation for energy suppliers to pay their customers for the electricity they generate with their solar panels (sometimes known as a 'Feed-in-tariff'). It is up to energy suppliers to decide whether they wish to offer such a scheme to customers.

2.10. Does my rooftop PV system require maintenance?

PV systems are low-maintenance, but not zero maintenance. The most important aspect is to monitor the performance of your system regularly. This could simply be a routine check of your inverter to see that the system is operational (e.g. no red blinking lights) and that the energy meter is increasing each day.

You should get an idea from your installer about how much the PV system should generate each year, and see that your system is generating close to that amount. Some suppliers will provide you with access to this information via your smartphone. The most common point of failure is the inverter, which may need to be replaced at some point in the PV system's lifetime.

The solar panels themselves are extremely robust, but consideration should be given to cleaning them every few years to maintain their performance. If you live near the sea or a main road more regular cleaning may be necessary.

3. Non-domestic rooftop solar PV

3.1. Are solar panels right for my business or building?

There are a variety of considerations when determining whether or not solar panels are right for your building. Some thought must go into how much of the generated electricity you will use as this will affect how economic it is as a solution for you. Solar PV systems generate electricity only during daylight hours, predominantly around the middle of the day. For businesses with high daytime electricity demands this could be a good option.

Also, around 75% of the annual energy from a solar PV system is produced from May-September. You need to consider how much of the generated electricity you will use in your building, based on the pattern of generation from the solar PV system, and the pattern of energy usage for your business. Without any additional systems, a lot of the generated electricity can be spilled (exported) to the grid, and there is currently no mechanism for generators to claim a payment for this (see question 3.4).

You also need to consider if the roof is suitable for solar PV considering the age and condition, the orientation, and any potential shading from nearby trees or buildings. The best rooftops for maximising electricity generation are those that are south-facing, in good condition and with minimal shading from trees or adjacent structures.

Finally, it is worth considering other options to improve the energy performance of your building, such as insulation, boiler upgrade, monitoring systems, or some other renewable generating technology. Speaking to a BER assessor is a good first step.

3.2. Do I need planning permission to install solar PV on my roof?

Larger solar PV systems in a business or industrial setting will typically require planning permission. Solar PV systems installed in such a setting under 50 sq. m (and representing less than 50% of the total roof area) are exempt from planning. Visit the page on conditional planning exemptions for the full details.

3.3. What supports are there for solar PV in businesses and other buildings?

- **Accelerated Capital Allowances:** the ACA is a tax incentive aimed at companies paying corporation tax, sole-traders and non-corporates. The scheme allows them to write off 100% of the purchase value of qualifying energy efficient equipment against their profit in the first year of purpose. Solar PV systems can qualify for the scheme provided the model of solar panel is registered on the Triple E Register.
- **Grants via EXEED:** The Excellence in Energy Efficiency Design (EXEED) programme offers grant support to business and industry for energy improvements and can encompass grant support for solar PV systems. More detail can be found on the EXEED webpage.

3.4. Is there a 'feed-in tariff' payment for excess solar electricity fed into the grid by owners of solar PV systems?

There is currently no obligation for energy suppliers to pay their customers for the electricity they generate with their solar panels (sometimes known as a 'Feed-in-tariff'). It is up to energy suppliers to decide whether they wish to offer such a scheme to customers.

4. Solar farms

4.1. What is a solar farm?

A solar farm is a large array of solar panels, installed in fields or other large spaces, feeding all of the generated power to the electricity grid. Sometimes these are referred to as a solar park or a ground-mounted solar array. In a solar farm the solar panels are installed on mounting systems approximately 3m high which are piled into the ground like fence-posts. Rows of these mounting systems would be a typical feature of a solar farm.

4.2. How much land is required for a solar farm?

Solar farms can be any range of sizes, but around 4-5 acres (1.6-2 hectares) is required for each Megawatt (MW) of solar panels installed (around 4,000 panels per MW).

4.3. What information is available on planning for large-scale solar farms in Ireland?

There are currently no large-scale solar farms in Ireland but there are a significant number in the UK. Information on planning requirements and the appropriate siting of solar farms in the UK can be found here. There are currently no central planning guidelines for large-scale solar farms in Ireland. However a research report on planning and development for solar farms in Ireland contains some useful information and can be accessed here.

4.4. What information is available for land-owners regarding solar farms?

- Presentations from an IFA event 'Solar – a real opportunity for farmers?' hosted in July 2016. The presentations cover technical, legal and tax considerations for landowners.
- A useful article for landowners on solar farms in the Engineers Journal.