



better energy

COMMUNITY Q&A

BETTER ENERGY COMMUNITY Q&A

WHY DO WE NEED SOLAR ENERGY?

Solar energy is a clean and safe, cheap and reliable energy source. Every hour, the sun radiates more energy onto the Earth than the entire human population uses in one year. Solar energy is a major renewable energy source with the potential to combat many of the challenging issues facing our world today.

Solar power is becoming increasingly popular because it is versatile with many benefits to people and the environment. There are many reasons to increase solar production in the energy mix. Using solar combats climate change and prevents the destruction of habitats. It has limited impact on local communities, and it performs well in many climates.

Large-scale solar photovoltaic (PV) systems (sometimes referred to as solar farms) are relatively new to the landscape. It is natural for communities near solar projects to have questions about possible impacts. We have put together a list of the most frequently asked questions we receive.

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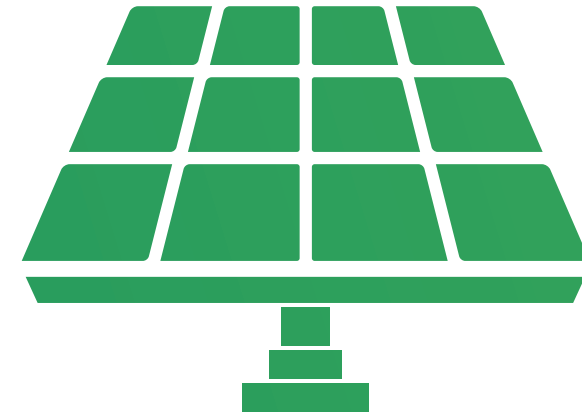
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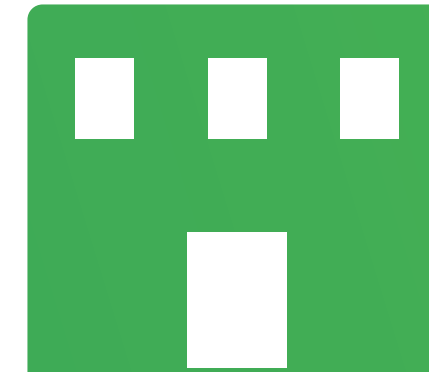
WHAT IS A SOLAR POWER PLANT?



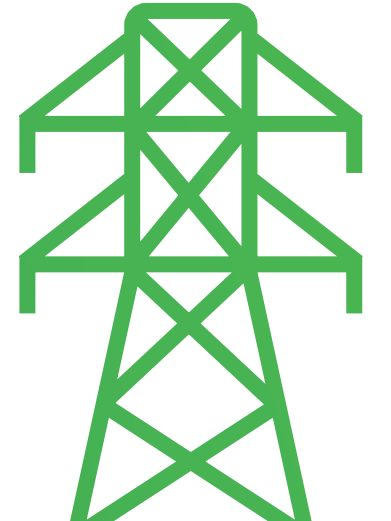
SOLAR PANELS



INVERTERS



TRANSFORMERS



GRID CONNECTION

A solar PV system is basically made up of land, solar panels, a mounting system, inverters, transformers and cables.

Land

A solar farm requires approximately one hectare of land per one megawatt of power generation. In general, we look for approximately 30 hectares of land that has no restrictions and that is close to electricity grid infrastructure.

Solar panels

PV solar arrays are made up of solar panels attached to a mounting structure. Each solar panel contains PV solar cells that convert sunlight into electricity. Inside each cell, there are layers of a natural semiconductor material called silicon. When photons from sunlight strike the solar cells, free electrons are generated. These free electrons flow through the material to produce a direct electrical current (DC). This is known as the photovoltaic effect.

Inverters

The DC current from the solar panels needs to be converted to alternating current (AC) by using an inverter before it can be fed into the electrical grid. Many inverters are placed throughout the solar plant.

Transformers

Transformers boost the lower voltage of the inverter output to the higher voltage of the grid connection point. The

transformer station contains the electrical switchgear which is used to control the electrical equipment in the solar plant.

Cables

Most electrical cables are laid underground. They connect the solar panels and other components. Solar cables are designed to be UV and weather resistant, and we place an extra shield around the short sections of cabling above ground to protect them from animals.

Grid connection

Proximity to a suitable grid connection point is an important consideration when locating a solar plant.

Site

Sites include security fencing, and they may include green setback areas and hedgerows. There are access tracks for small maintenance vehicles to move around the site. Wildlife corridors may divide larger sites to allow the passage

of deer and other large animals. We can break up a site into sections and add recreational areas and public pathways. Sheep grazing is common on our sites.

Where does the electricity go?

The electricity usually gets fed into the local utility grid and distributed in the local area through power lines. Large sites may be connected directly to higher voltage transmission lines which are linked across Europe.

WHY HERE?

Why is the project located here?

We look at many potential areas before we narrow it down to a specific location and hosting community. We first look at demography and topography, local conditions and the surrounding environment. To do so, we carry out a number of environmental and technical studies. Considerations include solar resources, land quality, local residences, local zoning and land use restrictions, proximity to electricity network and grid capacity, visual impact, environmental impact, and potential social and economic benefits to the community. We use specialised tools for geographical information system (GIS) analysis and 3-D terrain-based design. Every proposed project site has been subject to detailed studies and assessments.

Why don't you use rooftops instead?

Rooftop systems are good for powering homes and businesses. Large-scale ground systems are good for powering countries. The two systems differ on three critical points: (1) cost, (2) customisation, and (3) grid stability.

Large scale, low cost of energy

In order to combat climate change, countries around the world must replace massive volumes of oil, coal and gas as quickly as possible with affordable green alternatives. Rooftop solar is not the most effective solution. In any business, as scale of production increases, average costs fall. This is true for solar. Purchasing and installing small portions of panels one house or one business at a time is too expensive per kilowatt-hour. There are also grid connection costs for each system. The kilowatt-hour prices cannot compete in the wholesale electricity market.

Customised versus standardised

Rooftop systems are bespoke solutions, customised to fit building, roof and budget limitations. These limitations affect installation methods, technical designs, hardware requirements and component quality. There are costs associated with electrical and hardware labour, installer's profit, supply chain margins, equipment like scaffolding and cranes, and fees. There

are financing costs and questions concerning insurance, property lien rights and claims, payment priority, loans and mortgages.

Large-scale solar has standardised ground-mount system designs. Mounts have been stripped and simplified to save raw materials and assembly time, and to allow easy upgrade or recycling at end of life. The systems use high quality, durable materials to extend lifetime, reduce maintenance, and to ensure that components retain their value so they can be reused or recycled.

Grid stabilising and balancing

Unlike other power sources, large-scale solar systems can provide stability and reliability to the national power system 24 hours a day. Grid managers must maintain constant voltage and frequency on the electricity grid without spikes or disturbances. Solar PV with smart controls can help regulate voltage and frequency, ramp up and down gradually in steps, and help balance supply and demand, adding more reactive power (pushing real power around the system) or absorbing it when there is an excess. One rooftop system alone does not have the power to stabilise the national grid, and thousands of rooftop installations cannot be managed in the same way as fewer large-scale systems.

We spent many years designing and installing rooftop systems. They are excellent solutions to help cover own consumption needs. We founded Better Energy to get rid of extra costs and customisations and to find a more efficient way to power countries with green energy. Through our experience, we have found the best and most efficient way to truly make a significant green impact on the world is by investing in large-scale solar plants.

What kind of land do you use?

Selecting a suitable land area for a new solar plant is an important decision. We prefer to use large stretches of unused land – land retired from farming to protect groundwater, non-

agricultural, low-grade or unproductive land – but in many cases, this is not an option. By developing a solar plant, we can add value to unused land and help the fight against climate change, while creating long-term havens for wildlife and native plants and benefits for local communities.

Does solar work in cooler climates?

Solar panels will work in any part of the world where there is light. Solar panels need light, not heat, to produce power. In fact, solar systems work more efficiently in cold weather. This is surprising to many people. The efficiency of solar panels (the amount of light they convert to electricity) increases as the temperature decreases. Cold temperatures increase the efficiency of electrical current transmission through the electrical equipment by reducing the resistance of the wiring.

How will you build the solar project?

Solar projects are built in phases. First, rows of steel piles and mounting structures are set up, while cables are placed underground. Next, panels are mounted on the racking, and the inverters and transformers are installed and connected. Finally, the solar project is connected to the grid. Depending on the size of the project, the entire process takes several months.

We generally keep the landscape the way it is, without any land clearing or levelling. Installation can be carried out with small excavators – there is no need for any heavy construction equipment.

How long will the project be here?

Our solar systems are designed to operate for at least 30 years. The project can then be upgraded with new equipment and repowered, or it can be decommissioned and removed.

WHAT WILL I SEE?

What will I see from my property?

What you see depends on where you stand. The location of your property in relation to the project and geography make a huge difference. Later in the process, we can show you potential 3-D layouts of the project and topographic maps of the area. This makes it easier to see the viewing situations from different locations and viewing angles. If you are standing at ground level behind a hedgerow, you might not see anything.

Since each project is unique, we talk with property owners about the layout and how to site and screen the project so it has the least possible visual effect.

What will you do to screen our view?

We often use existing trees and hedgerows or plant new hedgerows to screen the project from neighbouring homes and roads. There can also be a green setback area along the outside perimeter of the site. These green areas also serve as important habitats for wildlife.

Will the solar panels create glare?

Solar panels have an anti-reflective coating to absorb as much sunlight as possible, so they have low reflection levels. They are less reflective than water and ordinary windows, and they are safe to install close to airports and major roads.



Panels are only slightly tilted, approximately 15-20 degrees, so any light they reflect is not likely directed at neighbouring roads and properties. They do not create any glare that could cause a disturbance to people or to wildlife.

What will happen to the landscape?

Together with neighbours and planning authorities, we adapt a project to fit into the landscape in the best possible way. We generally keep the landscape the way it is, without any land clearing or levelling. No concrete foundations are needed for the mounting system. Solar panels are mounted on a metal framework that follows the natural features and contours of the land.

Wildlife corridors may divide larger sites to allow the passage of deer and other large animals. We can break up a site into sections and add recreational areas and public pathways. Solar plants can improve biodiversity, so there may be more birds, insects and pollinators to see in the landscape.

At the end of the project life, the structures and panels can be removed. Once the equipment has been removed, the land can be restored to its former use. Farmers can grow crops or graze livestock.

RELIABILITY AND EFFICIENCY

Is solar power an expensive source of energy?

Solar is the cheapest source for new electricity generation available today. Solar power prices have dropped dramatically in the last few years, so solar power costs less than most people realise. Large-scale solar PV is now cheaper than fossil fuels like coal or gas. Better Energy can produce solar power without subsidies.

How efficient is solar power?

Solar projects are highly efficient at providing power at a low price per kilowatt-hour. Solar energy does not need to be created, just harvested. There is an unlimited supply of solar energy, and it does not need to be located, mined, excavated, chemically processed or burned. Solar power is carbon free and solar panels pay back their greenhouse gas emissions after two years. Solar projects use a relatively small amount of land in relation to the major contribution made as a 30+ year clean energy source.

Are solar projects driving the need to upgrade the grid? Raising electricity prices?

Growing populations and the rising use of electricity are driving the need to upgrade the grid. In many countries, transmission and distribution systems are decades old and need to be expanded and modernised. These investments and upgrades would be necessary even without adding new solar power plants.

In some remote areas, network upgrades are needed to handle new solar projects. We try to locate solar projects where they can be connected to the grid without network upgrades.

Will solar projects make the grid unstable?

No, recent reports show that solar helps keep the grid stable and supports the security of supply in Europe. Different types of renewable energy sources working together can ensure a stable supply. For example, solar and wind complement each other. As the sun goes down, wind generally increases. No single technology can meet all energy needs, so a mix of technologies is needed.

Unlike other power sources, large-scale solar systems can provide stability and reliability to the national power system 24 hours a day. Solar PV with smart controls can help balance supply and demand, adding more reactive power (pushing real power around the system) or absorbing it when there is an excess. Solar can quickly respond to changing demand because the amount of electricity that is being fed into the grid can be quickly adjusted. Conventional power plants are typically slower to start up and shut down.

Is solar power predictable?

Solar power is created by sunlight, and sunlight is very predictable with respect to location and season. Modern weather forecasting also helps to accurately predict the generation of solar power.

Since solar power plants are spread out geographically, local weather differences do not lead to major differences in solar power production throughout a country as a whole. We design our systems for each location to bring high reliability and maximum energy yield.

Do solar panels work when it's cloudy? At night?

Solar panels also work when the weather is cloudy. They do not need direct sunlight. Solar panels produce electricity from the photons, or light particles, found in natural daylight. On a cloudy day, there is still light available. Therefore, solar panels can still produce electricity from indirect light on cloudy or rainy days.

If there is no sunlight, and it is completely dark, they do not work.

How much maintenance do large solar projects require?

Solar projects require little maintenance. In the northern European climate, rain keeps the panels clean, so they do not have to be washed. Solar energy systems do not have any moving parts, so parts do not wear out quickly. Routine maintenance will be carried out on the equipment. If there are no sheep grazing on site, the grass and vegetation will be trimmed by mowers a few times a year.

THE ENVIRONMENT

What happens to the wildlife?

New studies show that solar projects can actually improve local biodiversity, with many benefits to wildlife. Solar plants can provide protected spaces and important habitat areas for native wildlife, birds and pollinators like bees and butterflies for over 30 years. The shade under the rows of modules protects plants and animals from weather conditions, and the ground stays relatively undisturbed for decades.

Beehive boxes can be placed at the edge of solar plants. Pollinators like bees and butterflies thrive in this quiet environment that is rich in plant life and free from pollutants and chemicals. If relevant, we create wildlife corridors and passages at large project sites to allow the movement of animals through the project.

Do solar projects make any noise?

A solar project is a very quiet neighbour. Solar panels do not produce any noise when they are in operation. The inverters that change the current of electricity generate a soft hum, but they are housed inside a cover and cannot be heard past the property lines of the site. There is no daily traffic to and from the site once it has been built. Solar panels are the quietest way to make energy.

Will you spray with pesticides and other chemicals?

No pesticides or chemicals will be used on our sites. We are careful to keep areas with pollinator-friendly grasses or flowers. We plant ground cover that is low-growing and requires little maintenance. Often, sheep graze in our solar plants, and this keeps the grass down naturally.

Can agriculture continue in a solar plant?

Yes. Agriculture and energy production can be combined on the same site. Over 95% of a solar park remains open to agriculture and the land can continue to be used for growing vegetation or grazing livestock according to organic principles. The same land area can be used for multiple purposes and productions.

How do projects affect groundwater and soil?

Our solar projects will not create any contamination to the water or land. The solar panels are mounted above ground, so only a very small part of the system is in contact with the ground. Our sites always have native grass or plant ground cover and they are free from pollutants and chemicals. The ground cover allows the soil to absorb water and nutrients during the life of the project. The soil is allowed to “rest” for typically 30+ years. Solar plants protect groundwater, prevent soil erosion and can restore degraded land.

Do solar systems have a high carbon footprint? Payback time?

In the solar PV industry, we often use the term energy payback time (EPBT). The energy

payback time of a power generating system is the length of time required for the system to generate an amount of energy equal to the energy used in manufacturing and lifetime operation of the system.

The payback time varies depending on the geographical location of the PV system due to the variation in solar irradiation. According to a study presented in March 2019 from Fraunhofer Institute, one of the most renowned research institutes within the solar industry, the expected EPBT in Northern Europe is around 2 to 2.5 years. The expected lifetime of our solar projects is 30+ years, so they will far outlive the payback time. In addition, for 30+ years, they will be replacing more carbon intensive sources with clean, renewable energy.

Do PV panels use up a lot of raw materials?

Solar panels are mostly made up of silicon, copper wires, glass and aluminium. Silicon is the second most abundant element on Earth (after oxygen). It is found in many types of rocks and sand. Copper, glass and aluminium are also readily available. All these raw materials can

be recovered and reused at the end of a solar panel’s useful life. Europe has strong and clear rules to support the PV recycling process to ensure that these materials are reused.

What happens at the end of a solar project’s life?

The project life of solar power plants is typically 30+ years. Projects can be upgraded and repowered, or they can be decommissioned and removed.

Solar energy facilities can be dismantled and completely removed without any permanent damage to the land. In general, the dismantling of the system is performed in reverse order to the installation. No structures are left behind. We recycle as much of the system as possible. Any disposal of waste or recycling is done in accordance with local laws and requirements.

Once the equipment has been removed, the land can be restored to its former use. Farmers can grow crops or graze livestock.

LOCAL ECONOMY & EMPLOYMENT

What benefits do solar farms bring to the community?

Projects create opportunities to support the local economy, education and tourism. Solar panels work automatically and do not require staff to operate, so solar projects do not create many permanent jobs. However, solar projects add dynamic to the local community. Having a green profile attracts businesses and increases tourism.

We use local expertise and resources where possible to create jobs and support the local economy. Local suppliers and resources might be used for land management and ground works. Examples of local job opportunities could be establishing roads, fencing and hedgerows, waste management, site security, grounds upkeep and electrical work.

Solar power projects also serve as a living classroom for visitors to learn about renewable energy, solar technology, ecosystems and biodiversity conservation. We are open to ideas from local communities on how we can have a positive impact by supporting local education programmes and energy tourism. We collaborate on innovative products, financing, initiatives and programmes. We give members of a community the opportunity to become involved in an open and fair process to bring social, environmental and economic benefits to the area.

Will the solar project affect property values?

Each property must be evaluated on a case-by-case basis, considering each specific location and scenic context. The value of your property depends on many factors. Better Energy works on a detailed level with the placement of each site, adding green setback areas and adjusting site boundaries in

agreement with property owners. Often, a well-screened site cannot be seen unless you are standing next to it. Solar systems operate silently and safely. Solar projects can drive community development and potentially provide funding for local schools and services, which positively benefits all property owners in the local community.

How do solar projects affect local residents?

Solar systems are clean and safe and produce power with no noise, no emissions, no waste and no water pollution. Rather, solar systems boost local plant and animal life, which can be beneficial and enjoyable to the community. Moreover, we look for additional ways to share benefits with the local community. We give members of the community the opportunity to be involved in an open and fair process to bring social, environmental and economic benefits to the area. Local residents will benefit from a less polluting energy source for over 30 years.

Do solar projects need a lot of subsidies?

Better Energy has worked intensively the past years to drive down the cost of solar energy by cutting costs and complexity in our value chain, technology and design. Our solar energy projects can produce affordable green energy with no government support. Non-subsidised solar energy is already cheaper than electricity from the grid in many European countries. Solar systems are being produced on a larger scale, and large-scale production of solar panels has resulted in cheaper prices. More knowledge of solar systems, competition on the market and technical improvements have also led to a lower cost of electricity.

HEALTH & SAFETY

How safe are solar farms?

Solar is one of the safest energy generation technologies in the world. Solar plants do not pose any health dangers. Solar PV technology has been around since the 1950s, and its potential impacts have been studied throughout the years. Solar panels and components have become more efficient, more connected and monitored through IT and easier to recycle than years ago. Large-scale solar projects may be new to the landscape, but the science behind the technology is well known and documented to be safe.

Do solar PV panels contain toxic substances?

Our solar PV panels do not contain any toxic or harmful substances. The solar cells are made from silicon, a common element found in rocks and sand, and they contain no heavy metals or toxic substances. The solar cells are covered with a thin layer of tempered glass, a type of safety glass that has an anti-reflective coating. There are no substances that can evaporate, leak or dissolve in water, so they create no emissions. The panels are well sealed from the environment and designed for a long life.

How safe are the other components?

Other major components include the mounting system, cabling, inverters and transformers. The mounting structure is made from galvanised steel and aluminium, which are both extremely common and safe building materials. Most cables are made of

copper and most cables are laid underground. Solar cables are designed to be UV and weather resistant, and we place an extra shield around the short sections of cabling above ground to protect them from animals.

The inverters that change the current of the solar generated electricity are housed in weather-proof covers that protect the electronics from the elements. The transformers, which increase the inverter output voltage to the voltage of the utility connection point, do contain a traditional mineral oil used for cooling. However, the transformer sits down into a completely sealed enclosure, so there is no danger of leakage.

What are the health impacts of project installation/construction?

The project installation and construction phases do not require any toxic chemicals, processes or heavy construction equipment. Fencing is built around the perimeter. Piles are driven into the ground and narrow trenches are dug for the underground cabling. The solar panels are bolted to the steel mounting structures and the cables are connected. Inverter and transformers are installed. The system is only turned on after the components have been tested. System installation and construction requires a great deal of electrical expertise and experience, but it does not impact health negatively.

Are there any risks from electric or magnetic fields?

The electrical and magnetic fields generated by solar panels and their inverters are lower than background electrical and magnetic fields created by other devices that surround our daily lives, such as computers and mobile phones. They emit fields that are several hundred times less than recommended exposure limits and lower than exposure found inside a typical home.

Do solar panels interrupt radio frequencies?

No, solar panels emit no energy radiation and emit no frequency which could affect radio equipment, mobile phones, heart monitors, TV reception or Wi-Fi.

be **IMPACT THAT
MATTERS**

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