



Powering Agriculture

A guide to reducing energy costs,
supporting diversification and
strengthening sustainability with solar.



Who this guide is for

This guide is for operators considering rooftop, ground-mount and barn-based solar PV to generate power for their own operation on agricultural sites.

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“Agriculture has always been about adapting to change, but the pace and scale of today’s challenges are greater than ever. From volatile energy prices and climate-related losses, to shifting subsidy schemes and growing pressure to diversify, the sector is under pressure from all sides. Yet these challenges also bring opportunity.

Energy is one of the most significant and unpredictable overheads for agriculture. Grain dryers, refrigeration units, poultry sheds and irrigation pumps all place a heavy demand on power and rising electricity prices can quickly erode tight margins. For diversified agricultural businesses, such as those running visitor attractions or accommodation, costs can be even higher.

Many agricultural businesses have already embraced renewable energy in the UK, with solar PV already playing an important role in the sector. In 2023/24, three-quarters of specialist pig and poultry units in England generated solar energy on site. Likewise, almost a third of general cropping businesses and more than a quarter of horticultural holdings also used solar energy, with many producing over 300kWh per hectare.

As well as ground mount options, installing solar PV on barns, outbuildings and other agricultural infrastructure allows businesses to generate renewable, reliable and cost-efficient power on site. That power cuts costs, reduces reliance on volatile markets and creates opportunities to support new income streams, from farm shops to EV charging for visitors.

At Geo Green Power, we’ve worked with the agricultural sector for over a decade. From arable and dairy enterprises to diversified visitor attractions, our installations are helping businesses control costs, improve sustainability credentials and make better use of their land and buildings.

This guide brings together sector insights, practical advice and real-world examples to help agricultural owners, managers and operators explore the potential of solar energy for their sites.”

“Solar can turn one of agriculture’s most unpredictable overheads into a source of stability and opportunity.”

James Cunningham,
Managing Director,
Geo Green Power



The agricultural energy challenge

Agriculture is energy-intensive and seasonal by nature. Equipment use peaks at harvest, livestock housing has varying demands throughout the year in terms of heating and lighting and irrigation becomes essential during hotter, drier summers. Together, UK agricultural businesses consume around four terawatt hours (TWh) of electricity each year¹ – and that figure will likely rise with diversification and electrification.

Sources of energy pressure



High-energy equipment

Subsectors such as pigs, poultry and horticulture show the highest electricity use per hectare, with more than 150kWh/ha recorded on over half of these farms.² Intensive processes, such as ventilation, refrigeration, heating and drying, make these businesses particularly vulnerable to energy costs.



Loss of subsidies

The phase-out of direct EU payments under the Basic Payment Scheme has created funding uncertainty. At the same time, new Environmental Land Management schemes focus more on environmental outcomes than on overhead relief.⁴ Cutting costs is therefore one of the most direct ways to protect margins.



Rising and volatile energy prices

UK industrial electricity prices are consistently among the highest in Europe, at times more than double the EU average.⁵ This volatility leaves agricultural businesses vulnerable to unpredictable changes in costs, affecting their long-term planning and resilience.



Climate change impacts

More frequent droughts, heatwaves and wetter harvests are increasing demand for pumps, fans, dryers and cooling equipment. Spring 2025 was the warmest and sunniest on record, ranking as the sixth driest spring in the UK since records began in 1836, with just 128.2mm of rainfall – approximately 40% below the long-term average and the driest spring in more than 50 years.³ As weather extremes intensify, they put additional strain on farm energy demand.



Diversification energy loads

Increasingly, agricultural businesses are branching into holiday lets, play barns, cafés, retail spaces and small-scale food production of artisan products. These activities increase energy load such as refrigeration for shops, heating and hot water for accommodation, power for kitchens and EV charging for visitors.



Sustainability pressures

Supply chain partners are increasingly required to provide evidence of sustainable production. For example, the UK's 10 largest retailers have made over 600 climate and sustainability commitments in the last decade and are under pressure to show reductions in Scope 3 supply chain emissions.⁶ Additionally, farms that can evidence environmental improvements can benefit from financial incentives such as those available through Tesco and Müller's Future Dairy Partnership.⁷



“Energy costs are no longer just an operational concern for agriculture – they’re a strategic risk.”

James Cunningham, Managing Director, Geo Green Power

¹ AMA Research (2024), Non-Domestic Rooftop Solar PV Market Report

² Defra, Energy use on farms in England 2023/24, 21 August 2025

³ <https://www.metoffice.gov.uk/about-us/news-and-media/media-centre/weather-and-climate-news/2025/double-record-breaker-spring-2025-is-warmest-and-sunniest-on-uk-record>

⁴ Defra, Monitoring the agricultural transition period in England, 2023/24, February 2025

⁵ Office for National Statistics (ONS), released 19 May 2025, ONS website, article, The impact of higher energy costs on UK businesses: 2021 to 2024

⁶ <https://foodfoundation.org.uk/press-release/uks-10-major-supermarkets-failing-meet-their-climate-commitment-promises>

⁷ <https://www.tescopic.com/tesco-farmers-set-to-benefit-from-financial-incentives-to-achieve-environmental-goals/>

Why solar, why now?

Solar is gaining momentum in agriculture as it aligns with the sector's needs: cost control, energy resilience and stronger environmental performance.

The latest government figures show that in 2023-24, 32% of agricultural businesses in England generated renewable energy, with 27% generating solar energy.⁸ Adoption is strongest in specialist pig and poultry operations, where three-quarters of holdings now use on-site solar PV; however, it is also well established in general cropping and horticulture. Of those with solar, 84% have installed on farm building rooftops. The primary reason for investing is to reduce energy bills, with many also citing the ability to generate their own electricity and protect their business against future price increases.

Why solar makes business sense



1. Technology improvements

Panel efficiency has improved significantly while installation costs have fallen by over 80% in the last decade. Agricultural businesses that considered solar 10 or 15 years ago will now find today's systems are even more affordable, productive and easier to integrate.



2. Make use of existing space

Thousands of agricultural buildings across the UK, including barns, outbuildings, and grain stores, provide ideal, underutilised rooftops for solar PV. Installing panels does not interfere with day-to-day operations and, since 2023, larger rooftop systems can proceed without planning permission in England.



3. Protect margins and control costs

Three-quarters of farms that have installed solar PV say reducing energy costs was their main reason for doing so.⁹ With UK industrial electricity prices rising by more than 70% between 2021 and 2023, solar PV provides farms with greater cost certainty. Through financing models such as Power Purchase Agreements (PPAs), many can lock in lower, stable energy costs for 25 years or more.



4. Support diversification

From holiday lets and cafés to retail units and visitor attractions, diversification brings higher electricity demand. Solar PV can provide a dependable, low-cost energy source that supports new ventures and enables features such as EV charging, making sites more attractive to visitors and tenants.



5. Free up budget for investment

By reducing reliance on the grid, solar PV can create immediate operational savings. When installed under a PPA, it requires no upfront investment, freeing budget for other farm priorities such as technology upgrades, automation or new diversification projects.

Why farms have chosen to install solar PV

- 77% of farms installed solar to cut bills
- 45% cited selling electricity as a motivator
- 42% wanted protection from future energy price rises
- 25% were motivated by environmental impact

Source: Defra, Energy use on farms in England 2023/24, 21 August 2025

⁸ Defra, Energy use on farms in England 2023/24, 21 August 2025

⁹ Ibid

¹⁰ Ibid



6. Meet sustainability demands

More than a quarter of farms adopting solar said environmental impact was a key driver,¹⁰ showing that sustainability pressures are becoming embedded in business decisions. Retailers and supply chain partners are increasingly requiring measurable evidence of low-carbon production or rewarding improvements. Solar PV is one of the most direct ways agricultural businesses can reduce emissions, demonstrate sustainability credentials and strengthen relationships with buyers.

Why now?

- Protect against volatile electricity prices
- Support investment in automation and electrification
- Secure electricity at a fixed rate
- Respond to sustainability expectations from buyers and consumers
- Generate value from unused roof space
- Improve business resilience



7. Smarter, data-led energy strategies

Modern solar systems do more than generate electricity. With real-time reporting and intelligent monitoring, farms can track generation, use, import and export across one or multiple sites. Doing this enables strategic energy management, reduces waste and supports long-term planning. Integrated systems also allow:

- Battery storage, so surplus power can be used when prices are high
- Optimised EV fleet charging, prioritising on-site needs before export
- Proactive maintenance, detecting issues early to avoid downtime
- Scalable planning, highlighting opportunities for future expansion



8. Future-proof against grid pressures

National Grid projects that the electrification of transport and heat will put increasing strain on local infrastructure. By generating power on-site now, agricultural businesses can reduce their exposure to future grid constraints and secure capacity for their operations.

Funding options

One of the most significant changes in the adoption of solar PV in agriculture is the flexibility of today’s funding models. Solar PV is no longer reserved for large landowners with deep capital reserves. Whether you are a farm owner looking to cut energy bills, a tenant farmer managing day-to-day costs, or an estate diversifying into tourism or retail, there are accessible routes to solar PV that require little to no upfront investment.

Self-funded

The farm owner (or, in some cases, the tenant) funds the system directly, either from cash reserves or through asset finance, such as a lease or loan. In both cases, the purchaser retains full ownership. All energy savings, carbon reductions and system benefits remain with the business, along with any depreciation or tax incentives.

Best for: Farm businesses or estates with capital available, or those investing under a sustainability or net-zero programme.

Advantages:

- Full system ownership and long-term savings
- Immediate reduction in grid electricity spend
- No third-party involvement or interest charges
- Carbon reduction and sustainability benefits

What is a sleeved PPA?

A sleeved PPA is a variation of a standard PPA, where electricity is purchased directly from a renewable generator but delivered through the farm’s existing energy supplier.

This provides the business with the stability of a long-term renewable energy price, along with the convenience of a supplier managing delivery, billing and balancing.

Sleeved PPAs can be attractive for sites that want a guaranteed renewable supply.

Power Purchase Agreement (PPA)

A third party funds, owns and maintains the solar PV system. The farmer or site operator purchases the electricity it generates at a fixed rate, typically below the market rate. These agreements generally last 10–25 years, offering long-term stability in energy costs.

Best for: Farms and estates seeking energy savings without self-funding, or landlords wanting to offer affordable energy to tenants.

Advantages:

- No upfront cost for the farm or tenant
- Fixed, below-market energy pricing
- Zero maintenance responsibility
- Optional system buyout at a later stage
- Carbon reduction and sustainability benefits

Grants and incentives

In some cases, sector-specific grants may cover part of the system cost. While past subsidies have declined, new Defra and regional programmes occasionally support sustainability-linked projects.

Best for: Farms and estates eligible for government or local sustainability support.

Advantages:

- No repayment
- Same benefits as CapEx without the upfront cost
- Can be combined with other incentives
- Carbon savings

What’s right for your farm?

The right funding option depends on the ownership structure, tenancy agreements and how energy costs are managed between the landlord and occupier. Whether you are running a family farm, managing an estate or operating as a tenant, Geo Green Power can help you structure the right solution with clear financial modelling, risk assessments and options that align with your business case.

	CapEx	PPA	Asset Finance	Grants
How much of the initial investment do I pay?	100%	0%	20%*	100%**
Do I own the system?	Yes	No	Yes	Yes
Will there be a reduction in energy costs?	Yes, significant	Yes, good	Yes, significant	Yes, significant
Do I pay maintenance costs?	Yes	No	Yes	Yes
What is the typical term?	N/A	10 to 15 years, but can be up to 25 years	4 to 7 years, but can be between 2 and 10	N/A
Do I pay interest?	No	No	Yes	No
Will credit be required?	No	No	Yes	No
What is the set up time?	Quick	Moderate	Moderate	Slow
What happens at the end of the term?	N/A	Option to purchase system or end contract	Full ownership	N/A

* Typically the VAT value, which you can claim back in the next quarter

** This is the same as CapEx and whilst you pay for 100% of the system, a grant or subsidy goes towards that investment





How solar PV delivers across agriculture

Agriculture encompasses a diverse range of business types, each with unique energy demands. Solar PV provides benefits across the board by reducing electricity costs, supporting diversification and strengthening sustainability performance.



Dairy and livestock enterprises

- Energy use patterns vary significantly between traditional and robotic milking systems. Traditional parlours operate two to three times a day, creating short, intense peaks in consumption followed by long periods of low demand. By contrast, robotic milking systems run continuously, with cows choosing when to be milked. This steady, around-the-clock operation aligns more closely with solar generation patterns, enabling higher levels of self-consumption and better overall savings.
- Additional peak loads occur during milking and in colder months when housing and heating requirements rise.
- Increasing scrutiny over carbon footprint from milk buyers and processors is driving investment in renewable energy and low-carbon technologies.

How solar helps:

Rooftop solar PV on barns cuts running costs for core equipment. Combined with battery storage, solar PV can also support refrigeration and ventilation during overnight hours. On-site generation helps meet sustainability requirements and improves resilience to volatile grid prices.



Horticulture

- High, continuous demand for heating, cooling, water pumping and lighting
- Thin margins and rising energy costs put businesses under pressure
- Increasing sustainability requirements from supermarkets and food processors

How solar helps:

Solar PV offsets significant daytime loads, particularly for lighting and pumping.



Diversified sites

- Electricity demand extends beyond farming to cafés, shops, holiday lets and EV charging
- Year-round loads from heating, hot water and hospitality services
- On-site manufacturing and production of artisan food products
- Visitors and partners expect demonstrable sustainability commitments

How solar helps:

Rooftop and ground-mount solar PV systems provide reliable, low-cost electricity to power diversification activities. This strengthens margins for hospitality and retail activities, making sites more attractive to visitors and tenants across their sites.



Poultry and livestock

- Energy demand varies across livestock enterprises. Poultry and dairy units typically have continuous use for heating, ventilation, automation and lighting, while beef and pig farms operate at lower overall electricity loads.

How solar helps:

Solar PV reduces daytime energy costs for animal housing where ventilation and heating loads are significant. With fixed-price PPAs, operators can control costs and improve sustainability reporting to retailers.



Arable farms

- Significant seasonal demand for grain drying and irrigation
- Peak energy use during harvest, especially in wet years
- Larger buildings and stores provide strong rooftop potential

How solar helps:

Solar PV offsets grain drying and irrigation costs, particularly in summer when solar generation aligns with pumping and drying demand. Systems can be sized for seasonal peaks and supplemented with battery storage.

Tailored solar solutions for your business profile

The agriculture sector is well-positioned to benefit from solar energy, but no two operations are alike. We take the time to understand your site, energy profile and business priorities, then design the most effective solution to meet them.

Rooftop solar

Rooftops are the most common application in the agricultural sector, with most sites having extensive, underused roof space that is ideal for solar PV. Rooftop systems deliver energy directly to the building below, with minimal disruption to site operations.

Why it works:

- Makes the most of your building footprint
- Scalable to match daytime energy loads
- Minimal operational disruption during installation
- Suitable for both owned and tenanted sites, including via PPA

Ground mount systems

Where rooftop capacity is limited or already used, ground-mounted systems provide a flexible alternative. Ground-mount systems can be installed on less productive land or planned to allow livestock to graze beneath the panels, providing shade. Ground-mount can also support diversification projects, powering visitor facilities, EV charging or energy-intensive processes.

Why it works:

- Makes use of underutilised or less fertile land
- Supports dual use, such as grazing beneath panels
- Allows optimum panel orientation for maximum generation
- Offers an option for estates or farms seeking larger-scale renewable generation beyond rooftops

“From site surveys to futureproofing, we build systems that work for your business, not just the available roof space.”

James Cunningham, Managing Director, Geo Green Power

Solar car ports & EV integration

With rural diversification and tourism growing, EV charging for visitors, as well as tenants and staff, is a consideration for future-focused operators. Agricultural sites with car parks, visitor centres, or machinery storage areas can unlock additional value by installing solar car ports that provide both power and shelter.

Why it works:

- Dual-use: generate clean electricity and provide shade or weather protection
- Powers EV charging for visitors, tenants or on-site vehicles
- Demonstrates sustainability to supply chain partners and customers
- Supports diversification ventures such as holiday lets or farm shops

Battery storage

Storing solar PV energy extends its value by making it available during periods of high demand or low sunlight. Farms with seasonal peaks, such as grain drying and irrigation, can also use batteries to help maximise solar use during those activities. For continuous operations like dairy or poultry, they provide reliable backup and greater protection from energy price volatility.

Why it works:

- Store excess solar PV generated during the day for use in the evening or at night
- Shift demand to avoid high grid prices
- Support backup power for critical equipment (e.g. refrigeration, milking systems, ventilation)
- Increase resilience, particularly in rural areas with weaker grid infrastructure systems during outages

The business case for solar investment

An at-a-glance overview of the strategic benefits of solar for the agricultural sector.

Strategic benefit	Why solar
Energy cost savings	Cut electricity bills for core processes (grain drying, dairy, poultry sheds, refrigeration). Secure long-term stable pricing via Power Purchase Agreements or self-funded systems.
Zero CapEx installation	Access solar PV through Power Purchase Agreements with no upfront cost. Benefit immediately from lower bills and carbon savings.
Business continuity	Installations are non-disruptive to day-to-day farming operations. Systems can be installed on barns, grain stores or outbuildings with minimal disruption.
Carbon & ESG performance	Reduce Scope 2 emissions, improve sustainability reporting, access financial incentives and strengthen relationships with retailers and processors demanding low-carbon production.
Resilience	Reduce exposure to price volatility and grid constraints. Supports diversification (holiday lets, retail, visitor attractions) and future electrification (EV charging, heat pumps).
Scalability	Expand over time as energy needs grow. Suitable for phased rollouts across multiple sites.
Commercial edge	Strengthen sustainability credentials. Meet buyer requirements, retain contracts and attract new customers with demonstrable low-carbon production.

Why partner with Geo Green Power?

Your energy strategy deserves more than a one-size-fits-all solution.

Choosing solar PV is a strategic business decision, and the partner you select to deliver it can significantly impact the long-term success of your investment. At Geo Green Power, we don't just design and install systems. We build long-term relationships based on quality, transparency and performance. Our approach is pragmatic, data-led and focused on outcomes that work for your business.

We understand agriculture

We've been delivering solar projects for UK farms of all sizes for over 15 years. We recognise the energy demands and commercial pressures facing the agricultural sector, from intensive

processes such as grain drying, refrigeration, and livestock housing to the challenges of increased automation, diversification, grid constraints and sustainability targets. With over a decade of experience delivering solar PV for farms and agricultural projects, we provide tailored solutions that work for both traditional businesses and diversified sites.

Built on trust and transparency

Everything we do is grounded in honest advice, clear timelines and upfront pricing. We don't push what isn't needed, and we don't disappear after the install. Our reputation is built on long-term performance and personal accountability - values that matter just as much to us as they do to our clients. performance and personal accountability - values that matter just as much to us as they do to our clients.

A partner from feasibility to long-term support

We support you at every stage:



Feasibility and business case

We use your energy data, production profile, and site plans to develop a tailored solar proposal - including cost, projected output, return on investment and carbon impact.



Design and installation

Our in-house design and engineering team will plan the optimal system for your business. We handle Distribution Network Operator (DNO) applications, compliance, safety, and scheduling around your operations.



Monitoring and maintenance

Post-installation, we provide ongoing monitoring, servicing and performance reports. We also offer annual health checks and issue detection to ensure your investment continues to generate a return.

We promise to:



Take the time to understand your business, energy needs and priorities



Provide straightforward, honest advice



Communicate clearly and regularly throughout your project



Deliver safely, on time and budget



Support your system's performance long after installation

Our accreditations



"We don't just fit panels. We help our customers build energy strategies that support resilience, reduce emissions, and deliver long-term value."

**James Cunningham, Managing Director,
Geo Green Power**



Red House Farm

About the business

Red House Farm in Doncaster is a progressive agricultural business that specialises in producing high-quality hay and haylage for the equine market.

Red House Farm was already utilising renewable technology to diversify its farm operations, specifically using a ground-source heat pump to heat barns for drying grass products. However, owner Michael Woolhouse was keen to investigate another source of renewable energy to further improve the farm's sustainability and reduce its reliance on the grid.

Why solar PV

The farm had completed two previous solar PV projects before embarking on its third and largest installation with Geo Green Power.

Michael Woodhouse added: "I knew that solar would work well alongside the existing ground-source heat pump and there would be a good return on investment from using our own energy, generated on site, to run the heat pump rather than purchasing this energy from the grid."

The system

 **Solar System Size: 1,088kWp**

The results

 **Annual Output: 1,000,000kWh**

 **Annual CO2 Saving: 250 Tonnes**

Supplies a significant proportion of the farm's electricity needs

A word from our client

"I knew that solar was good for cutting costs, so when I began thinking about adding a renewable energy source to the farm, solar was the first thing that came to mind."

Michael Woolhouse, Property Owner



Bluebell Dairy

About the business

Bluebell Dairy is a working dairy farm and visitor attraction, producing award-winning ice cream, operating a café, and welcoming thousands of visitors each year. Sustainability is key to the brand and central to its supply contracts, including the National Trust.

Why solar PV

To reduce overheads and deliver on sustainability commitments, Bluebell Dairy turned to solar PV as a renewable and cost-effective solution that could support both its farming and visitor operations.

The system

 **Solar System Sizes: 210kWp**

The results

 **Annual Output: 188,128kWh**

 **Annual CO2 Saving: 47 Tonnes**

 **Expected Payback Period: 4-5 years**

Enabled the dairy to promote itself as a sustainable producer and retain major contracts

A word from our client

“Geo Green Power have been absolutely excellent at every stage and completed the installation much quicker than we expected. They have helped us sort out the connection back to the grid and our electrical system on site. We can’t wait to see how it works and how it goes, and we can’t fault them at all, they’ve been great.”

Oliver Brown



Featherstone House Farm

About the business

Featherstone House Farm in Nottinghamshire, run by farmer Mark Strawson, is committed to improving sustainability and tackling rising energy costs. After first working with Geo Green Power in 2021 to re-install panels fitted by another contractor, Strawson was impressed by the team's expertise. This led to a 2MW ground-mount installation in 2022, followed by an extension in 2023 and a 330kWp rooftop system in 2024.

Why solar PV

Seeking to cut costs and reduce emissions, the farm invested in solar PV to power operations sustainably. The 2.8MW system now generates around 2.38 million kWh of electricity each year, cutting 595 tonnes of CO2 - equivalent to removing 119 petrol cars from the road.

The system

 **Solar System Size: 2.8MW**

The results

 **Annual Output: 2,380,000kWh**

 **Annual CO2 Saving: 595 Tonnes**

A word from our team

“This was an exciting project for Geo Green, delivery a large solar project for a customer we’ve worked closely with for over a decade. Working with customers like Strawsons is a real pleasure and their enthusiasm for renewable energy, and reducing their carbon footprint, is also inspiring!”

James Cunningham, Managing Director



Sutton Farm

About the business

Sutton Farm is a family-run arable business looking to improve its long-term resilience. Faced with energy-intensive operations, particularly grain drying, the farm sought to bring more of its energy supply under its control.

Why solar PV

After considering installing a windmill or a digester, owner Peter Wilkinson opted for solar energy to take control of the farm's electricity generation.

The system

 **Solar System Size: 450kWp**

The results

 **Annual Output: 297,000kWh**

 **Annual CO2 Saving: 74 Tonnes**

Strengthens resilience against grid volatility

A word from our client

“We were keen to generate our own power on the farm. After finding Geo Green Power in the NFU magazine, we contacted the company and arranged for them to install solar panels on the roof.”

Peter Wilkinson, Property Owner



"Thank you for taking the time to read our Powering Agriculture guide.

At Geo Green Power, we've delivered commercial solar systems for more than 15 years, and, in that time, the conversation has completely changed.

What was once seen as a forward-looking sustainability choice is now a business necessity. Agricultural enterprises are facing persistent energy price volatility, increased seasonal demand, loss of subsidies and growing scrutiny from supply chain partners and regulators.

We understand that investing in solar PV isn't just about the technology, it's about building resilience into your operations, cutting costs and creating confidence in your long-term energy planning. Our approach is designed to make that process straightforward, tailored and commercially sound from day one.

We don't believe in one-size-fits-all solutions. We work closely with farm owners, managers and diversified rural enterprises to understand energy profiles, land and building constraints, and commercial goals, before designing the right system. Whether you want to explore options for barns, ground mount or diversification projects, or build the business case, we're here to support with real numbers and real experience."

**James Cunningham, Managing Director,
Geo Green Power**