

Subsidy Free Solar:

A guide to some recommended options in Greater Cambridge



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1. Summary

[Carbon Neutral Cambridge](#) strongly supports the principle of increased provision of renewable power, including on and offshore wind, solar and energy storage, alongside reductions in consumption and increased energy efficiency. This is vital to avert a climate catastrophe.

Large scale installations are often more cost effective than small ones, but they must be done right.

The first priority for solar photovoltaic (PV) installations, is to site panels on existing buildings, particularly ones that will use at least 50% of the power produced by the panels. Although ground mounted installations are usually cheaper and can be much larger, these should in principle only be on lower value land, or for dual use for power generation and agriculture or biodiversity enhancement.

2 National overview

From a National Infrastructure point of view, it is sensible to site renewables in a range of locations across the country in order improve continuity of supply. The East of England is quite a good location for photo-voltaic solar (PV) because it's relatively sunny, while proximity to the national transmission grid at reduces costs and losses.

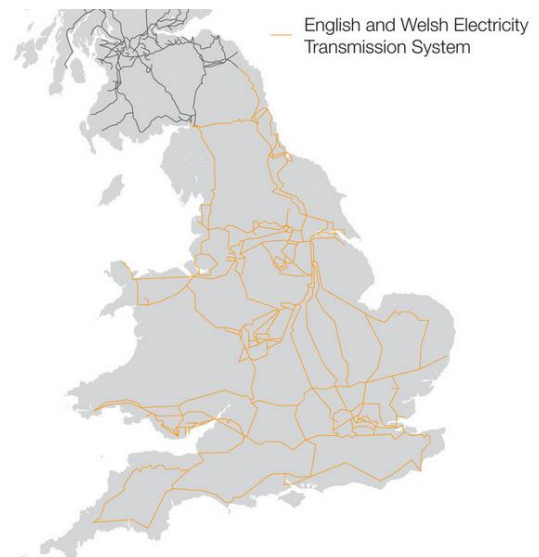
Grid capacity constraints can be a problem, particularly in outer Cambridge. Central Cambridge has fewer grid constraints, while the rural areas further from Cambridge have fewest constraints. Detailed maps are available by registering¹ with our District Network Operator, UK power networks, but (frustratingly) they do not allow us to reproduce the map here

These capacity constraints can be overcome where much, or all, of the power that's generated will be used by the building. Storage (for example in batteries, or sometimes as heat storage) can improve utilisation.

In general we support the principle of providing energy storage and grid balancing services (i.e. batteries) as this will be a vital part of a decarbonised electricity supply.

However, site selection is critical: the first choice must be to site panels on existing buildings.

Although ground mounted installations are usually cheaper and can be much larger, these should in principle only be on lower value land, or dual use. Dual use for agriculture and energy (eg Agro-voltaics) should be encouraged, and where land is removed from agricultural use, operators should be required to take measures to improve the quality of the land while its being used for energy generation. We believe that excellent quality (grade 1) agricultural land, which is nationally important and predominantly in the Fens² and very good (grade 2) land should always be retained solely for agriculture.



Map from National Grid

Installation options

Domestic Buildings

Despite the ending of the Feed in Tariff subsidy scheme, PV remains financially very attractive, where the building is usually occupied during the day. This is because panel costs are reducing rapidly and electricity prices have increased. PV also increases energy security, reducing the impact of future electricity price rises.

For home owners, we recommend Cambridgeshire's Solar Together³ scheme, which uses the power of group buying to reduce the cost, although there are also a number of excellent other local suppliers.

Large scale installations on buildings

Larger scale installations (>300m²) on buildings are more cost effective than domestic installations, and we're keen to encourage these in Greater Cambridge. The simplest approach is for the owner/occupier of the building owner to fund these themselves and reap the full benefits of their free solar electricity for the lifetime of their panels.



PV at British Antarctic Survey, Cambridge

However, where the building owner cannot afford the initial capital cost, an alternative is a free installation by BigSolar.coop⁴.

In this exciting new approach to subsidy-free solar, supported by Shareenergy⁵, BigSolar.Coop installs and own the panels, selling power to the building occupants at a rate that's guaranteed to be less than their rate for grid electricity.

A key to the project's success is that Community groups such as Carbon Neutral Cambridge help identify suitable sites and find interested building owners/occupiers. This helps make the scheme financially viable despite the ending of subsidies. We are excited about this approach because we think it can help decarbonise Cambridge, and allow building occupants to benefit from cost-free PV, without the need to raise the capital costs of the installation.

The most suitable local buildings are likely to be those with an unshaded roof area of over 300m² that face south, east or west; ideally pitched, and where 50% of the power will be used within the building or nearby. Likely uses include; Care homes/ hospices; large refrigeration usage; hospitals and community healthcare; food production sites; some agricultural operations; data centres.

If you think you may have, or know of, a suitable site, do contact us if you would like help assessing the potential. Alternatively, contact BigSolar.coop direct⁶.

Large Scale Ground Mounted Solar

Ground mounted solar is often commercially attractive without subsidy. However, we will only actively support large scale ground mounted solar installations where they are based on the following principles:

- Genuine community engagement.
- Financial benefits for the community
- Utilising lower quality land, or dual use of land, for example for agro-voltaics

Dual agricultural and energy use, known as Agro-voltaics (also agri-voltaics)

Agro-voltaics⁷⁸⁹ is a relatively new combination of agriculture (typically vegetable growing, sheep or poultry) and ground mounted panels. It is being used in USA, Japan, China, South Korea, India, Malaysia, Vietnam, Austria, Italy and France, while the UKRI is already funding innovation¹⁰ in agro-voltaics in Cambridgeshire.



A variety of approaches are being used. These are very site specific, but typically, these benefit agriculture (because some shading by the panels reduces crop overheating and water use) while the efficiency of the panels is improved by up to 10% (because cooling induced by transpiration by the crops improves PV efficiency) To enable this the panels are typically at a wider spacing than normal and may be mounted higher than normal in order to allow workforce and machinery to move underneath. Although solar output maybe slightly lower, overall productivity can be improved¹¹.

Research suggests that for success, agro-voltaic projects need to have agriculture at their heart.

Cambridgeshire is the UK's most important region for growing vegetables, but productivity is under threat: Cambridge has already seen some of the UK's highest temperatures (38.7C in 2019 and 39.9C in 2022), water supplies are already dangerously depleted, and soils are degrading. Climate change will make this worse, so innovative approaches are important.

We suspect Solar Farm operators are unlikely to embrace an agro-voltaic approach unless it is made a legally binding obligation. Where the land quality permits it, we would like to see this made a requirement of planning permission, along with evidence of the involvement of a skilled and engaged farmer.

This would promote UK focussed innovation in this nationally important area.

Improving Biodiversity, natural habitats, soil health, carbon sequestration and woodland

In most solar farms, the biodiversity benefits go no further than nice pictures of wild-flowers on the website, while on-site, plant growth is vigorously suppressed with herbicides, mowing and even gravel. However, organisations such as Wiltshire Wildlife Trusts and RSPB are showing what can be done, when the project has biodiversity enhancement at its heart^{12 13 14}

Taking land out of intensive agriculture for a period offers a substantial opportunity to rebuild soil health, sequester carbon, increase biodiversity and improve natural habitats. Although we are not experts in biodiversity, we would like to see a legally binding obligation on solar farm operators to significantly improve biodiversity and habitats, where the land is appropriate for this.



Cambridgeshire is the least wooded county in the country¹⁵, so thick hedges and appropriate height trees should be planted round the edges of the scheme and in areas not used by the panels. This will help improve biodiversity, sequester carbon and reduce the visual impact of the huge scheme on the local community.

Experience shows that although most local solar farms have over-promised and under-delivered on habitat creation, these approaches yield good results when done with conservation or agricultural production at heart.

Proposed legally binding obligations for large scale ground mounted solar

These obligations should include the following

Appropriate land use

- No use of grade 1 'excellent quality' or grade 2 'very good' agricultural land
- If good quality Grade 3 agricultural land is to be used, the priority must be to manage it for agro-voltaics¹⁶, ie a dual use agriculture (typically vegetable growing or sheep) and energy production. This will require the involvement of real farming expertise, so should only be permitted if there is evidence of the involvement of a keen landowner/farmer.
- Panels allowed on moderate quality grade 3 and poor quality 4 agricultural land unless the site is a valuable habitat for priority species such as stone curlew.

Biodiversity gain and minimisation of visual impact

- Appropriate height woodland/hedging to be planted around the sites, to reduce the visual impact of the sites and help meet national targets for woodland creation and biodiversity.
- 25% of site to be allocated and managed to improve habitats, biodiversity and carbon sequestration, aiming for at least 20% biodiversity net gain over the whole development using a recognised biodiversity metric (such as the Warwickshire Biodiversity Impact Assessment calculator)
- Remainder of the site to be managed to steadily improve net soil health, in preparation for when/if the land is returned for agricultural use.
- Land management regimes put in place, with the necessary expertise and monitoring to deliver on "promises of biodiversity net gain."

Financial benefit for community

- Large schemes must also provide substantial financial benefits to the community to compensate for the loss of amenity. For example, new Scottish renewables projects are required to provide a package of community benefits with a value equivalent to at least £5k/MW/yr¹⁷ rising with inflation for the life of the project. For a 500MW scheme (such as proposed by Sunnica in the area around villages to the north of Newmarket), this would result in **payments of at least £2.5Million pa to the local community, increasing with inflation for the life of the project.**
- This could do a lot to improve the local quality of life and sustainability. For example, funding the creation of safe cycling routes to schools and public transport hubs, or providing grants to improve the energy efficiency of people's homes.

References

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- ¹ <https://www.ukpowernetworks.co.uk/electricity/distribution-energy-resources/distributed-generation---dg-mapping-tool>
 - ² <http://publications.naturalengland.org.uk/publication/127056?category=5954148537204736>
 - ³ <https://solartogether.co.uk/cambridgeshire/home>
 - ⁴ <https://bigsolar.coop/>
 - ⁵ <https://bigsolar.coop/about-shareenergy/>
 - ⁶ <https://bigsolar.coop/submit-a-site/>
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 - ⁸ https://www.goodnewsnetwork.org/agrivoltaics-of-solar-power-and-farming-are-a-big-success-on-this-boulder-farm/#.YZhUa_S2n_E.reddit
 - ⁹ <https://www.foodsafetynews.com/2021/03/agrivoltaics-scores-impressive-triple-win-but-some-food-safety-concerns-remain/>
 - ¹⁰ <https://www.ukri.org/wp-content/uploads/2021/10/IUK-191021-Transforming-Food-Production-Winners-List.pdf>
 - ¹¹ <https://m.youtube.com/watch?v=2ue53mBUtNY>
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 - ¹⁴ <https://www.rspb.org.uk/our-work/policy-insight/climate-change/action-to-tackle-climate-change/uk-energy-policy/solar-power/>
 - ¹⁵ <https://twitter.com/woodlandtrust/status/1106482691866791936>
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