

Research Briefing

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Planning for solar farms



Summary

- 1 Background: Targets and statistics
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- 4 Impact of solar farms on farming and biodiversity
- 5 Barriers to the expansion of solar power

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Summary

The government set a legally binding [target to reduce the UK's greenhouse gas emissions by 100% by 2050](#), compared with 1990 levels. This is known as the 'net zero target'. To meet this target, the government has set the aim of "[a fully decarbonised, reliable and low-cost power system by 2035](#)".

The government said a fully decarbonised power system would be "composed predominantly of wind and solar". It aims to achieve [70 gigawatt \(GW\) of solar power by 2035](#) (up from 15.7 GW at the end of 2023).

Planning consent for solar farms

Solar farms usually require planning permission. The size of a solar farm will determine which body decides the application. For example, in England:

- Solar farms with a generating capacity below 50 megawatts (MW) need planning permission from the local planning authority (LPA).
- Solar farms with a generating capacity above 50 MW need [development consent from the Secretary of State](#) for Energy Security and Net Zero, because they are nationally significant infrastructure projects' (NSIPs).

Planning is a devolved matter. In the devolved administrations, the size of a solar farm will also determine whether the LPA or the government decide an application. However, thresholds differ across the UK.

Policies for small-scale solar farms (below 50 MW)

LPAs in England will decide applications for smaller-scale solar farms in line with their local plan and the national planning policies. Government guidance advises LPAs to [approve renewable energy developments whose "impacts are \(or can be made\) acceptable"](#).

Government guidance states that there "are no hard and fast rules about how suitable areas for renewable energy [developments] should be identified". It advises LPAs to consider their potential impacts on the local environment and the views of local communities when identifying suitable sites.

However, government guidance generally guides development away from the "best and most versatile" agricultural land and states that [many renewable energy developments are not "appropriate" development for green belt land](#).

Policies for large-scale solar farms (above 50 MW)

The Secretary of State will decide applications for large-scale solar farms in line with [energy national policy statements](#). These were updated in January 2024. They now state that the development of low-carbon infrastructure, such as solar farms, is a “critical national priority”. This means that the Secretary of State should generally grant consent to low-carbon infrastructure.

The updated [national policy statement for renewable energy infrastructure](#) also advises that solar farms should be sited on previously developed and non-agricultural land. However, it does not prohibit the siting of solar farms on agricultural land.

Land use for solar farms

Solar farms are not evenly distributed across the UK. 43% of ground-mounted installations (that have a capacity of at least one megawatt) that are already operational or are awaiting/under construction [are located in the South East and South West of England](#).

It is not possible to calculate how much land is used for solar farms and how much of different types of land are used.

Some organisations, such as the countryside charity CPRE, have expressed concern that [“valuable farmland” is often “the location of choice](#) for solar developments”. CPRE has said it is “essential” to preserve agricultural land for food production.

Renewable energy groups, such as Solar Energy UK, have argued [that “solar farms pose no threat to the UK’s food security”](#) (PDF). They also point to the multi-functional use of land, for example, grazing sheep on solar farms, to highlight that [solar power and farming are not necessarily mutually exclusive](#).

Barriers to the deployment of solar power

At the end of 2023, the cumulative installed capacity of solar power in the UK was 15.7 GW. The government aims to achieve [70 GW of solar power by 2035](#).

The Environmental Audit Committee, a Commons Select Committee, said meeting this target would be [“challenging given existing barriers and current rates of deployment”](#) (PDF). The government’s advisory Climate Change Committee also said [current deployment rates were “significantly off track”](#).

Two of the main barriers to the expansion of solar power they identified were grid capacity and delays in securing grid connections. The Environmental Audit Committee said [“upgrading the electricity grid is a crucial prerequisite to the achievement of net zero”](#) (PDF).

1 Background: Targets and statistics

Solar farms (also known as solar parks or power stations) are installations of multiple solar photovoltaic (PV) panels. They generate electricity at a large scale to feed into the grid and to supply power to domestic and commercial consumers. They differ from small-scale installations, which are used by households, businesses or communities to generate electricity directly for their consumption.¹

Most solar farms consist of ground-mounted panels which are sited on land rather than rooftops. Unlike rooftop panels, ground-mounted panels can be placed away from shade and moved so they are at the right angle to harvest sunlight throughout the day and the year.²

1 How do solar panels generate energy?

Solar panels are made up of photovoltaic (PV) cells that can convert energy from the sun into power. Each cell is made up of two slices of semi-conducting material (usually silicone). When exposed to sunlight, these cells produce an electric charge that is then converted to electricity.

Solar thermal is also another way to generate energy using sunlight. It uses energy from the sun to heat water (or other fluids). Solar thermal systems are usually installed at smaller scales to provide hot water and/or space heating for domestic use. At a larger scale, they can also be used in power stations.³

1.1 Government targets for solar power

In the [Climate Change Act 2008](#), the UK Government set a legally binding target to reduce its greenhouse gas emissions by 80% by 2050, compared with 1990 levels.⁴ In 2019, the UK Government raised the 80% target to a 100% target by 2050. This is referred to as the net zero target.⁵

¹ National Grid, [How does solar power work? | Solar energy explained](#), last updated May 2023

² Renewable Energy Hub, [Ground Mounted Solar Panel Systems](#), April 2023; Renewable Energy Hub, [Everything You Need to Know About Solar Farm Requirements](#), April 2023

³ National Grid ESO, [How is electricity generated using solar?](#), undated [accessed 23 August 2023];

National Grid, [How does solar power work? | Solar energy explained](#), last updated May 2023

⁴ Climate Change Committee (CCC), [A legal duty to act](#), undated [accessed 23 August 2023]

⁵ [Climate Change Act 2008; Climate Change Act 2008 \(2050 Target Amendment\) Order 2019](#)

For further information about the UK Government's targets, see the Library briefing on [the UK's plans and progress to reach net zero by 2050](#).

The devolved administrations have also set legally binding targets to reduce their greenhouse gas emissions to net zero compared with 1990 levels: Wales and Northern Ireland for 2050,⁶ and Scotland for 2045.⁷

A 'fully decarbonised' power system by 2035

One of the main ways in which the government proposes to meet its net zero target is by reducing its reliance on fossil fuels and increasing the use of renewable and low-carbon energy sources, such as wind and solar power.⁸

In its [Energy White Paper](#) (December 2020) and [Net Zero Strategy](#) (October 2021), the government has set the aim of "a fully decarbonised, reliable and low-cost power system by 2035". It said that "a low-cost, net-zero consistent electricity system is most likely to be composed predominantly of wind and solar", although it noted that these "intermittent renewables" would need to be complemented with technologies that can generate power flexibly, such as nuclear and gas with carbon capture and storage.⁹

To meet its sixth carbon budget (a 78% reduction in emissions compared to 1990 levels by 2035), the government's advisory Climate Change Committee (CCC) projected that solar power would need to provide 60 terawatt hours (TWh) of energy by 2035. It estimated that an additional 3 gigawatt (GW) of solar power would need to be installed per year to reach that level.¹⁰

70 gigawatt (GW) of solar power by 2035

One of the government's aims is to "ramp up" the deployment of rooftop and ground-mounted solar systems to achieve a fivefold increase in solar power by 2035 (from 14 GW in 2022 to 70 GW).¹¹ The government said it would seek:

- the widespread deployment of rooftop solar on commercial and industrial properties.
- the large-scale deployment of ground-mounted solar on brownfield, industrial, and low- and medium-grade agricultural land.¹²

⁶ Welsh Government, [Climate change targets and carbon budgets](#), last updated November 2022; [Climate Change Act \(Northern Ireland\) 2022](#)

⁷ [Climate Change \(Scotland\) Act 2009](#), as amended by the [Climate Change \(Emissions Reduction Targets\) \(Scotland\) Act 2019](#); Scottish Government, [Reducing greenhouse gas emissions](#), undated

⁸ DESNZ and BEIS, [Net Zero Strategy: Build Back Greener](#), last updated April 2022. It builds on the government's [ten-point plan for a green industrial revolution](#) (November 2020).

⁹ DESNZ and BEIS, [Energy white paper: Powering our net zero future](#), December 2020; DESNZ and BEIS, [Net Zero Strategy: Build Back Greener](#), last updated April 2022

¹⁰ CCC, [Sixth Carbon Budget: the UK's Path to Net Zero](#), December 2020, p.135

¹¹ DESNZ and BEIS, [British energy security strategy](#), last updated April 2022; DESNZ, [Powering up Britain](#), last updated April 2023

¹² DESNZ, [Powering up Britain: Energy Security Plan](#) (PDF), last updated April 2023, p.36

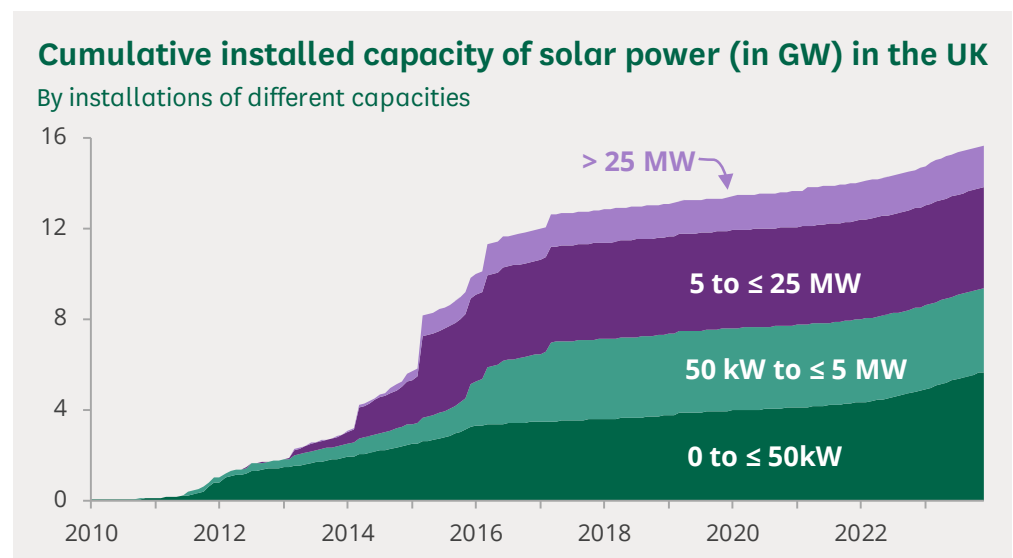
In line with recommendations made by Chris Skidmore MP in the [independent review of net zero](#) (January 2023), the government also said it would set up a [government–industry solar taskforce](#) in 2023 to achieve 70 GW of solar power by 2035. It also said it would publish a roadmap in 2024, setting out step-by-step plans for furthering the deployment of solar power.¹³

The government said an “effective planning system” was needed to maximise the deployment of renewable energy. To achieve its aim of a fivefold increase in solar power by 2035, the government said it was “committed to ensuring faster, fairer and more effective planning regimes”.¹⁴ For further information about the planning system and recent reforms, see section 2 of this briefing.

1.2 Trends in solar power capacity in the UK

As shown in the chart below, the cumulative installed capacity of solar power in the UK has grown substantially since 2010. In December 2023, there were around 1.4 million solar systems with a cumulative capacity of 15.7 GW in the UK (up from 22 megawatts (MW) or 0.02 GW, in January 2010).¹⁵

This includes solar systems of any size, both small-scale solar systems that are installed by households for their direct consumption and large-scale solar farms. It also includes both rooftop and ground-mounted solar installations.



Source: DESNZ, [Solar photovoltaics deployment](#), last updated January 2024 [accessed 8 February 2024]

As shown in the chart above, the growth in cumulative installed capacity of solar power in the UK has been much slower since 2017 compared to previous

¹³ DESNZ and BEIS, [Independent Review of Net Zero](#) (Skidmore Review), January 2023; DESNZ, [Independent Review of Net Zero: Government response](#), March 2023, recommendation 26

¹⁴ DESNZ, [Powering Up Britain](#), last updated April 2023

¹⁵ DESNZ, [Solar photovoltaics deployment](#), last updated January 2024 [accessed 8 February 2024]

years. The rise prior to 2017 was mainly driven by subsidies provided through the [Feed-in-Tariff](#) scheme and the [Renewable Obligation](#) scheme.¹⁶ Following a reduction in subsidies, the growth slowed down:

- Between 2013 and 2017, around 513,000 new solar systems with a cumulative installed capacity of 11 GW of power were installed.
- By comparison, between 2018 and 2022, around 323,000 new solar systems with a cumulative installed capacity of 1.8 GW were installed.¹⁷

The Library briefing, [Contracts for Difference Scheme](#), provides information on the current funding schemes for renewable energy developments.

Total electricity generated from solar power

In 2022, electricity generation from solar photovoltaics (PV) amounted to 13.3 TWh. This is around 10% of renewable electricity generated, and 4% of total electricity generated in the UK.¹⁸ Electricity is only part of the UK's energy supply mix alongside gas and oil, among others.

For further information about the UK's energy supply mix, see the Library briefing, [Introduction to the domestic energy market](#).

2 What's the difference between watts and watt-hours?

A watt (W) and its multiples (such as megawatt, MW, and gigawatt, GW) are units of power. They measure the amount of energy generated or consumed per unit of time.

Watts can be used to measure the installed capacity of a solar system, that is, the maximum amount of power it can generate at any particular time under ideal conditions (in direct sunlight and at the right angle, for example). The higher the wattage of a solar system, the more power it can generate under the same conditions.

A watt-hour (Wh) is a unit of energy. It measures the total amount of energy that is generated within a certain period, usually an hour.¹⁹

¹⁶ Ofgem, [Feed-in Tariffs \(FIT\)](#), undated [accessed 8 February 2024]; Ofgem, [Renewables Obligation \(RO\)](#), undated [accessed 8 February 2024]

¹⁷ DESNZ, [Solar photovoltaics deployment](#), last updated January 2024 [accessed 8 February 2024]

¹⁸ DESNZ, [Energy Trends: UK renewables, Renewable electricity capacity and generation \(ET 6.1 - quarterly\)](#) (Excel), last updated January 2024 [accessed 8 February 2024]

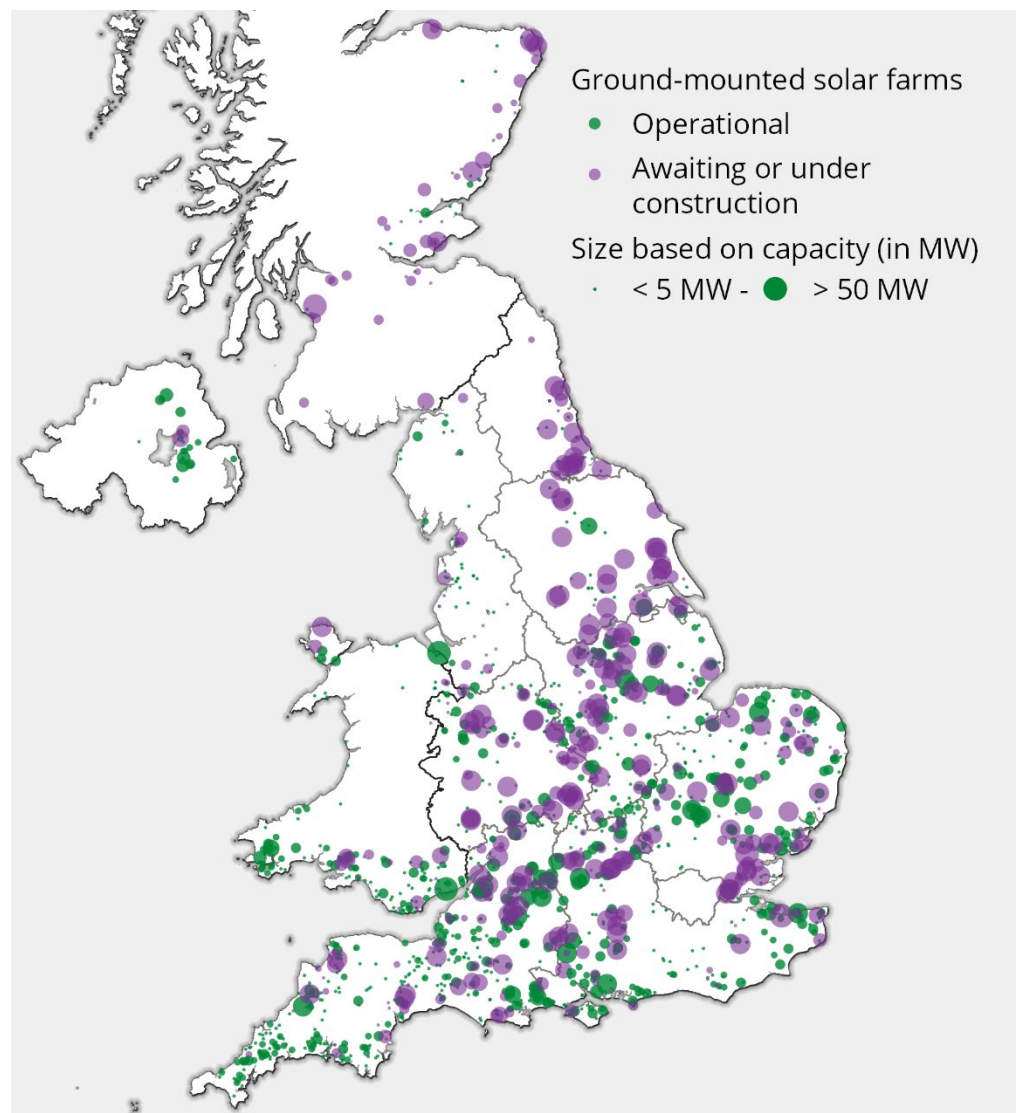
¹⁹ Energy Savings Trust, [Your guide to solar panels](#) (PDF), July 2023; The Eco Experts, [Solar Panel Output: How Much Electricity Do They Produce?](#), last updated February 2023

1.3

Location of solar farms in the UK

Most large-scale solar systems (that have a capacity of at least 1 MW) in the UK are ground-mounted (95%; 1,136 systems). Only 5% (61 solar systems with a capacity of at least 1 MW) are installed on rooftops.²⁰ These figures do not include small-scale solar systems (that have a capacity up to 1 MW) that are installed by households or businesses, usually for their direct consumption.

The distribution of ground-mounted solar farms in the UK with a capacity of at least 1 MW is shown in the map below.



Source: DESNZ, [Renewable Energy Planning Database: quarterly extract](#), [Renewable Energy Planning Database \(REPD\): October 2023](#) (CSV), last updated November 2023 [accessed 8 February 2024]

Note: Overlapping circles appear darker and indicate multiple solar farms in the same location.

²⁰ 81% (454) of the large-scale solar installations that are under/awaiting construction are ground-mounted, and 19% (106) have been installed on rooftops.

Of the ground-mounted solar farms that are either operational or have been granted planning permission and are under/awaiting construction, 28% are located in the South West of England and 15% in the South East of England.

This is followed by the East of England, where around 13% of these solar farms are sited, and the East Midlands, also 13%.²¹ 9% are located in Wales.

There are fewer solar farms in the northern regions of England and in Scotland and Northern Ireland, where weather patterns are less suited to solar power.²² The distribution of solar farms and installed capacity in each region of the UK is shown in the table below.

43% of solar farms are in the South West and South East			
Includes operational solar farms and those under/awaiting construction			
Region	Solar farms	Percent of total (%)	Total capacity (in MW)
South West	447	28.1	4,279
South East	233	14.7	3,238
Eastern	206	13.0	3,592
East Midlands	197	12.4	2,727
Wales	141	8.9	1,233
West Midlands	115	7.2	1,924
Scotland	66	4.2	898
North West	62	3.9	1,549
Yorkshire and Humber	59	3.7	359
North East	36	2.3	756
Northern Ireland	23	1.4	276
London	2	0.1	53
Total	1,589		20,914

Source: DESNZ, [Renewable Energy Planning Database: quarterly extract, Renewable Energy Planning Database \(REPD\): October 2023](#) (CSV), last updated November 2023 [accessed 8 February 2024]

It is not possible to say how much land is used for solar farms, because the government’s [renewable energy planning database](#) does not record the total area of each solar farm. The government estimates that a typical solar farm requires between two and four acres of land for each MW of output. It also estimates that a 50 MW solar farm consisting of around 100,000 to 150,000 panels will cover between 125 and 200 acres.²³

²¹ The [renewable energy planning database](#) does not cover renewable energy projects that did not require planning permission because of permitted development rights. Until 2021, database only included projects with a capacity over 1 MW; since 2021, it also covers projects with a capacity over 150kW. The following analysis focuses on solar systems with a generating capacity above 1 MW.

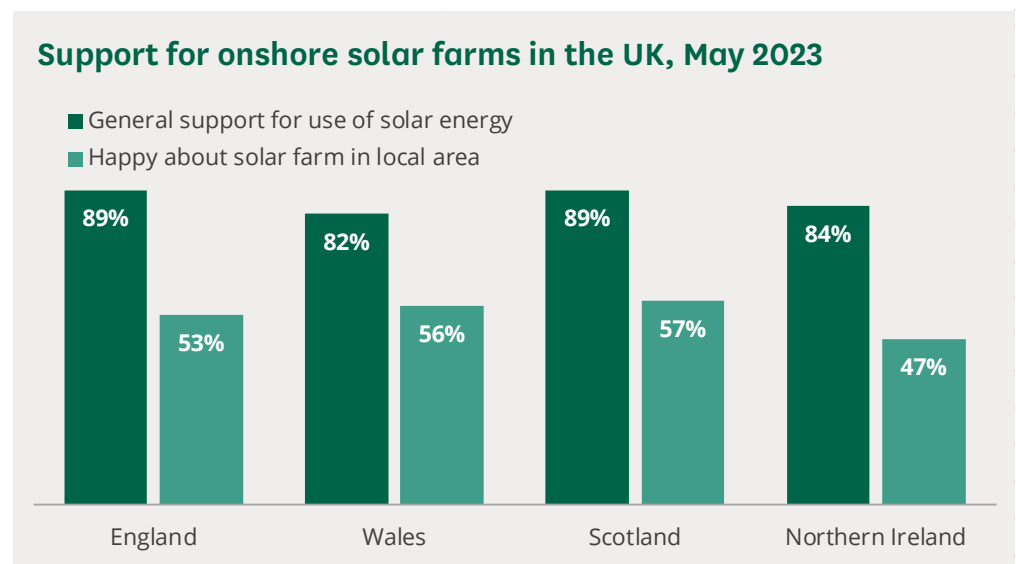
²² Yale Centre for Business and the Environment, [Agrivoltaics: Producing Solar Energy While Protecting Farmland](#), October 2021

²³ DESNZ, [National Policy Statement for renewable energy infrastructure \(EN-3\)](#), last updated January 2024, para 2.10.17

The amount of land covered by a solar farm can vary significantly depending on the site and the associated infrastructure (for example, whether it is co-located with a battery energy storage system), however. The amount of space taken up by panels is also expected to decrease over time, as the efficiency of solar PV technology increases.

1.4 Public support for solar farms in the UK

The majority of respondents (88%) surveyed by the Department for Energy Security and Net Zero (DESNZ) in spring 2023 expressed general support for the use of solar power in the UK. However, only around half (54%) of those surveyed said they would support be happy about a solar farm in their local area.²⁴ The results of the survey in the different parts of the UK are shown in the chart below.



Source: DESNZ, [DESNZ Public Attitudes Tracker: Spring 2023](#), [DESNZ Public Attitudes Tracker: Spring 2023 – Crosstabulations](#) (Excel), June 2023 [accessed 13 September 2023]

Therefore, broad trends in public attitudes towards solar power do not always reflect community-level support for solar farms. In evidence submitted to the Environmental Audit Committee, developers highlighted that a lack of public acceptance can sometimes pose a barrier to developments.²⁵

The government also notes that local opposition to proposed solar farms can lead to delays in planning decisions and legal challenges. This can increase the cost of projects and, in some cases, result in projects being abandoned.²⁶

²⁴ DESNZ, [DESNZ Public Attitudes Tracker: Spring 2023](#), June 2023 [accessed 13 September 2023]

²⁵ EAC, [Written evidence: Onshore solar energy](#) (PDF), OSE0057 [Lightsource bp]

²⁶ EAC, [Written evidence: Onshore solar energy](#) (PDF), OSE0063 [BEIS, now DESNZ]

Campaign groups formed in opposition to solar farms in their local area cite the use of “inappropriate sites”, such as agricultural land or landscapes of high environmental or heritage value, as the reason for their opposition.²⁷

²⁷ EAC, [Written evidence: Onshore solar energy](#) (PDF), OSE0015 [Mallard Pass Action Group]; EAC, [Written evidence: Onshore solar energy](#) (PDF), OSE0051 [Say No to Sunnica Action Group]

2

Planning policy for solar farms in England

Installing solar farms usually requires planning consent. Depending on their size, solar farms will either require consent from the local planning authority (LPA) or from the Secretary of State for Energy Security and Net Zero.

- Solar farms with a generating capacity below 50 megawatts (MW) need planning permission from the LPA.
- Solar farms with a generating capacity above 50 megawatts (MW) are considered ‘nationally significant infrastructure projects’ (NSIPs) and require development consent from the Secretary of State.²⁸

The size of a 50 MW solar farm will vary depending on the proposed site and the associated infrastructure. The government estimates that a typical 50 MW solar farm will include around 100,000 to 150,000 panels and cover between 125 and 200 acres. However, as solar technology becomes more efficient, the size of a solar farm capable of generating 50 MW might decrease.²⁹

3 Permitted development rights for solar PV systems

Installing solar panels on a roof or in a garden to generate energy for direct consumption does not usually require planning permission. These ‘permitted development rights’ cover solar panels up to 50 kW on domestic roofs. Since December 2023, there is no limit on the installed capacity of solar panels on non-domestic roofs. These rights are restricted for listed buildings and/or in certain designated areas, however.³⁰

In December 2023, following consultation, the government removed some restrictions on permitted development rights for solar installations. It also created new permitted development rights for solar canopies on off-street car parks (subject to certain conditions and limitations).³¹

²⁸ [Section 15 of the Planning Act 2008](#)

²⁹ DESNZ, [National Policy Statement for renewable energy infrastructure \(EN-3\)](#), last updated January 2024, para 2.10.17

³⁰ [Section 82 of the Energy Act 2004; Part 14 of Schedule 2 of the General Permitted Development \(England\) Order 2015](#)

³¹ DLUHC, [Permitted development rights: supporting temporary recreational campsites, renewable energy and film-making consultation](#), February 2023; [Town and Country Planning \(General Permitted Development etc.\) \(England\) \(Amendment\) \(No. 2\) Order 2023](#)

2.1

Small-scale solar farms (up to 50 MW)

LPAs are responsible for determining planning applications for solar farms with a generating capacity under 50 MW. They will decide applications in line with their local plan unless ‘material considerations’ indicate otherwise.³²

One important material consideration is the government’s [National Planning Policy Framework](#) (NPPF). It also provides a framework that can guide LPAs in drawing up their local plans. The NPPF states that the planning system should promote renewable energy and associated infrastructure.³³

When deciding planning applications, the NPPF advises LPAs to give planning permission to renewable energy projects whose impacts are (or can be made) acceptable. It states that LPAs should “not require applicants to demonstrate the overall need for renewable and low carbon energy”.³⁴

Planning considerations: Siting and impact

The NPPF advises LPAs to identify “suitable areas” for renewable energy projects.³⁵ Supplementary [planning guidance on renewable and low-carbon energy](#) states that “there are no hard and fast rules” on how LPAs should identify suitable areas, however, it states that they should take into account the potential impacts of solar farms on the local environment.³⁶

Supplementary [planning guidance on renewable and low-carbon energy](#) sets out what LPAs should consider when assessing planning applications for solar farms and drawing up their local plans:

- the impact of solar panels on local amenity and local landscapes, including cumulative impacts of large-scale solar farms.
- the impact of solar farms on protected areas, such as National Parks and National Landscapes (formerly Areas of Outstanding Natural Beauty).
- that the need for renewable energy does not automatically override environmental protections.
- the siting, size, colour and design of solar systems.
- the visual impact of solar farms, in particular their impact on the local landscape in terms of “glint and glare” and on neighbouring uses.³⁷

³² [Section 70\(2\) of the Town and Country Planning Act 1990; Section 38\(6\) of the Planning and Compulsory Purchase Act 2004](#)

³³ DLUHC, [National Planning Policy Framework](#), last updated December 2023, para 157

³⁴ DLUHC, [National Planning Policy Framework](#), last updated December 2023, para 163

³⁵ DLUHC, [National Planning Policy Framework](#), last updated December 2023, para 160

³⁶ DLUHC and MHCLG, [Renewable and low carbon energy](#), last updated August 2023, para 5

³⁷ DLUHC and MHCLG, [Renewable and low carbon energy](#), last updated August 2023, para 7

The guidance states that, although large-scale solar farms can have “a negative impact” on rural landscapes, their visual impact can usually be “properly addressed within the landscape”, for example, “with effective screening and appropriate land topography”.³⁸

Siting of small-scale solar farms on agricultural land

The government advises LPAs that, for the “effective use of land”, large-scale solar farms should be located on previously developed (brownfield) land and non-agricultural land which is not of “high environmental value”.³⁹ The NPPF guides development, including renewable energy developments such as solar farms, away from the ‘best and most versatile’ (BMV) agricultural land.⁴⁰

The term ‘best and most versatile’ (BMV) land is based on Natural England’s [agricultural land classification](#) scheme which grades agricultural land. BMV land is good to excellent quality land in grades 1, 2, and 3a.⁴¹

Where a developer can show that the use of agricultural land is necessary, the NPPF and planning guidance state that poorer-quality over higher-quality land should be used. LPAs should consider whether a proposed project allows for continued agricultural use or encourages biodiversity improvements.⁴²

In December 2023, [following consultation](#), the government updated the NPPF to provide that, where a developer proposes the use of agricultural land, LPAs should consider the “availability of agricultural land for food production”.⁴³

4 Consultation of Natural England

[Schedule 4 of the Development Management Procedure Order 2015](#) requires local planning authorities to consult Natural England, the government’s advisor on the natural environment, on planning applications that will result in the loss of over 20 hectares of ‘best and most versatile’ agricultural land if the development of that land is not in accordance with their local plan.⁴⁴

Natural England’s [Guide to assessing development proposals on agricultural land](#) sets out the considerations that local planning authorities must take into account when they assess applications for development for agricultural land.

³⁸ DLUHC and MHCLG, [Renewable and low carbon energy](#), last updated August 2023, para 7

³⁹ DLUHC and MHCLG, [Renewable and low carbon energy](#), last updated August 2023, para 13

⁴⁰ DLUHC, [National Planning Policy Framework](#), last updated December 2023, para 180

⁴¹ Natural England, [Guide to assessing development proposals on agricultural land](#), last updated February 2021

⁴² DLUHC, [National Planning Policy Framework](#), last updated December 2023, footnote 62; DLUHC and MHCLG, [Renewable and low carbon energy](#), last updated August 2023, para 13

⁴³ DLUHC, [National Planning Policy Framework](#), last updated December 2023, footnote 62; DLUHC, [Levelling-up and Regeneration Bill: Reforms to national planning policy](#), last updated December 2023

⁴⁴ [Schedule 4 of the Development Management Procedure \(England\) Order 2015](#)

How much weight an LPA will give to the need to protect agricultural land compared with the need for renewable energy will depend on the particular circumstances of each individual case. It is up to the LPA (or the government's Planning Inspectorate on appeal) to determine. If they have taken account of all relevant material considerations, the courts will generally not rule on the relative importance of material considerations.⁴⁵

Siting of small-scale solar farms on green belt land

It is the responsibility of LPAs to define and maintain green belt land in their areas. The NPPF makes clear that renewable energy projects, including solar farms, are not “appropriate” development for green belt land except in “very special circumstances”:

When located in the Green Belt, elements of many renewable energy projects will comprise inappropriate development. In such cases developers will need to demonstrate very special circumstances if projects are to proceed. Such very special circumstances may include the wider environmental benefits associated with increased production of energy from renewable sources.⁴⁶

The government states that it is up to LPAs to assess whether “very special circumstances” existed based on the merits of each case. It states that LPAs should “give relevant circumstances their due weight”.⁴⁷

The [Library briefing on the green belt](#) provides further information on green belt planning policy and proposals for reform.

2.2 Large-scale solar farms (over 50 MW)

Under the [Planning Act 2008](#), as amended by the [Localism Act 2011](#), major energy projects are considered ‘nationally significant infrastructure projects’ (NSIPs). They require ‘development consent’ from the Secretary of State for Energy Security and Net Zero.

Solar farms with a generating capacity over 50 MW are considered NSIPs.⁴⁸

Applications for NSIPs are made to the [National Infrastructure Directorate at the Planning Inspectorate](#). It will carry out an examination of the project and provide a report to the Secretary of State to help inform their decision.⁴⁹ The final decision whether to grant, or refuse, development consent rests with the

⁴⁵ DLUHC and MHCLG, [Determining a planning application](#), last updated June 2021, para 9

⁴⁶ DLUHC, [National Planning Policy Framework](#), last updated December 2023, para 156

⁴⁷ PQ 140431 [[Batteries: Planning Permission](#)] 15 March 2022

⁴⁸ [Section 15 of the Planning Act 2008](#); [Section 31 of the Planning Act 2008](#)

⁴⁹ [Part 6 of the Planning Act 2008](#); National Infrastructure Planning, [Planning Inspectorate role](#), undated [accessed 23 June 2023]

Secretary of State. If development consent is given, there is no need to obtain other consents, such as planning permission.⁵⁰

The Library briefing, [Planning for Nationally Significant Infrastructure Projects](#), sets out the process for obtaining development consent. The Planning Inspectorate also provides [guidance on the application process](#).

Critical national priority for low-carbon infrastructure

The National Infrastructure Directorate will examine, and the Secretary of State will decide, NSIPs in line with the [national policy statements](#) (NPSs). These are statutory documents that are subject to public consultation and parliamentary scrutiny.⁵¹

The NPS for renewable energy infrastructure (EN-3) in force prior to January 2024 did not set technology-specific policies for solar power.⁵² As technology-specific policies were not set out in an NPS, the Secretary of State made decisions on solar farms in line with matters they considered to be “important and relevant” to the proposed project. These included the NPPF and the local plan for the area.⁵³

5 Updates to national policy statements

The government [consulted on its proposed updates to the energy NPSs in 2021 and on further revisions in 2023](#).⁵⁴ In November 2023, the Secretary of State for DESNZ, Claire Coutinho, presented the energy NPSs to Parliament. They were designated in January 2024.⁵⁵

The updated NPSs guide decision-making only for applications for NSIPs that were accepted for examination after the date (17 January 2024) when the government designated the updated NPSs. However, they may also constitute “important and relevant considerations” for applications that were already under examination before that date.⁵⁶

The [updated NPS for energy EN-1](#) introduces a policy presumption for low-carbon infrastructure known as “critical national priority” status. It states

⁵⁰ [Section 114 of the Planning Act 2008; Section 33 of the Planning Act 2008](#)

⁵¹ [Part 2 of the Planning Act 2008; Section 104 of the Planning Act 2008](#)

⁵² Department of Energy and Climate Change (DECC), [National Policy Statement for Renewable Energy Infrastructure \(EN-3\)](#) (PDF), July 2011

⁵³ [Section 105 of the Planning Act 2008](#)

⁵⁴ DESNZ and BEIS, [Planning for new energy infrastructure: Review of energy National Policy Statements](#), last updated March 2023; DESNZ, [Planning for new energy infrastructure: Revisions to National Policy Statements](#), last updated November 2023

⁵⁵ HCWS62 [[Transforming Great Britain's Electricity Network](#)] 22 November 2023; HCWS193 [[Energy National Policy Statements](#)] 17 January 2024

⁵⁶ DESNZ, [Overarching National Policy Statement for energy \(EN-1\)](#), last updated January 2024, para 1.6.3

that there is an “urgent need” for low-carbon infrastructure, such as solar power, to ensure “a secure, reliable, and affordable supply of energy” and decarbonise the UK’s power supply in line with net zero goals.⁵⁷ The Secretary of State must give “substantial weight” to this urgent need when assessing applications for low-carbon infrastructure, such as solar farms. They should generally grant consent to low-carbon infrastructure.

The NPS EN-1 requires applicants to avoid, reduce, mitigate or compensate any adverse impacts of their projects (for example, on the environment) “so far as possible”. The NPS EN-1 acknowledges that there may be “residual adverse impacts” despite the implementation of such measures, which the Secretary of State should consider. However, it states that residual impacts are “unlikely to outweigh” the urgent need for low-carbon infrastructure. Except in “exceptional circumstances”, the Secretary of State should not refuse consent to low-carbon infrastructure because of residual impacts.⁵⁸

Siting of large-scale solar farms on green belt land and in protected areas

Further, the NPS EN-1 also states that the Secretary of State should assume that low-carbon infrastructure meets tests that require “clear outweighing of harm, exceptionality, or very special circumstances”. They should assume, for example, that the urgent need for low-carbon infrastructure meets the “very special circumstances” test for development on green belt land as well as the “exceptional circumstances” test for development in protected areas, such as National Parks and National Landscapes.⁵⁹

Siting of large-scale solar farms on agricultural land

The updated NPS EN-3 states that, although the suitability of a site should not be mainly determined by land type, solar farms should be sited on previously developed and non-agricultural land “where possible”. The NPS EN-3 notes, however, that it is “likely” that some agricultural land will need to be used for solar farms “at this scale”.

Like the NPPF, the updated NPS EN-3 recommends that developers should use poorer-quality over higher-quality agricultural land and avoid the use of BMV land “where possible”.⁶⁰ However, the NPS EN-3 does not prohibit the siting of solar farms on agricultural land, including on BMV land.

⁵⁷ DESNZ, [Overarching National Policy Statement for energy \(EN-1\)](#), last updated January 2024

⁵⁸ DESNZ, [Overarching National Policy Statement for energy \(EN-1\)](#), last updated January 2024, para 4.2.15. Exception to the presumption of consent are impacts which present an unacceptable risk to, or unacceptable interference with, human health and public safety, defence, irreplaceable habitats or the achievement of net zero.

⁵⁹ DESNZ, [Overarching National Policy Statement for energy \(EN-1\)](#), last updated January 2024, paras 4.2.16-4.2.17

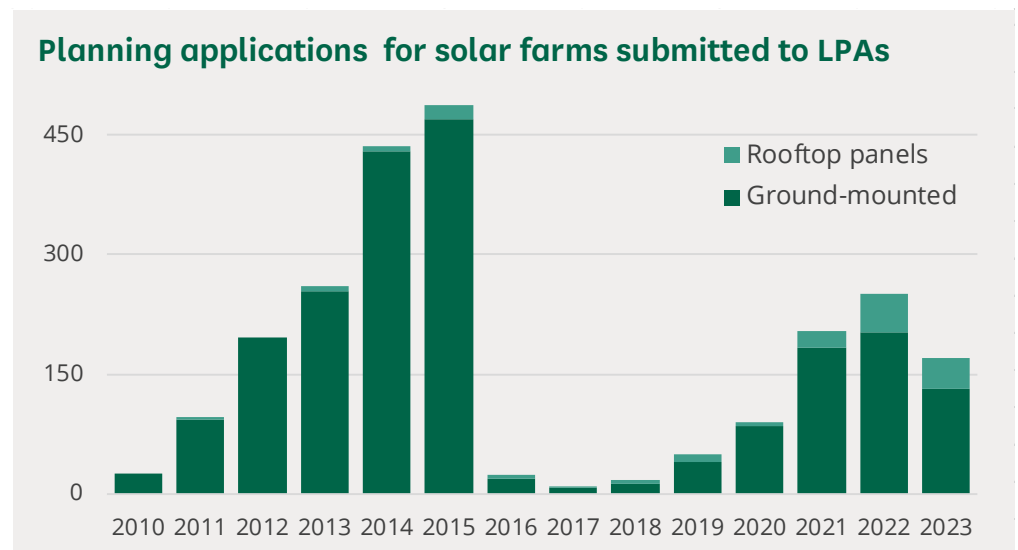
⁶⁰ DESNZ, [National Policy Statement for renewable energy infrastructure \(EN-3\)](#), last updated January 2024, para 2.10.29

2.3

Planning application statistics

Applications for small-scale solar farms (up to 50 MW)

The chart below shows how many planning applications for solar farms with a capacity over 1 MW were submitted to LPAs between 2010 and October 2023.⁶¹ The number of planning applications increased every year between 2010 and 2015. It then decreased substantially in 2016 and 2017, following a reduction in subsidies. Since 2017, the number of planning applications increased again (although it has not reached 2015 levels).



Source: DESNZ, [Renewable Energy Planning Database: quarterly extract](#), [Renewable Energy Planning Database \(REPD\): October 2023](#) (CSV), last updated November 2023 [accessed 8 February 2024]

However, the capacity of solar farms that have been submitted for planning permission to LPAs has increased substantially over time, from an average of 4 MW in 2010 to 25 MW in 2023 (up to October).⁶²

Around two thirds (67%) of the planning applications for solar farms with a capacity over 1 MW submitted to LPAs in England between 2010 and October 2023 were granted planning permission. 11% were refused permission, and 14% were either abandoned or withdrawn by developers.⁶³

⁶¹ Until 2021, the [renewable energy planning database](#) only included projects with a capacity over 1 MW; since 2021, it also covers projects with a capacity over 150 kW. To allow for a comparison over time, the following analysis focuses on solar systems with a generating capacity above 1 MW.

⁶² DESNZ, [Renewable Energy Planning Database: quarterly extract](#), [Renewable Energy Planning Database \(REPD\): October 2023](#) (CSV), last updated November 2023 [accessed 8 February 2024]

⁶³ Out of all planning applications that were submitted, including those where a decision has not yet been made. Excluding these, 73% were given planning permission, and 12% were refused.

Applications for large-scale solar farms (over 50 MW)

The majority of applications for solar farms fell below the 50 MW threshold and were therefore submitted to, and usually decided by, LPAs. Until 2018, no applications for solar farms with a capacity above the 50 MW threshold were submitted to the Secretary of State for development consents.⁶⁴

Since 2018, nine NSIP applications for solar farms have been submitted; these are shown in the chart below. Three of them have already been decided and were granted development consent.

Applications for NSIPs submitted for development consent						
Site name	County	Capacity (in MW)	Submitted	Decision	Development status	
Cleve Hill	Kent	373	2018	2020	Under construction	
Little Crow	Lincolnshire	150	2020	2022	Permission granted	
Sunnica	Cambridgeshire	500	2021	-	Awaiting decision	
Longfield	Essex	500	2022	2023	Permission granted	
Mallard Pass	Lincolnshire	350	2022	-	Awaiting decision	
Heckington Fen	Lincolnshire	500	2023	-	Awaiting decision	
Gate Burton	Lincolnshire	531	2023	-	Awaiting decision	
Cottam	Lincolnshire	600	2023	-	Awaiting decision	
West Burton	Lincolnshire	480	2023	-	Awaiting decision	

Source: DESNZ, [Renewable Energy Planning Database: quarterly extract](#), [Renewable Energy Planning Database \(REPD\): October 2023](#) (CSV), last updated November 2023 [accessed 8 February 2024]

2.4 Impacts on the environment, protected habitats and biodiversity

Environmental impact assessment

To be granted planning consent, certain developments have to undergo an environmental impact assessment process. It intends to ensure that the environmental impacts of a proposed development are assessed and can be considered by decision-makers (the LPA or the Secretary of State).⁶⁵

Which projects require an environmental impact assessment is set out in the regulations: solar farms might require an assessment depending on their size, location and potential impact.⁶⁶

⁶⁴ DESNZ, [Renewable Energy Planning Database: quarterly extract](#), [Renewable Energy Planning Database \(REPD\): October 2023](#) (CSV), last updated November 2023 [accessed 8 February 2024]

⁶⁵ DLUHC and MHCLG, [Environmental Impact Assessment](#), last updated May 2020; National Infrastructure Planning, [Advice Note Seven: Environmental Impact Assessment](#), undated

⁶⁶ [Town and Country Planning \(Environmental Impact Assessment\) Regulations 2017](#); [Infrastructure Planning \(Environmental Impact Assessment\) Regulations 2017](#)

Proposals for reform: Environmental outcome reports

The [Levelling Up and Regeneration Act 2023](#) gives the government the power to replace environmental impact assessments with ‘environmental outcome reports’. When these environmental outcomes reports will be required, what they will cover and how they will be considered in planning applications will be set out in regulations (to be drawn up by the government).⁶⁷

In setting environment outcomes and drawing up regulations, the government would be required to ensure that the overall level of environmental protection provided by existing laws is not reduced.⁶⁸

The government [consulted on its proposals for environmental outcome reports](#) between March and June 2023. At the time of writing (12 February 2024), the government has yet responded to that consultation.

Habitats regulation assessment

Where solar farms might have a significant effect on habitats and/or species protected by the [Conservation of Habitats and Species Regulations 2017](#), an LPA must undertake a habitats regulations assessment (HRA). Areas that are protected under the Habitats Regulations are:

- special areas of conservation (SAC), which protect certain habitats and species (other than birds).
- special areas of protection (SPA), which are protected areas for birds.

In total, there are 656 special areas of conservation and 286 special areas of protection in the UK.⁶⁹ For further information about the location of these areas, see a [map produced by the Department for Environment, Food and Rural Affairs](#) (Defra).

In addition, Ramsar Sites (wetlands of international importance that are designated under the Ramsar Convention on Wetlands), proposed SACs, potential SPAs, and sites compensating for damage to SACs and SPAs are also protected under the Habitats Regulations.⁷⁰

Where a proposed project is likely to have “significant effects” on a protected habitats site, an LPA must assess and consider its likely effects on the site and identify ways to avoid or mitigate adverse effects. If adverse effects cannot be avoided or mitigated, the LPA must refuse consent to the proposed project.

⁶⁷ [Part 6 of the Levelling Up and Regeneration Act 2023](#)

⁶⁸ [Part 6 of the Levelling Up and Regeneration Act 2023](#)

⁶⁹ Joint Nature Conservation Committee (JNCC), [Special Areas of Conservation](#), April 2023; JNCC, [Special Protection Areas](#), April 2023

⁷⁰ Department for Environment, Food & Rural Affairs (Defra), [Habitats regulations assessments: Protecting a European site](#), February 2021

Exceptions apply if there are no alternative solutions for the project and there are “imperative reasons of overriding public interest” for granting consent.⁷¹

The updated NPS EN-1 states that, for low-carbon infrastructure which has critical national priority status, energy security and decarbonising the power sector are “capable of amounting to imperative reasons for overriding public interest”. This means the Secretary of State should generally grant consent to these projects even if their adverse effects on a protected habitats site cannot be avoided or mitigated.⁷² Exceptions apply where residual impacts present “an unacceptable risk” to irreplaceable habitats.⁷³

Biodiversity net gain

Under the [Environment Act 2021](#), small-scale solar farms that are granted planning permission under the [Town and Country Planning Act 1990](#) will be required to demonstrate at least 10% biodiversity net gain from 12 February 2024.⁷⁴ The government defined biodiversity net gain as:

[...] an approach to development that leaves the natural environment in a measurably better state than it was beforehand. [...] Biodiversity net gain delivers measurable improvements for biodiversity by creating or enhancing habitats in association with development.⁷⁵

From 12 February 2024, developers must assess of the value of the natural habitat on the site before and after development, using Natural England’s biodiversity metric. They will be required to deliver 10% biodiversity net gain either onsite or offsite. The biodiversity gain must be secured for at least 30 years. If they cannot deliver the gains onsite or offsite, developers could also purchase statutory biodiversity credits from the government.⁷⁶

For further information, see [government guidance on biodiversity net gain](#).

The government said the requirement to deliver biodiversity gain will apply to projects granted development consent under the [Planning Act 2008](#) from “no later than November 2025”.⁷⁷ Until then, developers of large-scale solar farms will not be required to deliver mandatory biodiversity gain for NSIPs (although they may choose to voluntarily deliver biodiversity gain).

⁷¹ [Part 6 of the Conservation of Habitats and Species Regulations 2017](#); DLUHC and MHCLG, [Appropriate assessment](#), July 2019

⁷² DESNZ, [Overarching National Policy Statement for energy \(EN-1\)](#), last updated January 2024, paras 4.2.20-4.2.21

⁷³ DESNZ, [Overarching National Policy Statement for energy \(EN-1\)](#), last updated January 2024, para 4.1.7

⁷⁴ [Schedule 7A of the Town and Country Planning Act 1990](#), as inserted by [Schedule 14 of the Environment Act 2021](#)

⁷⁵ DLUHC and MHCLG, [Natural environment](#), last updated July 2019, para 20

⁷⁶ Defra, [Collection: Biodiversity net gain](#), November 2023; Defra, [Statutory biodiversity metric tools and guides](#), last updated December 2023

⁷⁷ [Schedule 15 of the Environment Act 2021](#); Defra, [Consultation on Biodiversity Net Gain regulations and implementation](#), last updated February 2023

3 Planning policy for solar farms in the devolved administrations

Planning is a devolved matter. Decision-making arrangements for planning permission for solar farms differ across the UK, as set out below.

3.1 Wales

In Wales, solar farms will either require planning permission from the local planning authority (LPA), planning permission from Welsh ministers, or development consent from the UK Secretary of State for Energy Security and Net Zero, depending on their size:

- Solar farms with a generating capacity below 10 MW require planning permission from the LPA. Solar systems below 50 kW are covered by permitted development rights and do not need planning permission.
- Under the [Planning \(Wales\) Act 2015](#), solar farms between 10 MW and 350 MW are classed as ‘developments of national significance’ (DNSs). They need planning permission from Welsh ministers.⁷⁸
- Solar farms with a generating capacity above 350 MW are considered ‘nationally significant infrastructure projects’ (NSIPs) and require development consent from the UK Secretary of State for Energy Security and Net Zero under [Section 15 of the Planning Act 2008](#).⁷⁹

For further information about the examination and consenting process that DNSs undergo, see briefings by the [Senedd Research Service on developments of national significance](#) (September 2022) and [consenting energy generation infrastructure](#) (June 2023).

Applications for DNSs are decided by Welsh ministers using the same policies that LPAs use on other planning applications. Both decide applications for renewable energy projects, such as solar farms, in line with:

- [Future Wales: the National Plan 2040](#), which is the Welsh Government’s national development framework for Wales.

⁷⁸ [Section 19 of the Planning \(Wales\) Act 2015](#), which added [section 62D to the Town and Country Planning Act 1990](#); [Section 39 of the Wales Act 2017](#)

⁷⁹ [Section 15 of the Planning Act 2008](#)

- [Planning Policy Wales](#), which sets out the Welsh Government’s national planning policy.
- Relevant policies in the local development plan for the area.

Planning policy for solar farms

Policies 17 and 18 of [Future Wales: the National Plan 2040](#) set out the Welsh Government’s policies for renewable energy developments. Future Wales and Planning Policy Wales set out how LPAs and Welsh ministers should determine applications for solar farms:

- Welsh ministers should generally grant planning permission to DNSs subject to certain criteria. For example, projects should not have “an unacceptable adverse impact” on the environment and landscape.⁸⁰
- LPAs should maximise “their area’s full potential for renewable energy generation”. They should consider a proposed project’s contribution to renewable energy targets and to cutting carbon emissions.⁸¹

Policy 17 advises LPAs and Welsh ministers to give “significant weight” to the Welsh Government’s target of generating 70% of its consumed energy from renewable sources by 2030 when determining planning applications.⁸²

Siting on agricultural land in Wales

Planning Policy Wales guides development away from the ‘best and most versatile’ (BMV) agricultural land. It states that LPAs and Welsh ministers should give “considerable weight” to its protection.⁸³ If they find that BMV land needs to be developed, they should direct development to lower-quality over higher-quality land.⁸⁴

In March 2022, the Welsh Government sent a letter to chief planning officers, highlighting that these policies also apply to solar farms. It stated that “it will be necessary to refuse permission” to solar farms on BMV agricultural land “unless other significant material considerations indicate otherwise”.⁸⁵

Proposed reforms to decision-making process

The Welsh Government has said that current approval process for DNSs can be “onerous”. Between April and July 2018, it [consulted on whether to create a bespoke consenting process](#) for major infrastructure projects, similar to the

⁸⁰ Welsh Government, [Future Wales: The National Plan 2040](#), February 2021, policy 18,

⁸¹ Welsh Government, [Planning policy Wales](#), last updated February 2021, para 5.9.19

⁸² Welsh Government, [Future Wales: The National Plan 2040](#), February 2021, policy 17, page 95

⁸³ Welsh Government, [Planning policy Wales](#), last updated February 2021, paras 3.58 and 3.59

⁸⁴ Welsh Government, [Planning policy Wales](#), last updated February 2021, paras 3.58-3.60

⁸⁵ Welsh Government, Dear Chief Planning Officer (CPO) letters: [Best and most versatile agricultural land and solar PV arrays](#), March 2022

development consent process for NSIPs in England.⁸⁶ It proposed a ‘one-stop-shop’ process, where all relevant consents can be obtained as one package.⁸⁷

In June 2023, the Welsh Government introduced the [Infrastructure \(Wales\) Bill](#). The Bill would replace the DNS regime with a “unified system” for major infrastructure projects.⁸⁸ Solar farms with a generating capacity between 50 MW and 350 MW would be classed as ‘significant infrastructure projects’ (SIPs) and require ‘infrastructure consent’ from Welsh ministers.

The application and approval process for SIPs in Wales would be similar to the NSIP regime in England (which also applies to solar farms with a capacity over 50 MW). Welsh Ministers would appoint a person or panel, likely to be [Planning and Environment Decisions Wales](#), to carry out an examination of the project. The final decision would, in most cases, rest with Welsh ministers.

Welsh ministers would decide applications in line with [Future Wales: the National Plan 2040](#) and any relevant ‘infrastructure policy statement’ (yet to be drawn up).

For further information, see briefings by Senedd Research Service linked on its [resource page on the Infrastructure \(Wales\) Bill](#) and information provided by the Senedd’s [Climate Change, Environment and Infrastructure Committee](#).

3.2

Scotland

In Scotland, unlike in Wales, the UK Government is not involved in decision-making on planning applications for solar farms regardless of their size.

- Solar farms with a generating capacity above 50 MW require energy consent from Scottish ministers under [section 36 of the Electricity Act 1989](#).⁸⁹ They are also classed as ‘national developments’ (as defined in the Scottish Government’s [National Planning Framework 4 \(NPF4\)](#)).⁹⁰
- All other applications for solar farms are made to, and decided by, the relevant planning authority.⁹¹ In Scotland, there is a distinction between ‘local’ and ‘major’ developments:

⁸⁶ Welsh Government, [Changes to the approval of infrastructure development](#), last updated July 2018

⁸⁷ Written Statement [[Introduction of the Infrastructure \(Wales\) Bill](#)] 12 June 2023

⁸⁸ Welsh Parliament/Senedd Cymru, [Infrastructure \(Wales\) Bill](#), June 2023; Welsh Government, [Infrastructure \(Wales\) Bill 2023](#), June 2023

⁸⁹ [Section 36 of the Electricity Act 1989](#); Scottish Government, Energy and Climate Change Directorate, [Energy infrastructure: Energy consents](#), undated [accessed 8 February 2024]

⁹⁰ Scottish Government, [National Planning Framework 4](#), February 2023, Annex B

⁹¹ [Town and Country Planning \(Scotland\) Act 1997](#)

- Solar farms with a generating capacity above 20 MW are considered major developments. They are decided by the relevant LPA but require a pre-application consultation with the local community.
- Solar farms with a capacity up to 20 MW are ‘local’ developments.⁹²

The designation of solar farms (and other renewable energy projects) with a generating capacity over 50 MW as ‘national developments’ means that “the principle of the[ir] development does not need to be agreed”, in other words, that there is a presumption in favour of granting consent. However, national development status does not mean that planning permission for a project is automatically granted. All relevant consents are still required.⁹³

Planning policy for solar farms

In deciding applications for solar farms, planning authorities are guided by the Scottish Government’s [National Planning Framework 4](#) (NPF4).

The NPF4 instructs planning authorities to “encourage, promote and facilitate all forms of renewable energy development” to support the transition to net zero. When deciding planning applications, planning authorities should place “significant weight” on contribution of a proposal to renewable energy and emissions targets.⁹⁴

The NPF4 also sets out which other factors planning authorities should consider when deciding planning applications for renewable energy projects. These include, for example, the impact of a development on designated areas (such as National Scenic Areas or Nature Reserves), the natural environment, biodiversity and birds, and local communities and residential amenity.⁹⁵

Siting on agricultural land in Scotland

The NPF4 is supported by Planning Advice Notes. A [note on solar arrays](#) (May 2013) sets out in detail which factors planning authorities should consider when assessing applications for solar farms on roofs and open sites.⁹⁶

Like planning guidance in the rest of the UK, the NPF4 guides development away from prime agricultural land. The NPF4 states, however, that planning authorities in Scotland may support development on prime agricultural land if it is “for the generation of energy from a renewable source” and if their layout and design minimise the amount of prime agricultural land used.⁹⁷

⁹² Regulation 2 of the [Town and Country Planning \(Hierarchy of Development\) \(Scotland\) Regulations 2009](#)

⁹³ [Section 36 of the Electricity Act 1989](#); Scottish Government, Energy and Climate Change Directorate, [Energy infrastructure: Energy consents](#), undated [accessed 8 February 2024]

⁹⁴ Scottish Government, [National Planning Framework 4](#), February 2023, policy 11

⁹⁵ Scottish Government, [National Planning Framework 4](#), February 2023, policy 11

⁹⁶ Scottish Government, [Large photovoltaic arrays: planning advice](#), May 2013

⁹⁷ Scottish Government, [National Planning Framework 4](#), February 2023, policy 5b

3.3

Northern Ireland

In Northern Ireland, as in Scotland, there is a hierarchy of developments depending on their size: ‘regionally significant’, ‘major’ and ‘local’.

- Solar farms with a generating capacity above 30 MW may be considered ‘regionally significant’ developments.⁹⁸ Whether a solar farm of that size is regionally significant is decided by the Department for Infrastructure:
 - Applicants are required to consult the department. If a project is “significant to the whole or a substantial part of Northern Ireland”, the application is determined by the department.⁹⁹
- All other applications for solar farms with a generating capacity below 30 MW are made to, and would usually be determined by, the LPA.
 - Solar farms with a generating capacity between 5 MW and 30 MW are ‘major’ developments.¹⁰⁰ They are usually determined by the LPA, but the department can use its ‘call-in powers’ to decide them.¹⁰¹
 - Solar farms with a capacity below 5 MW are ‘local’ developments.

Planning policy for solar farms

In determining planning applications, the Department for Infrastructure and LPAs are guided by the department’s [Strategic Planning Policy Statement \(SPPS\)](#) and the [Regional Development Strategy for Northern Ireland 2035](#).¹⁰²

The SPPS states that planning system should aim to “to facilitate the siting of renewable energy generating facilities in appropriate locations [...] in order to achieve Northern Ireland’s renewable energy targets”.¹⁰³ It advises LPAs (and the department) that they should give planning permission to renewable energy projects that will not result in an “unacceptable adverse impact” on visual amenity, landscape character, and nature conservation.¹⁰⁴

⁹⁸ [Schedule of the Planning \(Development Management\) Regulations \(Northern Ireland\) 2015](#); Department for Infrastructure (Dfi), [Development Management Practice Notes: Practice Note 01: Hierarchy of developments](#) (PDF), December 2018

⁹⁹ [Section 26 of the Planning Act \(Northern Ireland\) 2011](#); Dfi, [Development Management Practice Notes: Practice Note 01: Hierarchy of developments](#) (PDF), December 2018

¹⁰⁰ [Schedule of the Planning \(Development Management\) Regulations \(Northern Ireland\) 2015](#),

¹⁰¹ Dfi, [Strategic Planning Policy Statement](#), last updated May 2023, para 5.45

¹⁰² Dfi, [Regional Development Strategy 2035](#), March 2012; Dfi, [Strategic Planning Policy Statement](#), last updated May 2023

¹⁰³ Dfi, [Strategic Planning Policy Statement](#), last updated May 2023, para 6.218

¹⁰⁴ Dfi, [Strategic Planning Policy Statement](#), last updated May 2023, paras 6.214-6.234

Siting on agricultural land in Northern Ireland

The SPPS states that one important material consideration when determining planning applications is whether a proposed project will cause the permanent loss of BMV agricultural land.¹⁰⁵

Proposed reforms to planning policy

Between April and June 2023, the [Department for Infrastructure consulted on revisions to the policies on renewable and low carbon energy](#) in the SPPS. The changes intend to align planning policies with the Northern Ireland Executive's Energy Strategy and the Climate Change (Northern Ireland) Act 2022. The Act set a target of generating 80% of electricity consumed in Northern Ireland from renewable sources by 2030.¹⁰⁶

The updated SPPS would advise LPAs that, when drawing up their local plans and deciding planning applications, they should take “full account” of the target. They should “positively facilitate” renewable energy developments in “appropriate locations”. In areas that LPAs have identified as “appropriate” in their local plans, a there would be a presumption in favour of granting planning permission for renewable energy developments.¹⁰⁷

Existing protections for BMV agricultural land would continue to apply under the updated SPPS.¹⁰⁸ The updated SPPS would state that LPAs should promote the use of previously developed land for solar farms in the countryside.

¹⁰⁵ DfI, [Strategic Planning Policy Statement](#), last updated May 2023, para 6.321

¹⁰⁶ DfI, [Review of Regional Strategic Planning Policy on Renewable and Low Carbon Energy - Public Consultation](#), last updated June 2023

¹⁰⁷ DfI, [Revised Regional Strategic Planning Policy: Consultation draft](#) (PDF), April 2023, paras 1.6-1.9

¹⁰⁸ DfI, [Revised Regional Strategic Planning Policy: Consultation draft](#) (PDF), April 2023, para 1.17

4 Impact of solar farms on farming and biodiversity

4.1 Use of agricultural land for solar farms

Conservation groups

Some organisations have expressed concerns about the siting of solar farms on agricultural land and its implications for food security. They have called on the government to restrict the use of agricultural land and redirect solar development to previously developed (brownfield) land and rooftops.

For example, CPRE (formerly the Council for the Protection of Rural England) expressed concern that “valuable farmland” is often “the location of choice for solar developments”.¹⁰⁹ It argued that “it is essential to preserve our most productive agricultural land” for farming purposes and food production.¹¹⁰

Campaign groups formed in opposition to solar farms in their local area also cite the use of agricultural land and the impact of solar panels on the rural landscape as one of the reasons for their opposition.¹¹¹ The Solar Campaign Alliance, an umbrella organisation of these campaign groups, argued that developers often choose “inappropriate sites” for solar farms.¹¹²

These organisations have questioned whether agricultural land needs to be used to meet the government’s renewable energy targets.¹¹³ CPRE has argued that there is sufficient space for solar panels on rooftops, brownfield land and car parks to meet the UK’s target for solar power.¹¹⁴

Renewable energy groups

Renewable energy groups, such as Solar Energy UK, have argued that “solar farms pose no threat to the UK’s food security”. Even under the government’s proposed fivefold deployment in solar power by 2035, Solar Energy UK said that solar farms would have “minimal if any impact” on food security.¹¹⁵

¹⁰⁹ CPRE, [CPRE statement on solar energy](#), February 2022

¹¹⁰ CPRE, [Building on our food security](#), July 2022

¹¹¹ EAC, [Written evidence: Onshore solar energy](#) (PDF), OSE0015 [Mallard Pass Action Group]; EAC, [Written evidence: Onshore solar energy](#) (PDF), OSE0051 [[Say No to Sunnica Action Group]

¹¹² EAC, [Written evidence: Onshore solar energy](#) (PDF), OSE0033 [Solar Campaign Alliance]

¹¹³ CPRE, [Shout from the rooftops: delivering a common sense solar revolution](#), 23 May 2023

¹¹⁴ CPRE, [Unleash rooftop solar to tackle energy crisis, we urge Chancellor](#), November 2022

¹¹⁵ EAC, [Written evidence: Onshore solar energy](#) (PDF), OSE0001 [Solar Energy UK]

Solar Energy UK said that, by helping to tackle climate change, solar farms could help address “the biggest challenge to food security” in the UK.¹¹⁶

Wildlife and Countryside Link, an environment and wildlife protection group, also said that it considered solar farms to have “an insignificant impact on agricultural land” compared with other types of development. It said that solar farms did not “remotely pose enough of a threat to food security as the other issues identified” (such as building development).¹¹⁷

Renewable energy groups highlight that, in line with national planning policy, developers usually select brownfield land or lower-quality land.¹¹⁸ They have argued, however, that most grade 4 and grade 5 land is in remote locations which are not suitable for solar farms and that there are limited opportunities to build solar farms on brownfield land at the scale required.¹¹⁹

Solar Energy UK and the Solar Power Portal have also highlighted that LPAs can attach conditions to planning permission to require land to be returned to agricultural use once a solar farm is decommissioned. They have argued that solar farms could have benefits for arable land, giving the soil “a break from intensive cultivation” and allowing it to recover.¹²⁰

Agricultural sector

The National Farmers’ Union (NFU) has called for “a balance to ensure we can continue to produce quality, sustainable food [...] while also delivering our net zero ambition”.¹²¹ It said that “ideally” solar farms should be located on lower-quality land, avoiding the use of BMV land.¹²² However, it noted that “in some parts of the UK”, such as in Lincolnshire, using lower-quality land “may not always be practical” because most of the land is good quality.¹²³

4.2

How much farmland is used for solar power?

It is not possible to calculate how much agricultural land, including how much BMV land, in England is currently used for solar farms because:

¹¹⁶ Solar Energy UK, [Solar Farms & Food Security: The Facts](#), September 2022

¹¹⁷ Environment, Food & Rural Affairs (EFRA) Committee, [Written evidence: Food security](#) (PDF), HC 622 2021-22, FS0046 [Wildlife & Countryside Link]

¹¹⁸ Solar Power Portal, [Balancing energy security with food security on solar farms](#), July 2022

¹¹⁹ EAC, [Written evidence: Onshore solar energy](#) (PDF), OSE0010 [Enso Energy Ltd]; EAC, [Written evidence: Onshore solar energy](#) (PDF), OSE0039 [JBM Solar]

¹²⁰ Solar Energy UK, [Natural Capital Best Practice Guidance](#), May 2022; Solar Energy UK, [Solar Farms & Food Security: The Facts](#), September 2022

¹²¹ EAC, [Written evidence: Onshore solar energy](#) (PDF), OSE0064 [National Farmers Union, NFU]

¹²² [Petition launched to stop solar farms on productive farmland](#), Farmers Weekly, 27 January 2022 [accessed 31 July 2023]; NFU, [Solar photovoltaic electricity in agriculture](#), December 2021

¹²³ NFU, [Solar photovoltaic electricity in agriculture](#), December 2021

- The government's [renewable energy planning database](#) has data on the capacity (in MW) and location of solar systems that are given planning permission. However, the total area of solar systems is not recorded.
 - It is not possible to calculate the exact area a solar farm covers based on its capacity, because this will differ depending on the spacing between panels, the efficiency of the technology used, and whether the solar farm is co-located with battery storage.
- The [agricultural land classification \(ALC\) dataset published by Natural England](#) does not distinguish between grade 3a (good quality BMV land) and grade 3b (moderate quality land that is not BMV land). It is therefore not possible to map the location of grade 3a and 3b land in England.¹²⁴
 - Natural England last updated its ALC maps in the 1980s and, therefore, they are not always accurate.¹²⁵
 - Many fields often contain a mix of different grades.¹²⁶ Where a solar farm may affect BMV land, site-specific surveys may be required to determine whether the land is 3a or 3b grade land.¹²⁷

CPRE has criticised the lack of available data to assess the impact of solar farms on agricultural land and lack of monitoring of the use of BMV land.¹²⁸

Estimating the amount of land used for solar farms

Several organisations have attempted to estimate how much land, including how much BMV land, is currently used for solar farms and how much land is required to meet the government's target for solar power (70 GW by 2035).

In its report on [Building on our food security](#) (July 2022), CPRE estimated that 14,000 hectares of BMV land in England have been developed since 2010 (0.6% of total BMV land). Of these, 1,400 hectares are used for renewable energy projects, such as solar farms.¹²⁹

To meet the government's target of 70 GW of solar power by 2035, CPRE estimated that between 0.9% and 1.4% of all the land in England (180,000 hectares or 1,800 square kilometres)¹³⁰ would be required. In this analysis,

¹²⁴ EAC, [Written evidence: Onshore solar energy](#) (PDF), OSE0017 [Origin Power Services]

¹²⁵ EAC, [Oral evidence: Onshore solar energy](#) (PDF), HC 856, 11 January 2023, Q66-Q67 [Dr Armstrong]

¹²⁶ EAC, [Written evidence: Onshore solar energy](#) (PDF), OSE0035 [SSE Energy Solutions]

¹²⁷ EAC, [Oral evidence: Onshore solar energy](#) (PDF), HC 856, 11 January 2023, Q68 [Paul Miner, CPRE]

¹²⁸ CPRE, [Building on our food security](#), July 2022

¹²⁹ CPRE, [Building on our food security](#), July 2022. CPRE relied on data produced by Natural England in 1966 which categorises BMV land into grade 1, 2 and 3 (but does not provide subdivisions of grade 3). It also used data produced by Natural England since 1988 which distinguishes between grade 3a or 3b land. However, that dataset only provides data for around 3% of all grade 3 land.

¹³⁰ There are 100 hectares in 1 square kilometre. 1 hectare is equal to around 2.5 acres.

CPRE did not set out how much agricultural land (or how much BMV land) compared to other types of land would be required.¹³¹

Solar Energy UK estimated that, assuming an average of six acres (around 2.4 hectares) are needed per MW of solar power, existing solar farms which have a total capacity of 10 GW currently cover around 230 square kilometres in the UK. This amounts to 0.1% of the UK's total land area.

Solar Energy UK also estimated that, to meet the government's target of 70 GW of solar power by 2035, further 464 square kilometres would be required for new solar farms. For this analysis, it assumed that ground-mounted solar farms will account for around two thirds of the required increase (or 38 GW) and new solar farms would need three acres (around 1.2 hectares) per MW.¹³²

In total, Solar Energy UK estimated that around 700 square kilometres of land in the UK (0.3% of the UK's total land area) would host solar farms in 2035.

Carbon Brief, a news website focusing on climate change and energy policies, estimated that if these 700 square kilometres were used to grow wheat, "this would account for just 4% of the UK's annual wheat yield". It concluded that the impact of solar farms on food production would be small.¹³³

Evidence provided by the University of Sheffield, Open Climate Fix (a computer research lab focused on reducing emissions) and Exawatt (a renewable resources consultancy) to the Environmental Audit Committee noted that land in certain areas is better suited for solar panels:

To achieve 70 GW (approximately 5 times the current capacity) we assume that between 5 and 7 times the current area occupied by solar PV will be required. Current land use by PV is 24,400 ha [hectares] or 0.1% of the total land in the UK. Scaling up between 5 and 7 times leads to between 125,000 ha and 175,000 ha being needed (or 0.5 to 0.7 % of the total land).

[...] Ground-mounted solar parks will not be evenly distributed across the UK, so while 0.5 to 0.7% of the total UK land area may be considered small, this land use change will be concentrated in some areas e.g. south England.¹³⁴

University of Sheffield, Open Climate Fix and Exawatt also estimated to what extent agriculture land of differing qualities overlapped with the ease with which solar developments could gain access to grid connections.

The found that over half of grade 1 and 2 agricultural land (excellent and very good quality land that is considered BMV land) were suitable for solar farms

¹³¹ CPRE, [Shout from the rooftops: delivering a common sense solar revolution](#), 23 May 2023

¹³² Solar Energy UK, [Solar Farms & Food Security: The Facts](#), September 2022; EAC, [Additional written evidence: Onshore solar energy](#) (PDF), OSE0075 [Solar Energy UK]

¹³³ Carbon Brief, [Factcheck: Is solar power a 'threat' to UK farmland?](#), 25 August 2022. Carbon Brief based these estimates on [farming statistics published by Defra in 2020](#) (PDF), which show that one hectare of land produces around eight tonnes of wheat based on a five-year average (2015 to 2020) and [estimates of UK wheat production](#), published by Defra in 2021.

¹³⁴ EAC, [Written evidence: Onshore solar energy](#) (PDF), OSE0040 [Exawatt, Open Climate Fix, University of Sheffield]

based on the ease of gaining a grid connection. Using the same metric, 44% of grade 3 land (moderate and good quality land) and a third of grade 4 land (poor quality land that is not BMV land) would be suitable for solar farms.¹³⁵

4.3 Use of land for both agricultural production and solar power

Questions about competing land use are not unique to the UK and have also arisen in other countries. Researchers have explored whether it is possible to use land both to generate solar power and for agricultural purposes. The multi-functional use of land for solar power and agricultural production is called “agrivoltaics”. Examples of multi-functional land uses include:

- Some lower-growing crops that are usually harvested by hand, such as berries, lettuce or tomatoes, could be planted underneath solar panels.
- Certain animals, such as sheep, could graze between or underneath raised solar panels.¹³⁶

A two-year trial in Germany found that crops grown underneath solar panels were “qualitatively good and marketable”.¹³⁷ On average, however, they resulted in a lower yield than crops grown on a plot without solar panels.¹³⁸

Not all crops are suited to being grown in the shade of solar panels. While some crops such as lettuce can adapt to reduced light conditions, the shade of solar panels could decrease the yield of other crops such as wheat.¹³⁹

To accommodate crops and allow farming equipment to pass through, solar panels may also need to be spaced further apart or moveable. As a result, crop yields and power production may be reduced on land used for both than land used solely for either. However, the overall productivity of the land might still be improved by using it for both power production and farming.¹⁴⁰

Most research carried out to date has used modelling techniques rather than experiments and focused on smaller-sites and lower-growing, shade-tolerant

¹³⁵ EAC, [Written evidence: Onshore solar energy](#) (PDF), OSE0040 [Exawatt, Open Climate Fix, University of Sheffield]

¹³⁶ Claude Grison and others, [Photovoltaism, Agriculture and Ecology : From Agrivoltaism to Ecovoltaism](#), 2022

¹³⁷ Fraunhofer ISE, [Agrophotovoltaics: Harvesting the Sun for Power and Produce](#), December 2017

¹³⁸ Axel Weselek and others, [Agrivoltaic system impacts on microclimate and yield of different crops within an organic crop rotation](#), *Agronomy for Sustainable Development*, 2021, Vol 41(59)

¹³⁹ Axel Weselek and others, [Agrophotovoltaic systems: applications, challenges, and opportunities. A review](#), *Agronomy for Sustainable Development*, 2019, Vol 39

¹⁴⁰ Anthropocene Magazine, [Doubling up crops with solar farms could increase land-use efficiency by as much as 60%](#), December 2017

crops.¹⁴¹ Researchers have called for further studies on agrivoltaics, including to determine its potential role in the UK.¹⁴²

Stakeholder views

Renewable energy groups, such as the Solar Power Portal and Solar Energy UK, have pointed to agrivoltaics to highlight that power production and farming are not necessarily mutually exclusive. Solar Energy UK also noted that using some of their land to generate solar power could provide farmers with “a reliable source of additional income”.¹⁴³

The NFU has also expressed support for multi-purpose land uses, for example grazing sheep on solar farms, to address competing land pressures.¹⁴⁴

Other groups, however, have argued that agrivoltaics is not a viable solution.

For example, CPRE Hertfordshire said grazing sheep underneath solar panels was only a “token gesture” that could not compensate for the “lost potential of the land”.¹⁴⁵ The National Association of Local Councils, which represents the interests of parish and town councils, argued that the “chemicals used to clean the solar panels” would render the land underneath them unusable.¹⁴⁶

4.4

Impact of solar farms on biodiversity

Some organisations have also raised concerns about the impact of solar farms on biodiversity. For example, CPRE Hertfordshire argued that solar farms “can impact detrimentally on biodiversity and wildlife” as they may prevent “the movement of animals” and restrict “wildlife corridors”.¹⁴⁷

Solar Energy UK has said, however, that well designed and maintained solar farms could offer opportunities to improve biodiversity. Its [Natural Capital Best Practice Guidance](#) encourages developers to create wildflower meadows and grasslands on their solar farms to increase the abundance and variety of plants and boost the populations of pollinating insects and birds.¹⁴⁸

¹⁴¹ Al Mamun et al [A review of research on agrivoltaic systems](#), Renewable and Sustainable Energy Reviews, 2022, Vol 161

¹⁴² EAC, [Written evidence: Environmental change and food security](#) (PDF), ECFS0054 [Grantham Research Institute on Climate Change and the Environment]

¹⁴³ Solar Energy UK, [Solar farms and food security: The Facts](#), September 2022; Solar Power Portal, [Balancing energy security with food security on solar farms](#), 26 July 2022

¹⁴⁴ Lords Land use in England Committee, [Written evidence: Land use in England](#) (PDF), LUE0049 [NFU]; NFU, [Solar photovoltaic electricity in agriculture](#), December 2021

¹⁴⁵ CPRE Hertfordshire, [The problem with solar farms](#) (PDF), October 2021

¹⁴⁶ Lords Land use in England Committee, [Written evidence: Land use in England](#) (PDF), LUE0081 [National Association of Local Councils]

¹⁴⁷ CPRE Hertfordshire, [Solar energy installations in the countryside](#) (PDF), September 2021

¹⁴⁸ Solar Energy UK, [Natural Capital Best Practice Guidance](#), May 2022

Solar Energy UK has also said that habitat improvements on solar farms could also have potential benefits for nearby agricultural land.¹⁴⁹

Small-scale solar farms that are granted planning permission by LPAs will be required to deliver 10% biodiversity net gain from February 2024, under duties introduced by the [Environment Act 2021](#).¹⁵⁰ The same requirement will apply to large-scale solar farms that are granted development consent under the NSIP regime by November 2025.¹⁵¹

Management of solar farms to encourage biodiversity

Researchers have also explored whether planting wildflowers or hedgerows or adopting other land management practices on solar farms could benefit biodiversity in an area. Reviews of these studies suggest that these measures have “considerable potential” to enhance the biodiversity of pollinators (such as bees and butterflies) in an area. They also suggest that the shading that solar panels provide could benefit vegetation and promote insect diversity.¹⁵²

For example, a study carried out by two ecological consulting groups which compared changes in biodiversity on eleven solar farms in southern England to a nearby “control plot” found that greater diversity of plants and birds and a greater abundance of butterflies and bumblebees on the solar farms.¹⁵³

The solar farms and the control plots in the study were managed differently, however. The solar farms had been seeded with wildflower mixes, plants that intend to attract pollinators (such as bumblebees) or a grazing mixes suitable for grazing for sheep. The control plots were used to grow crops or grass for livestock. The researchers stated that “the purpose of the control plot was to give an indication of wildlife levels before the solar farm was constructed”.¹⁵⁴

In general, researchers have noted the practice of restoring habitats on solar farms is “still relatively new” and, therefore, there is not yet “strong evidence of the long-term impacts on pollinators” and other biodiversity measures.¹⁵⁵

¹⁴⁹ Solar Energy UK, [Solar Habitat: A Look into ecological trends on solar farms in the UK](#), June 2023

¹⁵⁰ [Schedule 7A of the Town and Country Planning Act 1990](#), as inserted by [Schedule 14 of the Environment Act 2021](#)

¹⁵¹ [Schedule 15 of the Environment Act 2021](#); Defra, [Consultation on Biodiversity Net Gain regulations and implementation](#), last updated February 2023

¹⁵² Hollie Blaydes and others, [Opportunities to enhance pollinator biodiversity in solar parks](#), Renewable and Sustainable Energy Reviews, 2021, Vol 145; Leroy Walston and others, [Opportunities for agrivoltaic systems to achieve synergistic food-energy-environmental needs and address sustainability goals](#), Frontiers in Sustainable Food Systems, 2022, Vol 6

¹⁵³ The term “diversity” is used to describe the number of different species present at a site. The term “abundance” is used to describe the number of individuals present at a site.

¹⁵⁴ Clarkson and Woods and Wychwood Biodiversity, [The effects of solar farms on local biodiversity: A comparative study](#) (PDF), April 2016

¹⁵⁵ Hollie Blaydes and others, [Opportunities to enhance pollinator biodiversity in solar parks](#), Renewable and Sustainable Energy Reviews, 2021, Vol 145; Leroy Walston and others, [Opportunities for agrivoltaic systems to achieve synergistic food-energy-environmental needs and address sustainability goals](#), Frontiers in Sustainable Food Systems, 2022, Vol 6

4.5

Committee reports and government response

Expanding the definition of BMV land

The use of agricultural land for solar farms was raised in the Conservative Party leadership campaign in the summer of 2022.¹⁵⁶ In October 2022, the Guardian reported that the government under Prime Minister Liz Truss was considering expanding the definition of BMV land to also include grade 3b “moderate quality” agricultural land.¹⁵⁷

In its 2023 report [Accelerating the transition from fossil fuels and securing energy supplies](#) (PDF), the Environmental Audit Committee questioned whether the government would be able to achieve its target of 70 GW of solar power by 2035 if it limited the land available for solar installations. It stated:

We recognise that the Government must balance the needs of energy security with biodiversity protection and food production. Nevertheless, moves to limit the land available for solar installations will make it harder to achieve the Government’s stated ambition in the British Energy Security Strategy to increase solar capacity to 70GW by 2035.¹⁵⁸

In March 2023, the government under Rishi Sunak confirmed that it would not “be making changes to categories of agricultural land in ways that might constrain solar deployment”. It said that energy security and climate change goals could be achieved while also maintaining food security for the UK:

Solar and farming can be complementary, supporting each other financially, environmentally and through shared use of land. [...] meeting energy security and climate change goals is urgent and of critical importance to the country, and that these goals can be achieved together with maintaining food security for the UK. [...]

The government will therefore not be making changes to categories of agricultural land in ways that might constrain solar deployment.¹⁵⁹

Calls for a land use framework

In its report on [Making the most out of England’s land](#) (PDF, December 2022), the Lords Land Use Committee called on the government to develop a land use framework to identify what land should be used for which purposes.¹⁶⁰

¹⁵⁶ [Rishi Sunak: We won’t lose our best farmland to solar panels](#), The Telegraph, 18 August 2022 [accessed 17 July 2023]; [‘Our fields shouldn’t be full of solar panels’: Truss vows to crackdown on renewables development](#), Business Green, 2 August 2022 [accessed 17 July 2023]

¹⁵⁷ [Ministers hope to ban solar projects from most English farms](#), The Guardian, 10 October 2022 [accessed 17 July 2023]

¹⁵⁸ EAC, [Accelerating the transition from fossil fuels and securing energy supplies](#) (PDF), HC 109, Fourth Report of Session 2022-23, January 2023, para 100

¹⁵⁹ DESNZ, [Powering Up Britain: Energy Security Plan](#), last updated April 2023

¹⁶⁰ Lords Land Use Committee, [Making the most out of England’s land](#), HL Paper 105, Report of Session 2022-23, December 2022, para 156

The committee noted that, although the NPPF discourages the development of BMV land, “too many exceptions are being made”. It recommended that the government should put in place “stricter regulations [...] to prevent the development of solar farms on BMV land” and adopt “a consistent policy” to promote the installation of solar panels on the rooftops of buildings.¹⁶¹

In its response to the committee in April 2023, the government noted its target of a fivefold increase in solar deployment by 2035 would require “sustained growth in both rooftop and ground-mounted capacity”. The government also said it would publish a land use framework in 2023. However, the framework would not “determine [...] where individual activities or uses should or should not be occurring”.¹⁶²

The [independent review of net zero led by Chris Skidmore MP](#) (January 2023) also called on the government to publish a land use strategy. It argued that:

[...] solar farms in the countryside should not be planned piecemeal but in a co-ordinated fashion as part of a Land Use Strategy.¹⁶³

The review also called on the government to remove restrictions on the siting of renewable projects “where applicable”, arguing that these restrictions put an “unnecessary burden” on the planning system. Instead, it recommended that the government should publish new guidance to allow for “case-by-case decisions” on renewable energy projects.¹⁶⁴

In its response to the review, the government restated its commitment to publishing a land use framework in 2023. As set out above, however, the government does not intend to use the framework to prescribe what land should be used for which purposes. It pointed to existing planning guidance (the NPPF and supplementary planning practice guidance), stating that it would not publish further guidance to support case-by-case decisions.¹⁶⁵

At the time of writing (12 February 2024), a land use framework has not yet been published. In January 2024, the government said it would publish the framework “in due course”.¹⁶⁶

¹⁶¹ Lords Land Use Committee, [Making the most out of England’s land](#), HL Paper 105, Report of Session 2022–23, December 2022, para 132

¹⁶² [Government response to the Land Use Committee report ‘Making the most out of England’s land’](#) (PDF), April 2023, para 20; Defra, [Government food strategy](#), June 2022, Executive Summary, para 17

¹⁶³ DESNZ and BEIS, [Independent review of net zero](#) (Skidmore review), January 2023, para 268

¹⁶⁴ DESNZ and BEIS, [Independent review of net zero](#) (Skidmore review), January 2023, para 248

¹⁶⁵ DESNZ, [Independent Review of Net Zero: government response](#), March 2023, para 28 and para 48; Defra, [Government food strategy](#), June 2022, Executive Summary, para 17

¹⁶⁶ PQ HL853 [[Agriculture: Land Use](#)] 4 December 2023

5 Barriers to the expansion of solar power

In a [letter to the Secretary of State for Energy Security and Net Zero](#) (PDF) in May 2023, the Environmental Audit Select Committee noted that solar power could make a “significant contribution” to the decarbonisation of the power sector and to energy security.¹⁶⁷

The committee expressed concern, however, whether the government would be able to meet its ambition of 70 GW of solar power by 2035 “given existing barriers and current rates of deployment”. It stated that “rates of deployment of rooftop solar need to double to reach the 70GW target” by 2035.¹⁶⁸

In its [2023 progress report to Parliament](#), the government’s advisory Climate Change Committee (CCC) also noted that the deployment of solar power was “significantly off track”. To meet the target of 70 GW by 2035, the CCC said that the government would need to support the delivery of “average annual deployment rate of 3.4 GW”.¹⁶⁹

5.1 Lack of grid capacity and difficulty securing grid connections

One of the major barriers to the expansion of solar power are difficulties in securing grid connections (in part because of a lack of grid capacity). To supply power to consumers, energy generators need to be connected to either the transmission or the distribution network. This requires approval from the DNOs, National Grid or both.¹⁷⁰

Renewable energy companies highlighted difficulties connecting to both the transmission and distribution network and that DNOs and National Grid were unable to provide the connections required.¹⁷¹ For example, Solar Energy UK, which represents solar energy companies, found in a survey of its members in 2022 that grid connection issues had delayed at least 40 projects.¹⁷² Energy

¹⁶⁷ EAC, [Letter from the EAC Chair to the Secretary of State for ESNZ](#) (PDF), 4 May 2023

¹⁶⁸ EAC, [Letter from the EAC Chair to the Secretary of State for ESNZ](#) (PDF), 4 May 2023

¹⁶⁹ Climate Change Committee, [2023 Progress Report to Parliament](#), June 2023

¹⁷⁰ Ofgem, [A guide to electricity distribution connections policy](#), April 2014

¹⁷¹ For example: EAC, [Written evidence: Onshore solar energy](#) (PDF), OSE0046 [RWE]; EAC, [Written evidence: Onshore solar energy](#) (PDF), OSE0035 [SSE Energy Solutions]

¹⁷² EAC, [Written evidence: Onshore solar energy](#) (PDF), OSE0001 [Solar Energy UK]

UK, the energy industry's trade association, found that “wait times for grid connections can be more [than] six years, in some cases up to 10 years”.¹⁷³

Renewable energy groups have therefore said that a lack of grid capacity and delays to grid connections had become a “significant source of uncertainty” for developers and added “major costs and delays” to their projects.¹⁷⁴ These groups have called on the government to review the way the grid is planned and developed, stating that the current system was “not fit for purpose”.¹⁷⁵

6 The electricity grid in Great Britain

The electricity grid connects electricity generators and consumers. It is formed of two networks:

- The higher-voltage transmission network, which connects larger power stations to substations. It is operated by National Grid Electricity System Operator (ESO) in Great Britain.
- The lower-voltage distribution network, which connects substations to consumers and also integrates smaller power generators. It is operated by licensed distribution network operators (DNOs).¹⁷⁶

DNOs and National Grid ESO are private companies that own and/or operate a monopoly infrastructure. They are regulated by Ofgem, the government’s regulator of the gas and electricity industry. The Library briefing, [Electricity grids](#), provides further information on the electricity in Great Britain.

The [Energy Act 2023](#) establishes an independent body, the Future System Operator (FSO), to oversee the entire energy system and transfers much of the responsibilities of National Grid ESO role to the FSO.¹⁷⁷ The Library briefing, [Energy Bill 2022-23, parts 4-6: Electricity and gas markets](#), provides further information on the relevant provisions in the Bill.

5.2

Committee report and government response

In its [inquiry into onshore solar energy](#), the Environmental Audit Committee found that three main issues that had emerged:

¹⁷³ DESNZ and BEIS, [Independent review of net zero](#) (Skidmore review), January 2023, para 249

¹⁷⁴ DESNZ and BEIS, [Independent review of net zero](#) (Skidmore review), January 2023, para 249

¹⁷⁵ EAC, [Written evidence: Onshore solar energy](#) (PDF), OSE0017 [Origin Power Services Ltd]

¹⁷⁶ National Grid, [What’s the difference between electricity transmission and distribution?](#), undated [accessed 31 August 2023]

¹⁷⁷ DESNZ and BEIS, [Energy Security Bill factsheet: Future System Operator](#), last updated June 2023; [Part 5 of the Energy Act 2023](#)

- A lack of physical infrastructure, such as cables, transformers and sub-stations, to distribute electricity.
- The queuing system. To be connected to the grid, generators need to make an application to National Grid or the DNO. Developers can make applications for projects that have not yet secured planning permission, which may “clog” the queue with projects that will not be completed.
- A lack of available data on solar installations, which can make it difficult to plan for and invest in grid infrastructure in the right location.¹⁷⁸

In its [report on accelerating the transition from fossil fuels and securing energy supplies](#) (PDF, January 2023), the committee said “upgrading the electricity grid is a crucial prerequisite to the achievement of net zero”.¹⁷⁹

In its [letter to the Secretary of State](#) (PDF, May 2023), it recommended that the government should work with National Grid ESO and DNOs to find “short-term solutions to unblock the pipeline of delays” and also deliver “long term fixes to improve grid connections”.¹⁸⁰

The Environmental Audit Committee is currently undertaking a further inquiry, examining what [changes need to be made to the way the grid is managed](#) to decarbonise the UK’s power system and to speed up connection timelines for renewable energy projects. Separately, the Energy Security and Net Zero Committee is undertaking an inquiry on [building a flexible grid for the future](#).

Actions to reduce connection times

In its [Powering Up Britain policy paper](#), the government acknowledged that, in parts of the country, “connection timelines have become a very significant issue” which affected the rapid deployment of renewables. It said that it was “essential that we prevent networks from becoming a blocker to progress”.¹⁸¹

In its response to the committee, the government said workstreams led by the National Grid ESO and the Energy Networks Association, an industry body which represents licensed transmission and distribution network operators, were working on shorter-term reforms to speed up connections to the grid.¹⁸²

The government has also pointed to other actions it is taking to speed up the building of transmission infrastructure and to reduce connection times:

- In November 2023, the government published two action plans, setting out how they intend to accelerate the building of electricity transmission

¹⁷⁸ EAC, [Letter from the EAC Chair to the Secretary of State for ESNZ](#) (PDF), 4 May 2023

¹⁷⁹ EAC, [Accelerating the transition from fossil fuels and securing energy supplies](#) (PDF), HC 109, Fourth Report of Session 2022-23, January 2023, para 108

¹⁸⁰ EAC, [Letter from the EAC Chair to the Secretary of State for ESNZ](#) (PDF), 4 May 2023

¹⁸¹ DESNZ, [Powering Up Britain: Energy Security Plan](#), last updated April 2023

¹⁸² DESNZ, [Letter from the Secretary of State, DESNZ, to the EAC](#) (PDF), 17 May 2023

infrastructure and connections to the electricity network.¹⁸³ In the action plans, the government also responded to [recommendations made by the Electricity Networks Commissioner Nick Winser](#).¹⁸⁴

- Under the Energy Act 2023, the government will establish a new, publicly owned and independent Future System Operator (FSO). The government consulted on its roles between August and October 2023.¹⁸⁵

¹⁸³ DESNZ, [Electricity networks: Transmission acceleration action plan](#), November 2023; DESNZ and Ofgem, [Electricity networks: Connections action plan](#), November 2023

¹⁸⁴ DESNZ, [Accelerating electricity transmission network deployment: Electricity Networks Commissioner's recommendations](#), August 2023

¹⁸⁵ BEIS and DESNZ, [Energy Security Bill factsheet: Future System Operator](#), last updated June 2023; DESNZ, [Future System Operator: Second policy consultation and project update](#), August 2023

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